

From the INTERNATIONAL BUREAU

PCTNOTIFICATION CONCERNING SUBMISSION,
OBTENTION OR TRANSMITTAL
OF PRIORITY DOCUMENT

(PCT Administrative Instructions, Section 411)

To:

CHRISTENSEN, Michael, R.
Knobbe Martens Olson & Bear, LLP
2040 Main Street, 14th Floor
Irvine, CA 92614
ÉTATS-UNIS D'AMÉRIQUE

Date of mailing (day/month/year) 24 March 2016 (24.03.2016)	
Applicant's or agent's file reference SBUX1-384WO	IMPORTANT NOTIFICATION
International application No. PCT/US2016/021449	International filing date (day/month/year) 09 March 2016 (09.03.2016)
International publication date (day/month/year) Not yet published	Priority date (day/month/year) 11 March 2015 (11.03.2015)
Applicant STARBUCKS CORPORATION D/B/A STARBUCKS COFFEE COMPANY	

The applicant is hereby notified of the date of receipt (or of obtaining by the International Bureau) of the priority document(s) relating to all earlier application(s) whose priority is claimed. Unless otherwise indicated by the letters "NR", in the right-hand column or by an asterisk appearing next to the date of receipt, **the priority document concerned was submitted or transmitted to or obtained by the International Bureau in compliance with Rule 17.1(a), (b) or (b-bis)**. This Form replaces any previously issued notification concerning submission, transmittal or obtaining of priority documents.

<u>Priority date</u>	<u>Priority application No.</u>	<u>Country or regional Office or PCT receiving Office</u>	<u>Date of receipt of priority document</u>
11 March 2015 (11.03.2015)	62/131,732	US	20 March 2016 (20.03.2016)

The letters "NR" denote a priority document which, on the date of mailing of this Form, had not yet been received or obtained by the International Bureau in compliance with Rule 17.1(a), (b) or (b-bis). Where the applicant has failed to either submit, request to prepare and transmit, or to request the International Bureau to obtain the priority document within the applicable time limit under that Rule, the attention of the applicant is directed to Rule 17.1(c) which provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.

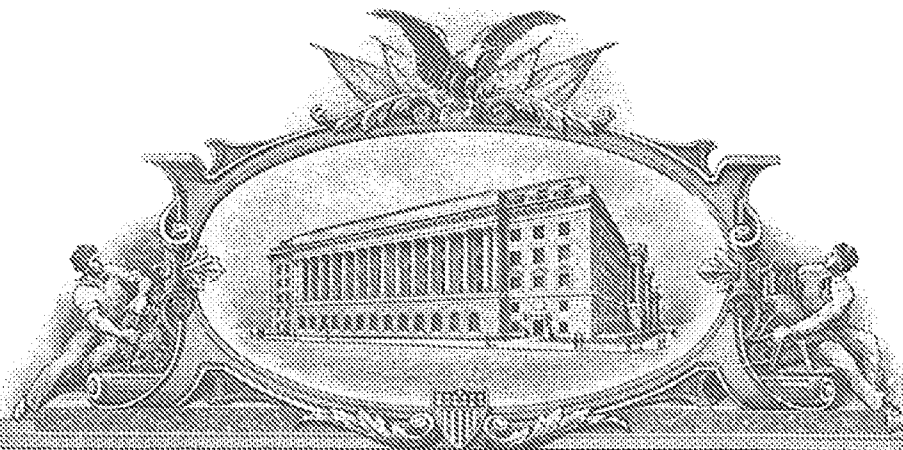
An asterisk "*" next to a date of receipt, denotes a priority document submitted or transmitted to or obtained by the International Bureau but not in compliance with Rule 17.1(a), (b) or (b-bis) (the priority document was received after the time limit prescribed in Rule 17.1(a); the request to prepare and transmit the priority document was submitted to the receiving Office after the applicable time limit under Rule 17.1(b) or the request to the International Bureau to obtain the priority document was made after the applicable time limit under Rule 17.1(b-bis)). Even though the priority document was not furnished in compliance with Rule 17.1(a), (b) or (b-bis), the International Bureau will nevertheless transmit a copy of the document to the designated Offices, for their consideration. In case such a copy is not accepted by the designated Office as the priority document, Rule 17.1(c) provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 89 95	Authorized officer Athina Nickitas-Etienne e-mail pt04.pct@wipo.int Telephone No. +41 22 338 74 04
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DOCUMENT MADE AVAILABLE UNDER THE PATENT COOPERATION TREATY (PCT)

International application number:	PCT/US2016/021449
International filing date:	09 March 2016 (09.03.2016)
Document type:	Certified copy of priority document
Document details:	Country/Office: US
	Number: 62/131,732
	Filing date: 11 March 2015 (11.03.2015)
Date of receipt at the International Bureau:	20 March 2016 (20.03.2016)

Remark: Priority document submitted or transmitted to the International Bureau in compliance with Rule 17.1(a),(b) or (b-bis)



THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

March 19, 2016

THIS IS TO CERTIFY THAT ANNEXED HERETO IS A TRUE COPY FROM THE RECORDS OF THE UNITED STATES PATENT AND TRADEMARK OFFICE OF THOSE PAPERS OF THE BELOW IDENTIFIED PATENT APPLICATION THAT MET THE REQUIREMENTS TO BE GRANTED A FILING DATE.

APPLICATION NUMBER: 62/131,732

FILING DATE: *March 11, 2015*

RELATED PCT APPLICATION NUMBER: *PCT/US16/21449*

THE COUNTRY CODE AND NUMBER OF YOUR PRIORITY APPLICATION, TO BE USED FOR FILING ABROAD UNDER THE PARIS CONVENTION, IS *US62/131,732*



Certified by

Michelle K. Lee

Under Secretary of Commerce
for Intellectual Property
and Director of the United States
Patent and Trademark Office

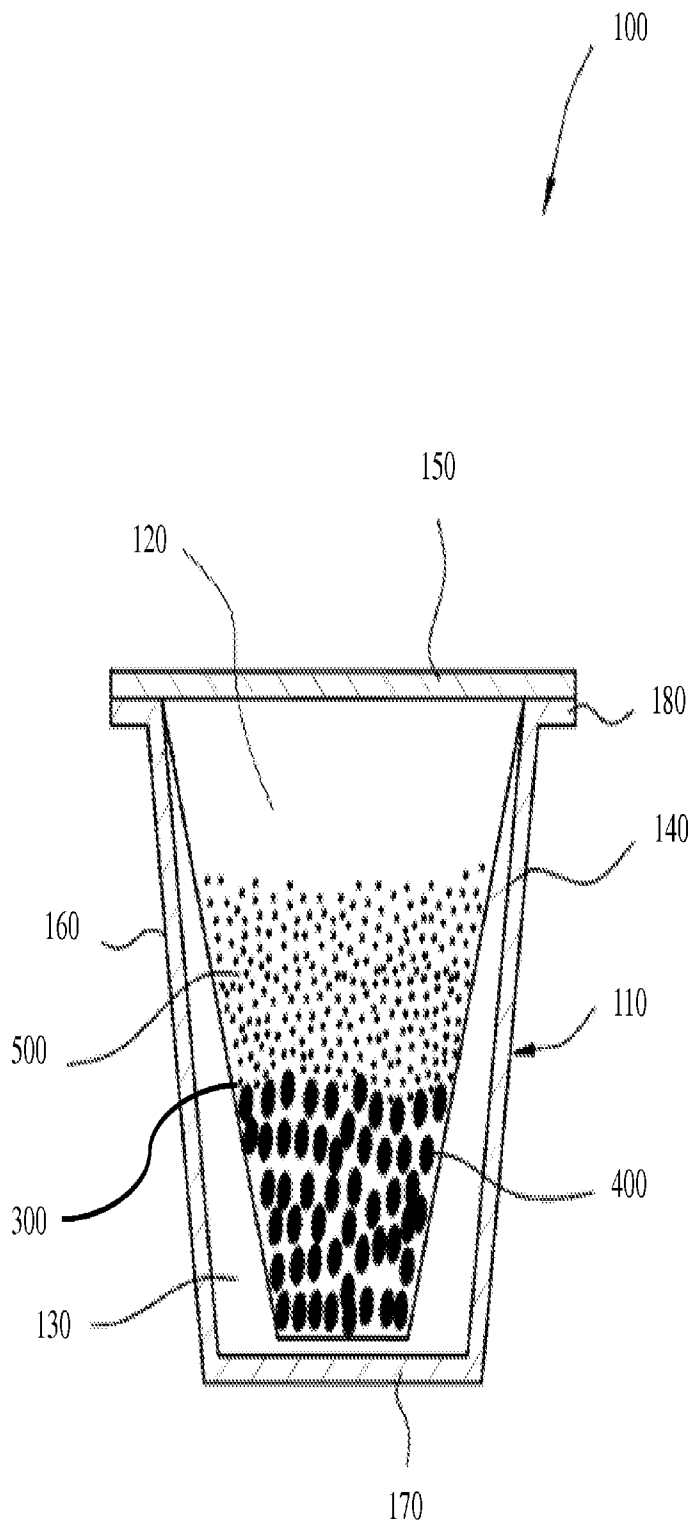


FIG. 1A

100

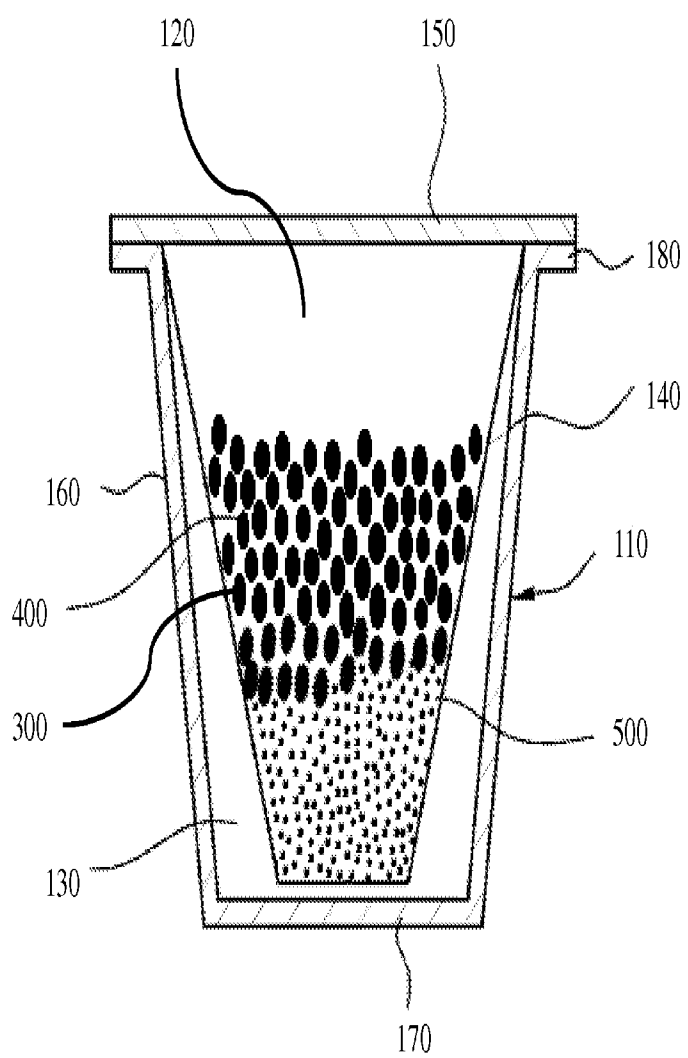


FIG. 1B

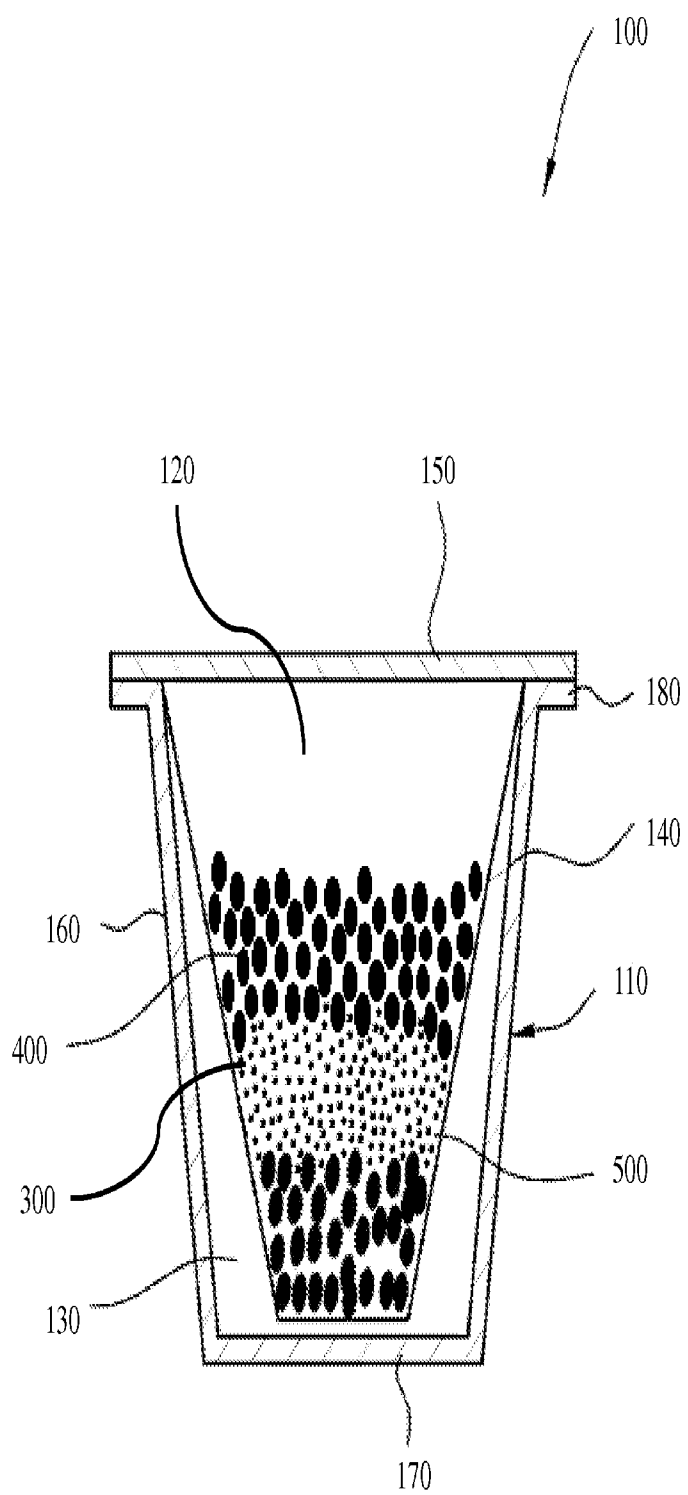


FIG. 1C

100

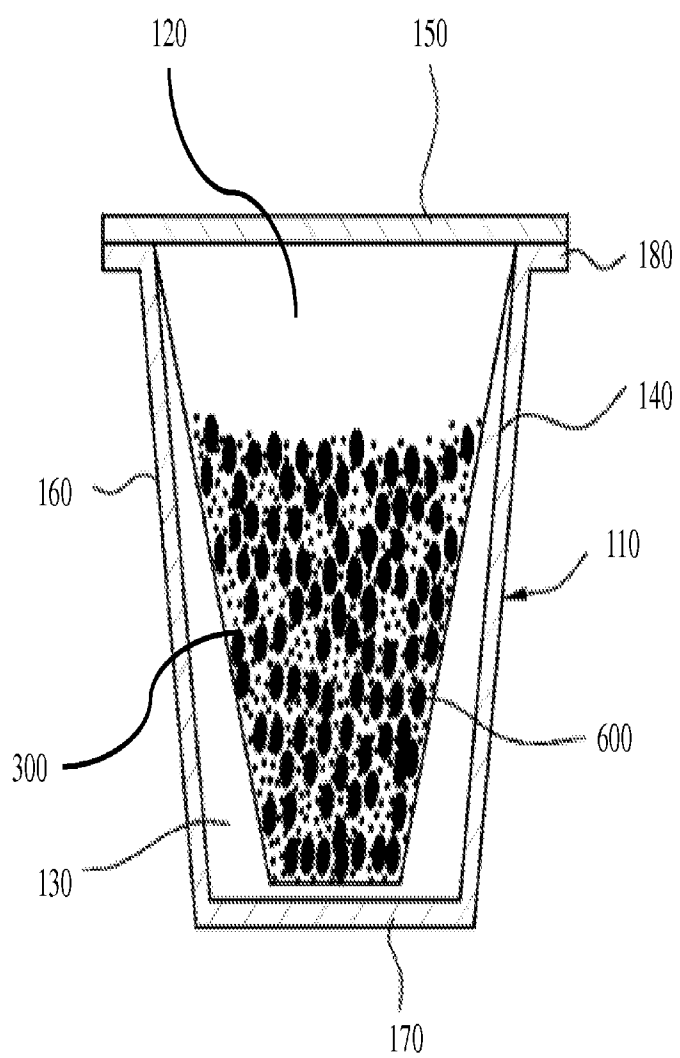


FIG. 1D

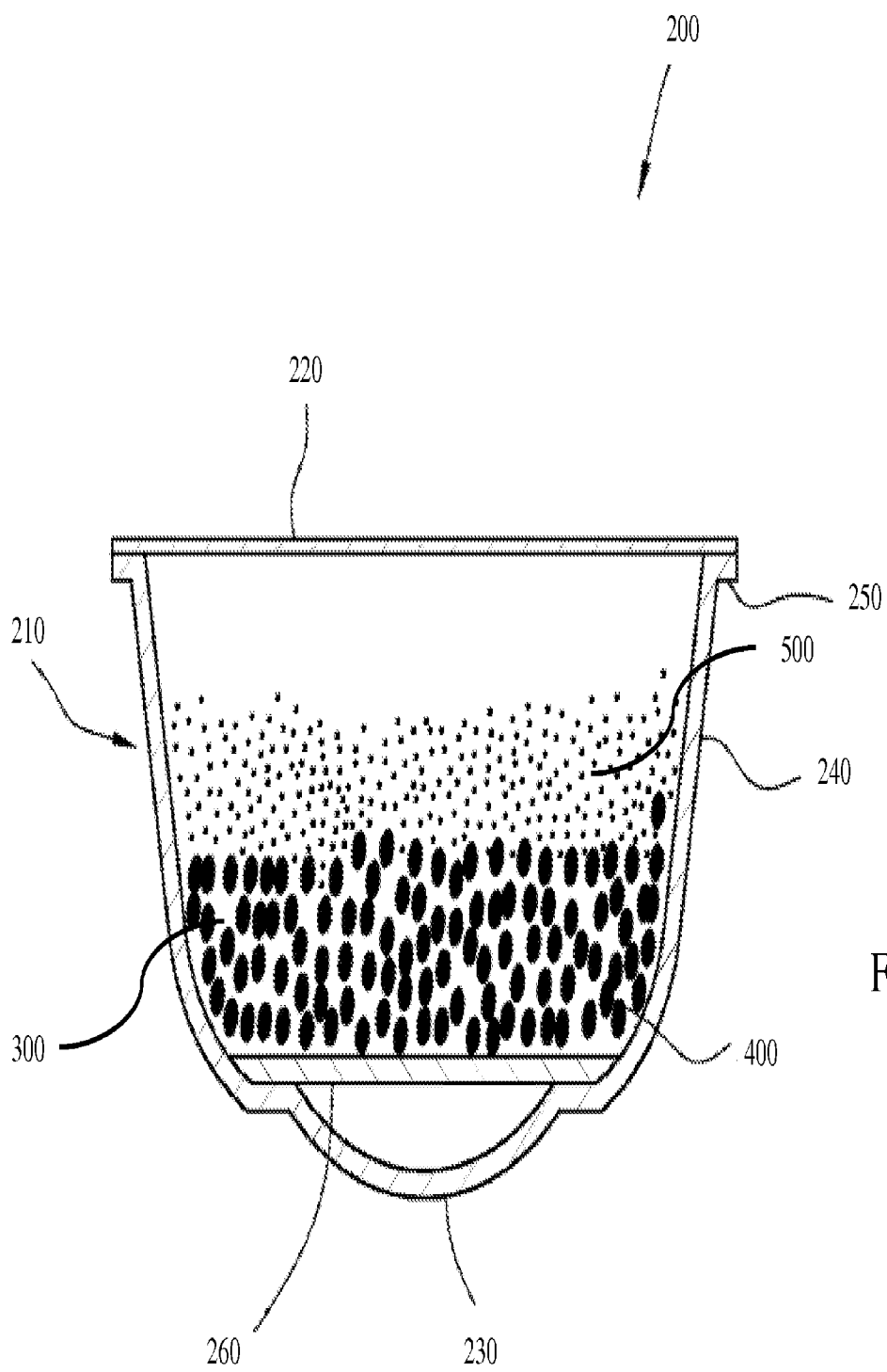


FIG. 1E

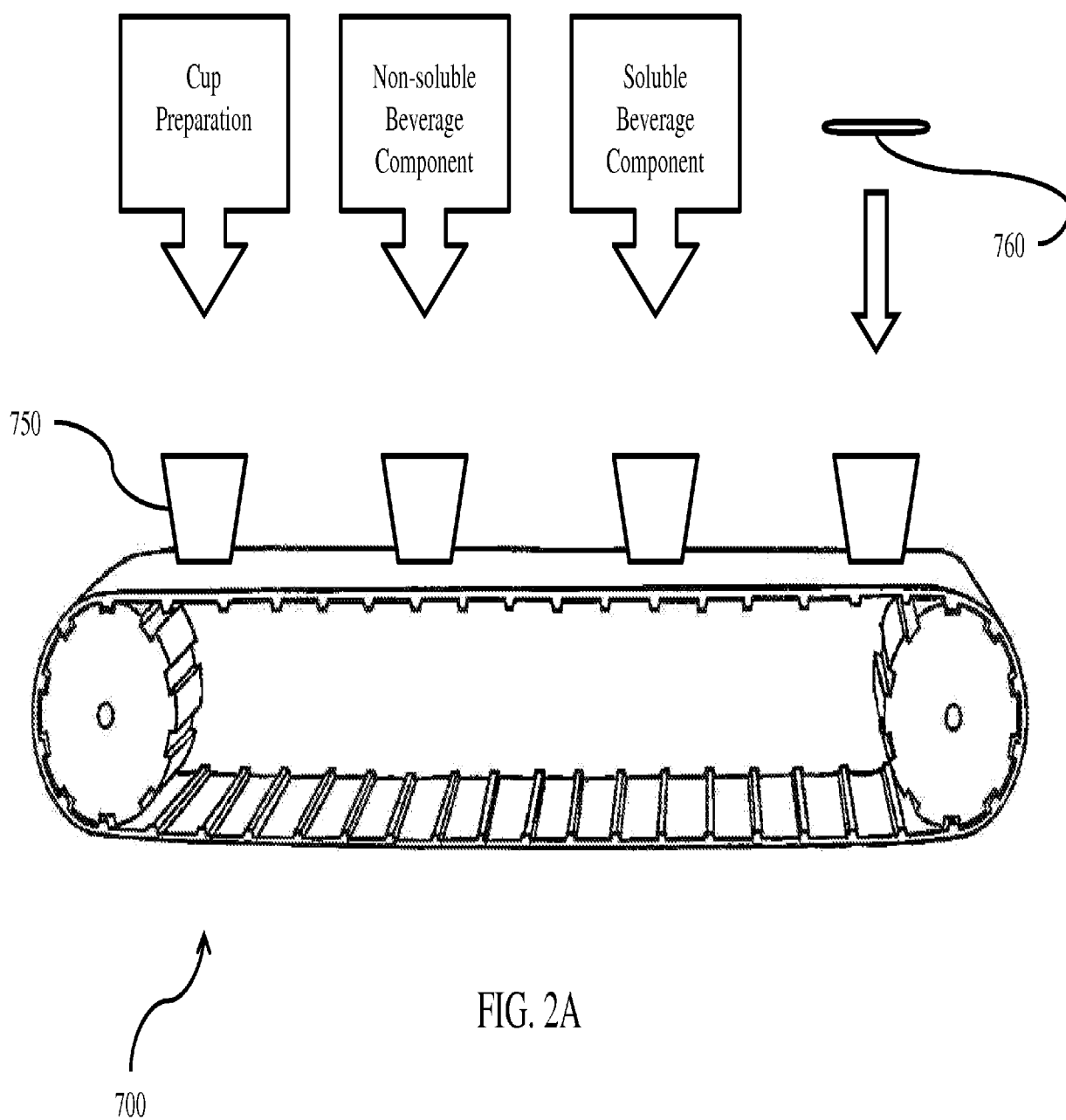


FIG. 2A

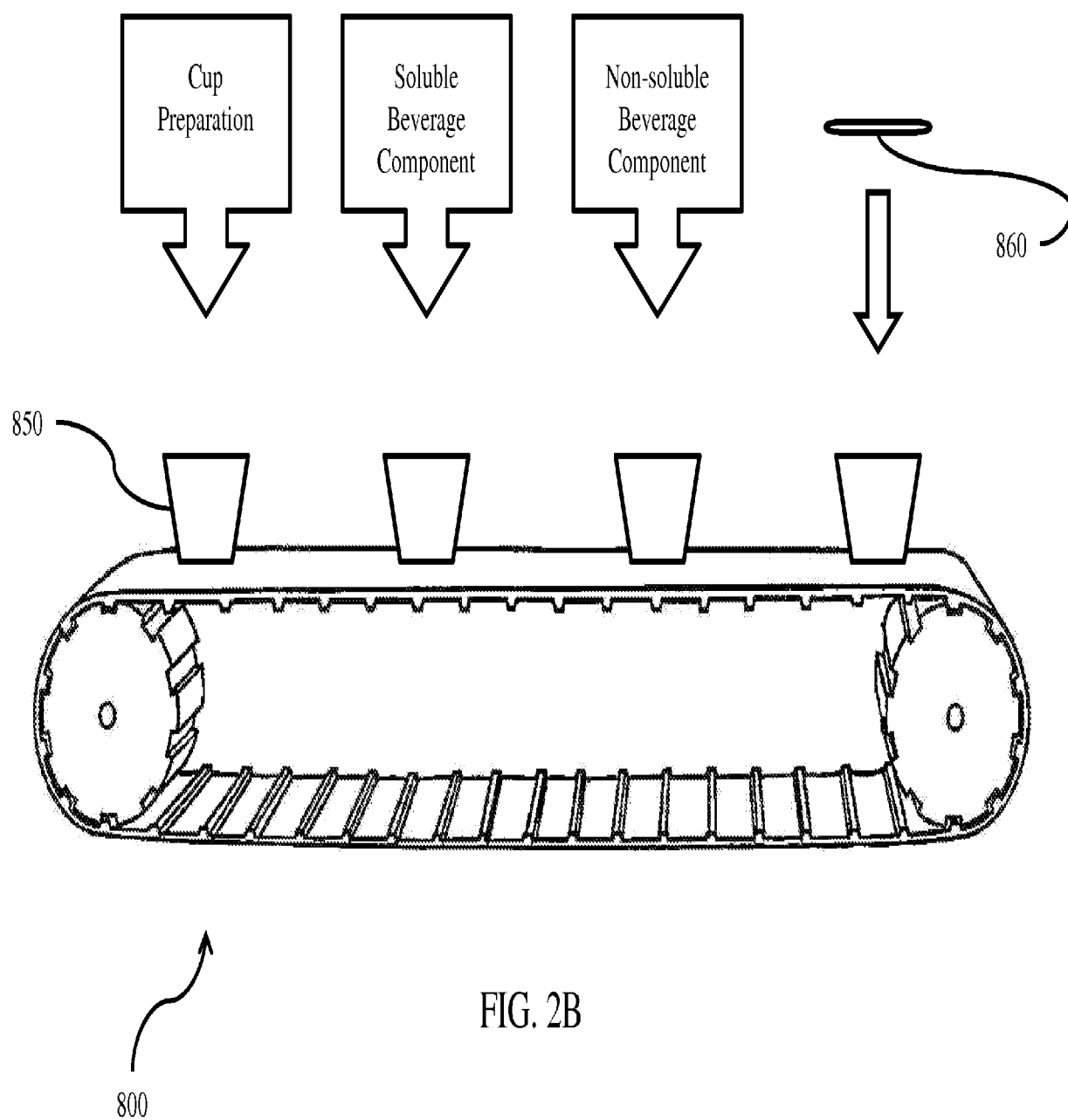


FIG. 2B

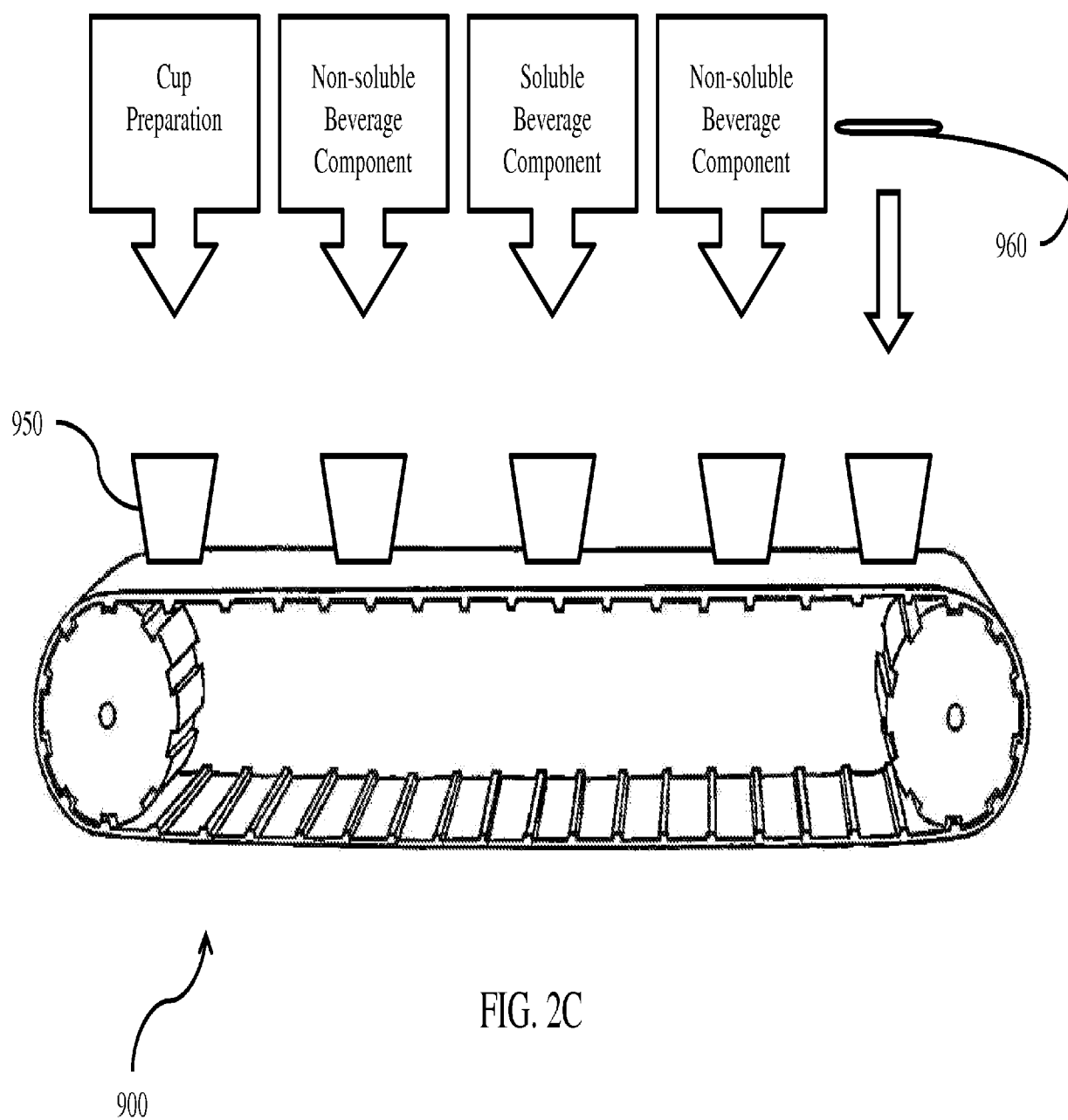


FIG. 2C

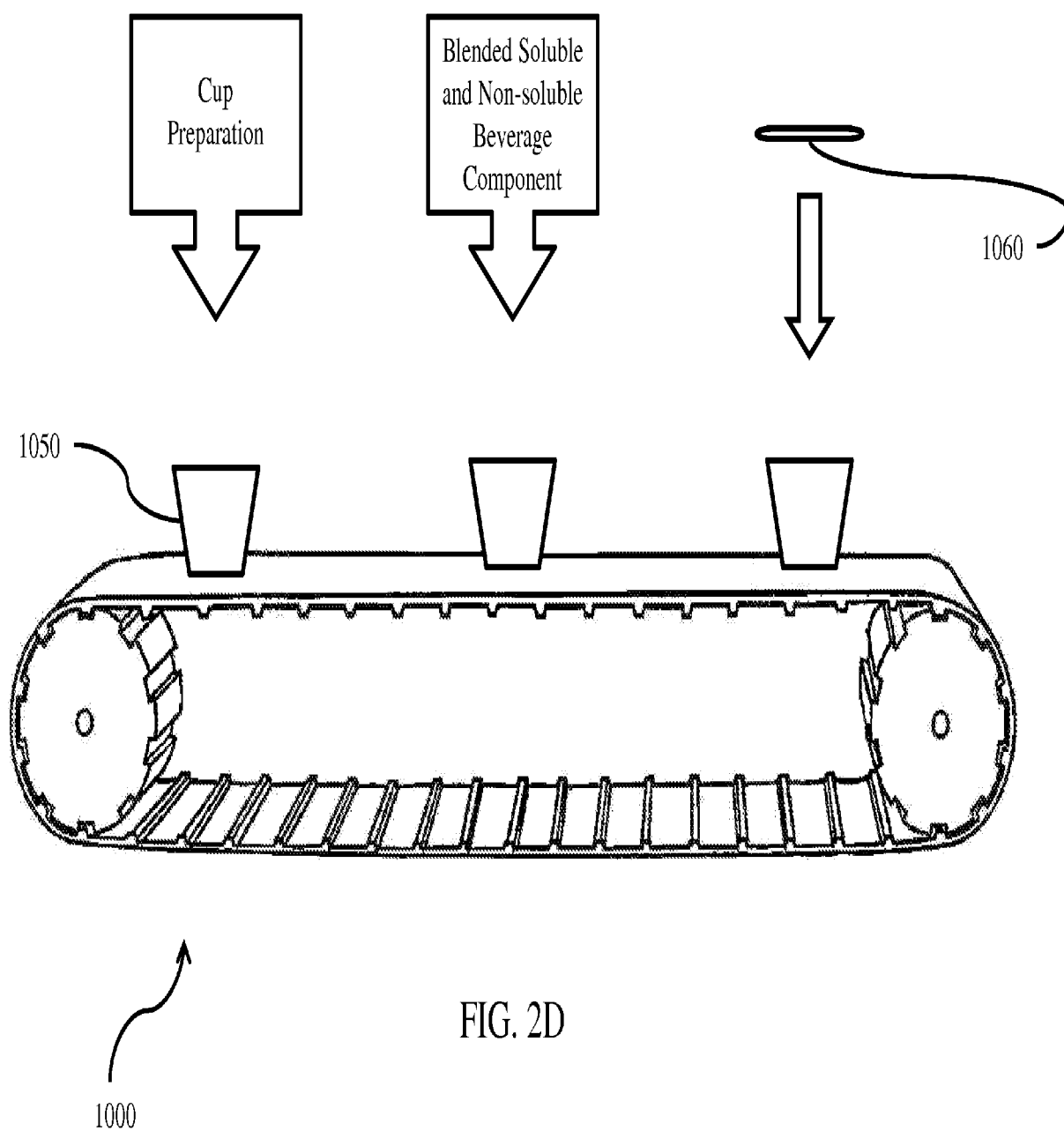
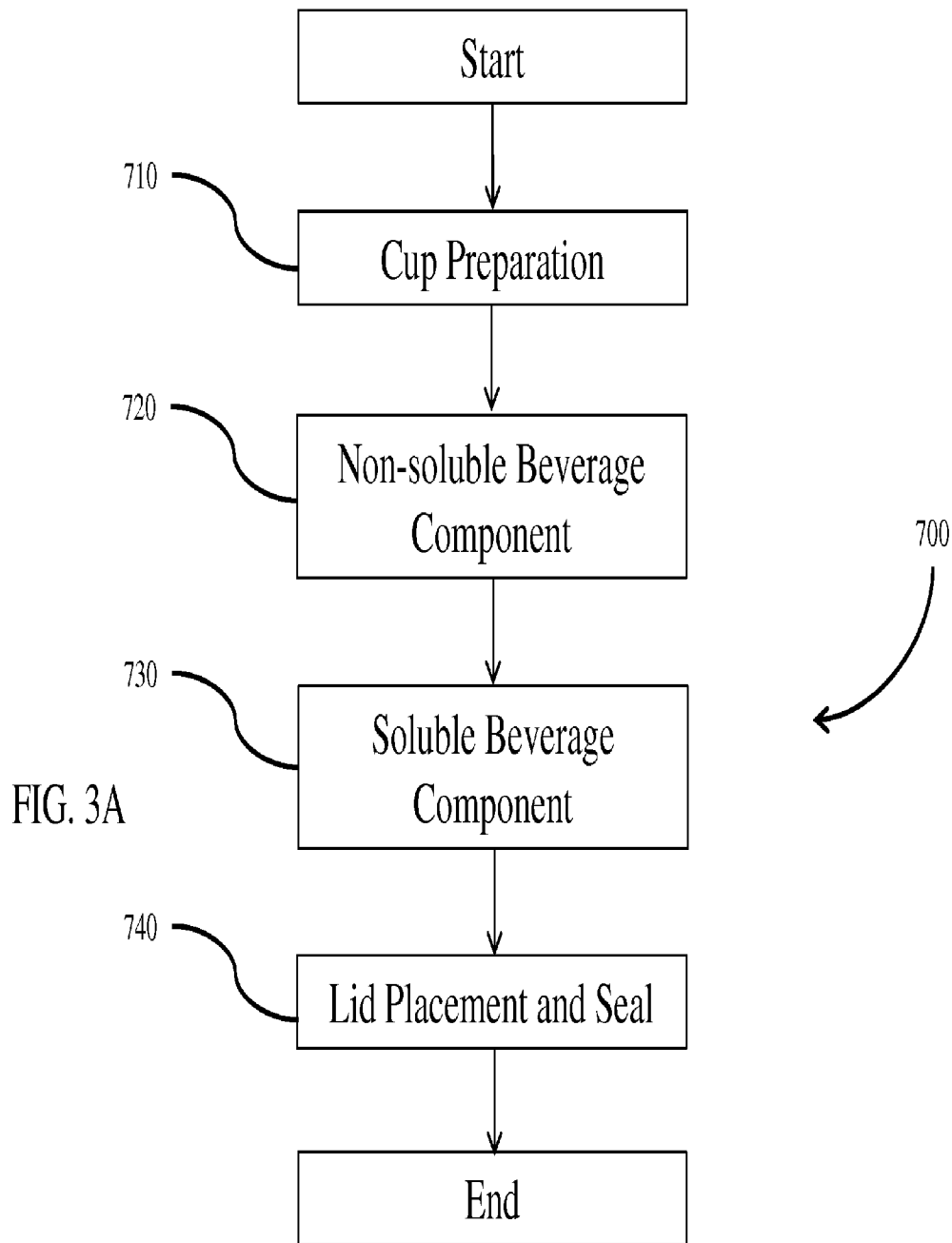
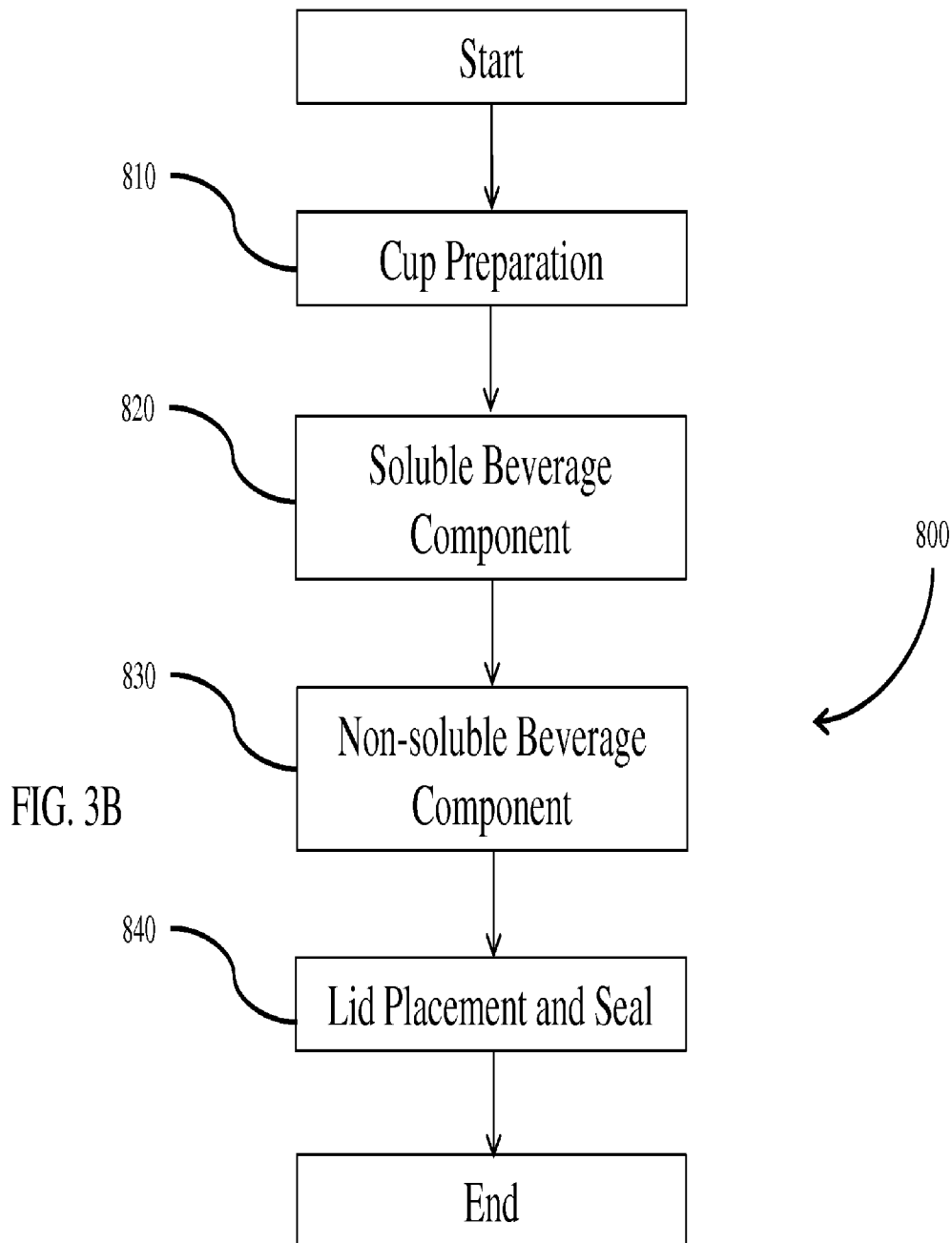


FIG. 2D





Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	SBUX1.384PR
		Application Number	
Title of Invention	BEVERAGE CARTRIDGES AND METHODS		
The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76. This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.			

Secrecy Order 37 CFR 5.2

☐	Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)
--------------------------	---

Inventor Information:

Inventor 1					Remove
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Paul		Camera		
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service					
City		State/Province		Country of Residence ⁱ	
Mailing Address of Inventor:					
Address 1					
Address 2					
City		State/Province			
Postal Code		Country ⁱ			
Inventor 2					Remove
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	John		Brockman		
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service					
City		State/Province		Country of Residence ⁱ	
Mailing Address of Inventor:					
Address 1					
Address 2					
City		State/Province			
Postal Code		Country ⁱ			
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button.					Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).
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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	SBUX1.384PR
		Application Number	
Title of Invention	BEVERAGE CARTRIDGES AND METHODS		

☐ An Address is being provided for the correspondence information of this application.

Customer Number	20995		
Email Address	efiling@knobbe.com	Add Email	Remove Email

Application Information:

Title of the Invention	BEVERAGE CARTRIDGES AND METHODS		
Attorney Docket Number	SBUX1.384PR	Small Entity Status Claimed ☐	
Application Type	Provisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	11	Suggested Figure for Publication (if any)	

Filing By Reference :

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:
☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not be** the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	☒ Customer Number	☐ US Patent Practitioner	☐ Limited Recognition (37 CFR 11.9)
Customer Number	20995		

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	SBUX1.384PR
		Application Number	
Title of Invention	BEVERAGE CARTRIDGES AND METHODS		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

When referring to the current application, please leave the application number blank.

Prior Application Status		Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.			Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(d). When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX) ⁱthe information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(h)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove			
Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Access Code ^j (if applicable)
Additional Foreign Priority Data may be generated within this form by selecting the Add button.			Add

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013. NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	SBUX1.384PR
		Application Number	
Title of Invention	BEVERAGE CARTRIDGES AND METHODS		

Authorization to Permit Access:

☒ Authorization to Permit Access to the Instant Application by the Participating Offices
If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application. In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application. In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing this Authorization.

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.		
Applicant 1		Remove
If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.		
Clear		
☒ Assignee	☐ Legal Representative under 35 U.S.C. 117	☐ Joint Inventor
☐ Person to whom the inventor is obligated to assign.	☐ Person who shows sufficient proprietary interest	
If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:		
Name of the Deceased or Legally Incapacitated Inventor :		
If the Applicant is an Organization check here. ☒		
Organization Name	Starbucks Corporation dba Starbucks Coffee Company	

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	SBUX1.384PR
		Application Number	
Title of Invention	BEVERAGE CARTRIDGES AND METHODS		

Mailing Address Information:			
Address 1	2401 Utah Avenue South		
Address 2			
City	Seattle	State/Province	WA
Country i		Postal Code	98134-1435
Phone Number		Fax Number	
Email Address			
Additional Applicant Data may be generated within this form by selecting the Add button. Add			

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.				
Assignee 1				
Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.				
				Remove
If the Assignee or Non-Applicant Assignee is an Organization check here.				☐
Prefix	Given Name	Middle Name	Family Name	Suffix
Mailing Address Information For Assignee including Non-Applicant Assignee:				
Address 1				
Address 2				
City		State/Province		
Country i		Postal Code		
Phone Number		Fax Number		
Email Address				
Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.				Add

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	SBUX1.384PR
		Application Number	
Title of Invention	BEVERAGE CARTRIDGES AND METHODS		

Signature:[Remove](#)

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications

Signature	/Rabinder N. Narula/			Date (YYYY-MM-DD)	2015-03-11
First Name	Rabinder	Last Name	Narula	Registration Number	53371
Additional Signature may be generated within this form by selecting the Add button.					Add

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

ABSTRACT OF THE DISCLOSURE

Present embodiments generally related to a single-serve beverage cartridge for use with a beverage machine. In some embodiments, the cartridge includes a cup, a lid, and a beverage component disposed in the cup. The beverage component can include a soluble beverage component and a non-soluble beverage component. In certain instances, the beverage component in the beverage cartridge can include a first layer of non-soluble beverage component and a second layer of soluble beverage component. In other instances, the beverage component can include a first layer of soluble beverage component and a second layer of non-soluble beverage component. In other instances, the beverage component can include a first layer of non-soluble beverage component, a second layer of soluble beverage component, and a third layer of non-soluble beverage component. In other instances, the beverage component can include a mixture of soluble beverage component and non-soluble beverage component. The soluble and non-soluble beverage components can be the soluble and non-soluble components of a same or similar type of beverage.

20029963
022015

Electronic Acknowledgement Receipt

EFS ID:	21742959
Application Number:	62131732
International Application Number:	
Confirmation Number:	5657
Title of Invention:	BEVERAGE CARTRIDGES AND METHODS
First Named Inventor/Applicant Name:	Paul Camera
Customer Number:	20995
Filer:	Rabinder N. Narula/Jennifer Neat
Filer Authorized By:	Rabinder N. Narula
Attorney Docket Number:	SBUX1.384PR
Receipt Date:	11-MAR-2015
Filing Date:	
Time Stamp:	18:56:45
Application Type:	Provisional

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	\$ 260
RAM confirmation Number	5264
Deposit Account	111410
Authorized User	KNOBBE MARTENS OLSON AND BEAR

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	SBUX1384PR_ADS.pdf	1561052	no	7
			9384bc949f3fec47a4c986ba84a8afc54bed56a		
Warnings:					
Information:					
2		SBUX1384PR_SPECS.pdf	1486843	yes	30
			1f669e8d248cf94d5f0c1822a438cd79f1a750a		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Specification		1	26	
	Claims		27	29	
	Abstract		30	30	
Warnings:					
Information:					
3	Drawings-only black and white line drawings	SBUX1384PR_DWGS.pdf	252923	no	11
			94b4994b53f55e9f63862aadadb8056498d9e17e		
Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	30265	no	2
			85eec63cacaeb25c06b24ae9b1a363a1a09a5b02		
Warnings:					
Information:					
Total Files Size (in bytes):			3331083		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

WHAT IS CLAIMED IS:

1. A beverage cartridge for use with a single-serve beverage machine, the cartridge including:

a cup having a bottom wall, a side wall and a lid;

a beverage component disposed in the cup, wherein the beverage component includes a soluble beverage component and a non-soluble beverage component, wherein the soluble beverage component and the non-soluble beverage component are soluble and non-soluble components of a same type of beverage.

2. The single-serve beverage cartridge of Claim 1, wherein the non-soluble beverage component forms a first layer of the beverage component and the soluble beverage component forms a second layer.

3. The single-serve beverage cartridge of Claim 1, wherein the soluble beverage component forms a first layer of the beverage component and the non-soluble beverage component forms a second layer.

4. The single-serve beverage cartridge of Claim 1, wherein the non-soluble beverage component forms a first layer of the beverage component, the soluble beverage component forms a second layer, and the non-soluble beverage component forms a third layer of the beverage component.

5. The single-serve beverage cartridge of Claim 1, wherein cup includes a shoulder disposed generally opposite the bottom wall and the lid is joined to the shoulder.

6. The single-serve beverage cartridge of Claim 1, wherein the non-soluble beverage component is ground coffee.

7. The single-serve beverage cartridge of Claim 6, wherein the soluble beverage component is freeze-dried or instant coffee.

8. The single-serve beverage cartridge of Claim 7, wherein the non-soluble beverage component includes 22-26 grams of roast and/or ground coffee.

9. The single-serve beverage cartridge of Claim 8, wherein the soluble beverage component includes 1-4 grams of freeze-dried or instant coffee.

10. The single-serve beverage cartridge of Claim 6, wherein the soluble beverage component includes a portion of microground coffee.

11. The single-serve beverage cartridge of Claim 1 wherein the lid and the bottom wall are each configured to be pierced to allow the flow of liquid therethrough.
12. The single-serve beverage cartridge of Claim 1 wherein the cartridge includes an element configured to retain the non-soluble components within the cartridge.
13. The single-serve beverage cartridge of Claim 12 wherein the element is a filter.
14. A method of assembling a single-serve beverage cartridge, method including:
filling a cup with a beverage component including a soluble beverage component and a non-soluble beverage component; and
sealing the beverage component within the cup.
15. The method of Claim 14, wherein filling the cup includes providing a first layer of non-soluble beverage component and providing a second layer of soluble beverage component.
16. The method of Claim 14, wherein filling the cup includes providing a first layer of soluble beverage component and providing a second layer of non-soluble beverage component.
17. The method of Claim 14, wherein filling the cup includes providing a first layer of non-soluble beverage component, providing a second layer of soluble beverage component, and providing a third layer of non-soluble beverage component.
18. The method of Claim 14, wherein filling the cup includes providing a beverage component with a combination of soluble beverage component and non-soluble beverage component.
19. The method of Claim 14, wherein the non-soluble beverage component is ground coffee.
20. The method of Claim 19, wherein the soluble beverage component is freeze-dried or instant coffee.
21. The method of Claim 20, wherein the non-soluble beverage component includes 22-26 grams of roast and/or ground coffee
22. The method of Claim 21, wherein the soluble beverage component includes 1-4 grams of freeze-dried or instant coffee.

23. The method of Claim 20, wherein the soluble beverage component includes a portion of microground coffee.

24. The method of Claim 14, wherein the soluble beverage component and a non-soluble beverage component are soluble and non-soluble components of a same type of beverage.

25. The method of Claim 14 comprising forming a cup having a bottom wall and a shoulder disposed generally opposite the bottom wall.

26. The method of Claim 25 wherein sealing the beverage component within the cup comprises joining a lid with the shoulder.

27. The method of Claim 14 comprising removing air from the cup and/or filling the cup with an inert gas before sealing the beverage component within the cup.

BEVERAGE CARTRIDGES AND METHODS

FIELD

[0001] The present disclosure relates to a sealed cartridge with a soluble beverage component and an insoluble beverage component for producing a beverage when fluid is introduced into the cartridge. The cartridge can be configured for use with single-serve beverage machines.

DESCRIPTION OF CERTAIN RELATED ART

[0002] Single-serve beverage machines are devices that are designed to produce a single serving, or sometimes a single cup, of a desired beverage. In comparison to other types of beverage machines (such as drip coffee makers having a multi-cup carafe), single-serve beverage machines can enhance convenience by reducing the time to prepare the beverage. Furthermore, single-serve beverage machines can reduce waste by decreasing the likelihood of producing excess amounts of the beverage, which may go unused and be subsequently discarded.

[0003] Some single-serve beverage machines use a cartridge (also called a pod or capsule) containing substantially non-soluble coffee grounds to produce the beverage. Generally, such cartridges are received in the single-serve beverage machine, are used to produce the single serving of the beverage, and are subsequently manually removed from the machine and discarded.

SUMMARY OF THE DISCLOSURE

[0004] In certain applications, the size and/or volume of a cartridge for a single-serve beverage machine may be limited. As a result, the cartridge may not provide enough room to accommodate the recommended quantity of non-soluble beverage component to dispense a beverage of a certain volume from a beverage machine. Accordingly, in some embodiments, a cartridge is provided with a soluble beverage component in conjunction with a non-soluble beverage component. The soluble beverage component can provide additional flavor per unit volume within the cartridge than a cartridge with only a non-soluble component. In this manner, the intended flavor profile can be achieved for a greater range of beverage volumes formed from a fixed cartridge volume while still providing the flavor

advantages and benefits of the non-soluble component. In certain embodiments, the soluble beverage component and the non-soluble beverage component are soluble and non-soluble components of the same or similar type of beverage, such as coffee. Thus, in an embodiment where the beverage is coffee, the soluble beverage component can comprise instant coffee and the non-soluble component can comprise roasted ground coffee. In an embodiment where the beverage is tea, the soluble beverage component can comprise instant tea and the non-soluble component can comprise tea leaves. A combination of a soluble beverage component and a non-soluble beverage component can enhance the desired body and flavor profile for a cartridge over a wider range of beverage volumes provided by a beverage machine.

[0005] In certain configurations, the cartridge can include a beverage component composed of a predetermined ratio of soluble beverage component and non-soluble beverage component. Similarly, the soluble beverage component and non-soluble beverage component can be provided in one or more layers within the cartridge or thoroughly mixed prior to placement within the cartridge. In some configurations, the soluble beverage component comprises dry coffee extract and the non-soluble beverage component comprises roasted ground coffee. In certain configurations, the soluble beverage component can include microground coffee and dry coffee extract. In certain embodiments, the cartridge can include a lid and a bottom wall that can be configured to be pierced to allow the flow of liquid therethrough. In certain embodiments, the cartridge can include a filter element to retain the non-soluble beverage component within the cartridge.

[0006] In some embodiments, a method of assembling a cartridge for producing a beverage is described. In some arrangements, a method for filling a cartridge with a predetermined ratio of soluble beverage component and non-soluble beverage component is provided. In some arrangements, the soluble beverage component and the non-soluble beverage component are introduced into the cartridge via separate feed mechanisms and/or discrete steps. In some arrangements, the soluble beverage component and the non-soluble beverage component are fed into the cartridge such that the cartridge has a first layer of soluble beverage component and a second layer of non-soluble beverage component. In some arrangements, the cartridge has a first layer of non-soluble beverage component and a second layer of soluble beverage component. In some arrangements, the cartridge has a first layer of

soluble beverage component, a second layer of non-soluble beverage component, and a third layer of soluble beverage component. In some arrangements, a predetermined ratio of the soluble beverage component and non-soluble beverage component is first mixed before filling the cartridge.

BRIEF DESCRIPTION OF THE FIGURES

[0007] Various embodiments are depicted in the accompanying drawings for illustrative purposes, and should in no way be interpreted as limiting the scope of the embodiments. Furthermore, various features of different disclosed embodiments can be combined to form additional embodiments, which are part of this disclosure.

[0008] FIG. 1A illustrates a cross-sectional view of an embodiment of a cartridge with a beverage component including a first layer of non-soluble beverage component and a second layer of soluble beverage component.

[0009] FIG. 1B illustrates a cross-sectional view of an embodiment of a cartridge of FIG. 1A with a beverage component including a first layer of soluble beverage component and a second layer of non-soluble beverage component.

[0010] FIG. 1C illustrates a cross-sectional view of an embodiment of a cartridge of FIG. 1A with a beverage component including a first layer of non-soluble beverage component, a second layer of soluble beverage component, and a third layer of non-soluble beverage component.

[0011] FIG. 1D illustrates a cross-sectional view of an embodiment of a cartridge of FIG. 1A with a beverage component including a combination of soluble beverage component and non-soluble beverage component.

[0012] FIG. 1E illustrates a cross-sectional view of an alternative embodiment of a cartridge with the beverage component illustrated in FIG. 1A including a combination of non-soluble beverage component and soluble beverage component.

[0013] FIG. 2A illustrates a schematic representation of an embodiment of a method for assembling the beverage cartridge illustrated in FIG. 1A.

[0014] FIG. 2B illustrates a schematic representation of an embodiment of a method for assembling the beverage cartridge illustrated in FIG. 1B.

[0015] FIG. 2C illustrates a schematic representation of an embodiment of a method for assembling the beverage cartridge illustrated in FIG. 1C.

[0016] FIG. 2D illustrates a schematic representation of an embodiment of a method for assembling the beverage cartridge illustrated in FIG. 1D.

[0017] FIG. 3A illustrates a flow chart of a method for assembling a beverage cartridge as illustrated in FIG. 2A.

[0018] FIG. 3B illustrates a flow chart of a method for assembling a beverage cartridge as illustrated in FIG. 2B.

DETAILED DESCRIPTION

[0019] The following discussion is presented to enable a person skilled in the art to make and use one or more of the described embodiments. The general principles described herein may be applied to embodiments and applications other than those detailed below without departing from the spirit and scope of the disclosure. Indeed, the described embodiments are not intended to be limited to the particular embodiments shown, but are to be accorded the widest scope consistent with the principles and features disclosed or suggested herein.

Certain Cartridge Structures

[0020] **FIGS. 1A – D** illustrate cross-sectional views of some embodiments of a cartridge 100. The specific structure of the cartridge 100 described below is not intended to be limiting but provides one example carrier for the beverage component 300 described below.

[0021] As described herein, the size and/or volume of a cartridge for a beverage machine may be limited. As a result, the cartridge may not provide enough room to accommodate the recommended quantity of non-soluble beverage component to dispense a beverage of a certain volume from a beverage machine. Accordingly, in certain embodiments describe below, the cartridge 100 can be provided with a soluble beverage component in combination with a non-soluble beverage component. As described herein, the soluble beverage component and the non-soluble beverage component can be soluble and non-soluble components of the same type of beverage, such as coffee. Thus, in an embodiment where the

beverage is coffee, the soluble beverage component can comprise instant coffee and the non-soluble component can comprise roasted ground coffee. A combination of a soluble beverage component and a non-soluble beverage component can enhance the desired body and flavor profile for a cartridge over a wider range of beverage volumes provided by a beverage machine

[0022] Referring to **FIGS. 1A – D**, a cartridge 100 can include a cup 110, a lid 150 and a filter element 140. In some embodiments, the cartridge has no filter. In some embodiments, the cup 110 can have a generally hollow structure having a bottom wall 170, a protruding lip 180 and a sidewall 160. In other embodiments, the cartridge 100 can have a gradually tapered, generally cylindrical shape; however, other shapes can be used without departing from the spirit and/or scope of the disclosure.

[0023] The cup can include an outwardly protruding lip 180. In some embodiments, the lid 150 is secured to the radially outwardly protruding lip 180 surrounding an access opening. The lid 150 can be secured, adhered, or otherwise connected with the outwardly protruding lip 180 or adjacent thereto, thereby forming a sealed cartridge 100. The seal can be an airtight seal to reduce entry of ambient air into the cartridge 100 and thus promote freshness of the beverage component 300. The lid 150 can be secured or adhered to the cartridge 100 using any suitable adhesive or sealing techniques and materials, such as heat-sealing, crimping, gluing, UV-curing, applying ultrasonic or microwave energy (e.g., sonic welding), and otherwise.

[0024] In additional variants, the filter element 140 can be disposed within the cup 110 and attached to the cup 110 adjacent the lid 150. The filter element 140 can define a first chamber 120 and a second chamber 130. In some examples, the first chamber 120 can contain a beverage component 300 for producing a brewed beverage when water is introduced into the cartridge 100. In some embodiments, during the brewing process, the lid 150 is pierced so that liquid is introduced into the first chamber 120 and mixes with the beverage component 300. In some examples, the brewed beverage can then pass through the filter element 140 (which removes non-soluble components of the used beverage component 300 from the brewed beverage) and into the second chamber 130. In some examples, the brewed beverage

then exits the cartridge 100 through the bottom wall 170 of the cartridge 100, which has also been pierced to produce an opening.

[0025] The cup 110 and the lid 150 can be constructed of a liquid-impermeable material that is capable of being pierced or perforated by a piercing member of a single-serve beverage machine to allow the introduction of liquid (e.g., hot water or cold water) into the cartridge 100. For example, the cup 110 and the lid 150 can be made of one or more metallic (e.g., aluminum), paper-based, polymeric (e.g., plastic, polyethylene, polyurethane, nylon), and/or biodegradable materials. In some embodiments, the cup 110 and/or the lid 150 is constructed of a flexible material. In certain instances, the lid 150 of the cartridge 100 can be pierced or perforated by a piercing member. In such cases, liquid can be injected or otherwise delivered through a piercing member and/or the opening created therefrom into the cup 110, thereby forming a beverage within the cup 110. In other instances, the lid 150 may be constructed of a gas and/or water permeable material that allows a liquid, such as water, to pass through without requirement piercing of the lid.

[0026] In some embodiments, the introduction of liquid into the cartridge 100 encourages mixing of the liquid and the beverage component 300. For example, the liquid can be introduced as a pressurized (e.g., between about 0.5 bars and about 20 bars) stream, which can impinge the beverage component 300 and/or the cup 110 (e.g., the bottom wall 170) and facilitate mixing. In some embodiments, the liquid is injected in a manner such that liquid and instant beverage component are effectively churned or swirled within the cup 110, thereby allowing the beverage particles to be dispersed and/or dissolved more readily. For example, in some such cases the liquid is injected in a cyclonic fashion.

[0027] In some embodiments, the liquid introduced into the cartridge is water. For example, in some embodiments, use other types of liquid. For example, in certain embodiments, the liquid is milk, such as for the preparation of hot cocoa. In other embodiments, the liquid is a juice. In some embodiments, the liquid is carbonated, such as for the preparation of a soft drink. In certain embodiments, the liquid is alcoholic, such as for the preparation of a shot or a cocktail. In some instances, a hot liquid is introduced, e.g., for hot beverages. In other instances, a cold liquid is introduced, e.g., for iced beverages. The

amount of liquid introduced can be predetermined or adjusted based on a desired strength of the beverage.

[0028] In some embodiments, after the cartridge has been pierced by a first piercing member, the liquid has been introduced into the cartridge, and the beverage components have been at least partly mixed with and/or dissolved into the liquid, the beverage is ready to exit the cartridge. Accordingly, in some instances, the cup 110 can be configured to provide a location for the liquid to exit the cartridge 100. For example, the bottom wall 170 can be configured to be pierced or perforated by a piercing member to allow the prepared beverage to exit the cartridge 100. The piercing member can be a hollow needle or cannula-like element, such that the prepared beverage can flow through the second piercing member for delivery to a cup or other beverage receptacle for consumption (e.g., via a discharge spout). In some embodiments, the prepared beverage does not flow through a piercing member, rather the prepared beverage exits via a hole or opening formed by a piercing member. In certain embodiments, a piercing member pierces approximately the center (e.g., radial center) of the bottom wall 170. In yet other embodiments the cartridge may be fabricated with one or more holes or openings in the bottom wall 170. In such embodiments, the hole(s) may be sealed by a removable tab or other covering that may be stripped from the bottom wall 170 prior to use. In yet other embodiments, the bottom wall 170 is constructed of a gas and/or impermeable material that can allow the formed beverage to pass through without requiring piercing or removal of any tab or covering.

[0029] In certain arrangements, components of the cartridge 100 are constructed of a flexible material. For example, in some embodiments, the cup 110 is sufficiently flexible to be able to collapse and expand. Such a configuration can, for example, reduce the storage space occupied by the cartridge 100 and reduce the likelihood of air or other gasses spoiling or otherwise degrading the beverage component 300. In some cases, the cup 110 is collapsed around the beverage component 300. In some cases, air or other gases are substantially evacuated from the cartridge 100. In some embodiments, the cup 110 is configured to expand when the liquid is introduced into the cartridge 100. In certain such cases, the cup 110 expands to about its size and shape prior to collapse.

[0030] FIG. 1E illustrates another example of a cartridge 200. In some embodiments, the cartridge 200 includes a cup 210 with a bottom wall 230, a sidewall 240, and a lid 220. The lid 220 can be sealed with a lip 250 of the cartridge 200. The cartridge 200 can include a barrier 260 to prevent leakage of the coffee grounds from the cartridge 200 when the capsule is pierced during the coffee brewing process. During the brewing process, the bottom wall 230 of the capsule is pierced so that water is introduced into the cartridge 200 and mixes with the beverage component 300. The brewed espresso beverage then exits through the lid 220 of the cartridge 200, which lid 220 has been ruptured to produce a number of openings or perforations. As illustrated, the beverage cartridge 200 can include a first layer of non-soluble beverage component 400 and a second layer of soluble beverage component 500.

[0031] In various embodiments, the cartridges described herein can be made of biodegradable or otherwise “environmental friendly” materials. The cartridges described herein can be configured for single use. The cartridges described herein can be compatible with one or more existing single-serve beverage machines or technologies. The cartridge described herein can be configured to deliver a “single-serving” of beverage. The term “single serving” has its ordinary and customary meaning, and includes, among other things, a portion of beverage that is customarily consumed by one person. For example, some single-serving beverage pods are configured to produce less than or equal to about 20 fluid ounces (about 600 milliliters) of beverage. While several embodiments described herein are described with respect to single serving applications, this disclosure is not limited to such applications and certain embodiments can also be applied to cartridges configured for larger than a single serving.

[0032] In some embodiments, the cartridge can be vacuum sealed or pressurized. In some embodiments, the oxygen or ambient air in the cartridge is replaced with nitrogen (or another generally non-reactive gas). In certain other embodiments, the oxygen or ambient air in the cartridge is replaced with a combination of nitrogen and carbon-dioxide. Replacement of the oxygen or ambient air in the cartridge can, for example, enhance the shelf-life of the cartridge and reduce the chance of spoilage or degradation of the contents of the cartridge. In some embodiments, one or more portions of the cartridge (e.g., the cup and/or the lid) are

configured to limit or otherwise control the transmission of water vapor and/or oxygen between the beverage component and an external environment (e.g., ambient air) in order to provide an acceptable shelf life. For example, in some cases, the lid has a water vapor transmission rate of less than or equal to about 0.050 g/m²/day (measured as per ASTM F-1249). In certain embodiments, the lid has an oxygen transmission rate of less than or equal to about 0.500 cc/m²/day (measured as per ASTM D3985). Those skilled in the art will recognize that such transmission rates are illustrative and thus, should not be construed as limiting. In some instances, an acceptable shelf life is between about 6 months and about 12 months after assembly of the cartridge. However, depending on the contents of the cartridge, a shelf life that is shorter (e.g., about 3 months) or longer (e.g., about 18 months) may be applicable and is contemplated by this disclosure.

[0033] The cartridge can include a single serving, or single-serve portion, of the beverage component, such as instant coffee, tea, fruit juice, soft drink, or any other beverage that can be produced by mixing one or more substantially soluble beverage components with a fluid. The term soluble as used herein shall be given its ordinary and customary meaning, and shall include, without limitation, products that readily dissolve or disperse in a liquid, such as water or milk. Similarly, the term non-soluble as used herein shall be given its ordinary and customary meaning, and shall include, without limitation, products that do not readily dissolve in a liquid, such as water or milk. As will be described below, the cartridge can include a combination of soluble beverage component and a non-soluble beverage component. The soluble beverage component and a non-soluble beverage component can be components of the same type of beverage, such as coffee.

[0034] In some embodiments the soluble beverage component can be composed of dissolvable beverage components such as a dried (e.g. freeze-dried, hot air dried, or any other drying process) coffee, tea, fruit juice, dairy or cocoa-based beverage. In other embodiments, the soluble beverage component can be composed of other dissolvable beverage components that can include, but is not limited to, dairy, soy, sugar, artificial sweeteners, nutrients, flavorings, or other soluble components, in addition to, for example, coffee, tea, fruit juice, dairy or cocoa-based beverage.

[0035] In some embodiments, the soluble beverage component can include a portion of microground or pulverized coffee, such as that described in U.S. Patent Application Publication No. 2010/0009039, filed July 9, 2008, and titled “METHOD OF MAKING BEVERAGES WITH ENHANCED FLAVORS AND AROMAS,” the entirety of which is incorporated herein by reference. For example, in some cases, the soluble beverage component can include coffee having a median or mean particle size of about 350 microns or less. In some embodiments, the soluble beverage component includes a combination of freeze-dried coffee and microground coffee.

[0036] In some embodiments, the non-soluble beverage component can be composed of a beverage component that is not readily dissolvable such as coffee grounds, tea leaves, fruits, and any other particles that can be used to impart flavor into the beverage without being readily dissolvable. In some embodiments, the non-soluble beverage component is retained within the cartridge 100 by a filter element (e.g., such as the filter element 140 described above) such that the prepared beverage does not contain undesirable textures associate with components that are not readily dissolvable.

Certain Cartridge Components

[0037] As described above, the cartridge can include soluble and non-soluble beverage components. In certain embodiments, the soluble beverage component and the non-soluble beverage component can be combined within the cartridge to form a mixed beverage component. As discussed, in some examples, the soluble beverage component and the non-soluble beverage component can be at a predetermine ratio. In some embodiments, additional beverage components can be combined within the cartridge, including but not limited to dairy, soy, sugar, artificial sweeteners, nutrients, flavorings, or other soluble components, in addition to, for example, coffee, tea, fruit juice, dairy or cocoa-based beverage. As mentioned above, the non-soluble beverage component and the soluble beverage can be soluble and non-soluble components of the same beverage, such as coffee.

[0038] The type and amount of beverage component and/or the ratio of soluble to non-soluble components can be selected to provide a beverage having certain desired characteristics. For example, the amount of soluble beverage component 500 can be selected to deliver a predetermined strength of beverage given a fixed cartridge size and/or volume.

The type and amount soluble and non-soluble beverage components within the cartridge can also depend upon the size and/or type of cartridge and the beverage sized delivered by the cartridge. Accordingly, the ratio of soluble beverage component to non-soluble beverage component can vary in light of the disclosure herein to provide a beverage having certain desired characteristics and are not limited to the following non-limiting example arrangements and embodiments.

[0040] In certain arrangements, the ratio of soluble beverage component to non-soluble beverage component can include ratios of, for example, 1:22, 1:23, 1:24, 1:25, 1:26, 2:22, 2:23, 2:24, 2:25, 2:26, 3:22, 3:23, 3:24, 3:25, 3:26, 4:22, 4:23, 4:24, 4:25, 4:26, values between the aforementioned values, or other values. In certain arrangements, the soluble beverage component can comprise 3% to 16% of the total weight of the soluble and non-soluble beverage components 500, 400 within the cartridge and in certain arrangements 2% to 18% of the total weight of the soluble and non-soluble beverage components 500, 400 within the cartridge, and in certain embodiments 1% to 22% of the total weight of the soluble and non-soluble beverage components 500, 400 within the cartridge. In certain arrangements, the soluble beverage component 500 can comprise about 3% to about 16% of the total weight of the soluble and non-soluble beverage components 500, 400 within the cartridge and in certain arrangements about 2% to about 18% of the total weight of the soluble and non-soluble beverage components 500, 400 within the cartridge, and in certain embodiments about 1% to about 22% of the total weight of the soluble and non-soluble beverage components 500, 400 within the cartridge. In certain embodiments, the ratio of non-soluble beverage component 400 to soluble beverage component 500 can include ratios of 26:1, 26:2, 26:3 and in certain arrangements 14:1, 14:2, and 14:3 and in certain arrangements 7:1 7:2 and these arrangements can also include values between the aforementioned values, or other values. In certain arrangements, the above ratios and/or weight percentages can apply to arrangements where the non-soluble beverage component 400 and the soluble beverage 500 can be soluble and non-soluble components of the same beverage, such as coffee, tea or any of the beverages described herein. In certain arrangements, the above ratios and/or weight percentages can apply to arrangements where the non-soluble beverage component is roasted ground coffee

and the soluble beverage can be soluble coffee such as coffee extract, freeze-dried and/or instant coffee.

[0041] In some arrangements configured for single servings, the cartridge comprises 22 to 26 grams of non-soluble beverage component and 1 to 4 grams of soluble beverage component. In some arrangements configured for single servings, the cartridge comprises about 22 to about 26 grams of non-soluble beverage component and about 1 to about 4 grams of soluble beverage component. In some arrangements, the cartridge comprises 22 to 26 grams of non-soluble coffee component such as roasted ground coffee and 1 to 4 grams of soluble coffee component such as coffee extract, freeze-dried and/or instant coffee. In some arrangements, the cartridge comprises about 22 to about 26 grams of non-soluble coffee component such as roasted ground coffee and about 1 to about 4 grams of soluble coffee component such as coffee extract, freeze-dried and/or instant coffee.

[0042] **FIG. 1A** illustrates a cartridge 100 with a first layer of non-soluble beverage component 400 and a second layer of soluble beverage component 500. In this arrangement, the layer of soluble beverage component 500 can be positioned on top of the layer of non-soluble beverage component 400. In the illustrated arrangement, the second layer of soluble beverage component 500 can form the upper most or top layer of the beverage components positioned within the cartridge 100. In one embodiment, the layer of soluble beverage component 500 is positioned within the top half of the depth of components within the cartridge, in another embodiment, within the top third, and in another embodiment, within the top quarter of the depth of the components within the cartridge.

[0043] **FIG. 1B** illustrates a cartridge with a first layer of soluble beverage component 500 and a second layer with a non-soluble beverage component 400. In this arrangement, the layer of soluble beverage component 500 can be positioned below the layer of non-soluble beverage component. In this arrangement, the soluble beverage component 500 can form the lower-most or bottom layer of the beverage components within the cartridge 100. In one embodiment, the layer of soluble beverage component 500 is positioned within the bottom half of the depth of components within the cartridge, in another embodiment, within the bottom third, and in another embodiment, within the bottom quarter of the depth of the components within the cartridge.

[0044] Layering of the soluble 500 and non-soluble beverage components 400 of the beverage component 300 (such as is illustrated in **FIGS. 1A – B**) can aid in providing the cartridge with a prescribed amount and/or proportion of soluble beverage component 500 to non-soluble beverage component 400. For example, as will be discussed in more detail below, layering can reduce or avoid problems associated with the fine granular size of the soluble beverage component 500. In some embodiments, layering can avoid or reduce problems associated with mixing the non-soluble and soluble components together before insertion into the cartridge. For example, layering can reduce or avoid issues associated with mixing components of different densities

[0045] In some instances, layering can facilitate transport and/or manufacturability of the cartridge. For example, in the layered approach, the soluble and non-soluble components can be maintained, transported, and/or inserted into the cartridge as separate components. In contrast, in a mixed approach, the soluble and non-soluble components are mixed, transported, and inserted into the cartridge as combined components. In certain instances, the mixed components can stratify during mechanical transport (e.g., before insertion into a pod), which can lead to and inconsistent proportions of the soluble and non-soluble components being inserted into the cartridge during manufacturing.

[0046] **FIG. 1C – D** illustrates certain additional configurations of the beverage component 300. **FIG. 1C** illustrates a cartridge with a first layer of non-soluble beverage component 400, a second layer of soluble beverage component 500, and non-soluble beverage component 400. Thus, in the illustrated arrangement, the soluble beverage component 500 can comprise one or more layers between layers of the non-soluble beverage component 400 or the non-soluble beverage component 400 can comprise one or more layers between layers of soluble beverage component 500.

[0047] **FIG. 1D** illustrates a cartridge with a beverage component 300 composed of a mixed beverage component 600. In some embodiments, the mixed beverage component 600 is mixed in the desired ratio of soluble beverage component 500 to non-soluble beverage component 400 described above. The combination of the soluble beverage component and non-soluble beverage component can be combined by one or more of many different methods, e.g., centrifugal equipment, lightning mixer, ribbon blender, PK blender,

sonic methods, etc. In some embodiments, other compounds may be added during the mixing process, including beverage component oils, beverage component aromas, etc. The soluble beverage component 500 and the non-soluble beverage component 400 can be mixed before and/or after insertion into the cartridge.

[0048] The beverage component 300 can be provided in the cup in many forms. For example, in some embodiments, the beverage component 300 is generally loose and non-compressed. In another embodiment, the beverage component 300 is generally compressed and/or compacted.

Certain Methods Related to Cartridges with Multiple Components

[0049] As discussed above, the cartridge 100 can include various layers and/or combinations of soluble beverage component 500 and non-soluble beverage component 400. **FIGS. 3A – B** illustrate flow-charts that provide an overview of methods for assembling a beverage cartridge with a non-soluble beverage component 400 and a soluble beverage component 500 according to certain embodiments. Each of the steps described below in **FIGS. 3A – B** is described in further detail according to certain embodiments with regard to **FIGS. 2A – D**.

[0050] **FIGS. 2A** and **3A** illustrate a method 700 for assembling a beverage cartridge 750. In some embodiments, the method 700 can include block 710 that includes preparing the cup for assembly. In some embodiments, preparing the cup for assembly can include forming a cup according to one the embodiments described above with respect to **FIGS. 1A-E**. In some embodiments, forming a cup can include forming a cup with a bottom wall, a side wall and a lip onto which a lid can be attached. In some embodiments, preparing the cup can include forming a cup, inserting a filter within the cup and securing the filter to the cup by, for example, welding the filter to the cup. In some embodiments, the method for assembling the beverage cartridge 700 can include block 720 which describes first filling the cartridge 750 with a non-soluble beverage component 400. The method 700 can include block 730, which describes filling the cartridge 750 with a soluble beverage component 500. In some embodiments, the method 700 can include block 740 which describes placing and sealing the lid 760 to the cartridge 750. In some embodiments, an inert gas can be placed within the cartridge 750 before the cartridge is sealed with a lid and/or air can be removed

from the cartridge before the cartridge is sealed. During this process, the soluble and/or insoluble components can be shielded under an inert gas (e.g., nitrogen) blanket until the cartridge is sealed.

[0051] **FIGS. 2B** and **3B** illustrates a method 800 for assembling a beverage cartridge 850 that is also illustrated in **FIG. 1B**. In some embodiments, the method 800 can include block 810 that includes preparing the cup for assembly. In some embodiments, the method 700 can include block 710 that includes preparing the cup for assembly. In some embodiments, preparing the cup for assembly can include forming a cup according to one the embodiments described above with respect to **FIGS. 1A-E**. In some embodiments, preparing the cup can include forming a cup, inserting a filter within the cup and securing the filter to the cup by, for example, welding the filter to the cup. In some embodiments, forming a cup can include forming a cup with a bottom wall, a side wall and a lip onto which a lid can be attached. The method 800 can include block 820 which describes first filling the cartridge 850 with a soluble beverage component 500. The method 800 can include block 830, which describes filling the cartridge 850 with a non-soluble beverage component 400. In some embodiments, the method 800 can include block 840 which describes placing and sealing the lid 860 to the cartridge 850. In some embodiments, an inert gas can be placed within the cartridge 850 before the cartridge is sealed with a lid and/or air can be removed from the cartridge before the cartridge is sealed. During this process, the soluble and/or insoluble components can be shielded under an inert gas (e.g., nitrogen) blanket until the cartridge is sealed.

[0052] **FIGS. 2A – D** also illustrate schematic representations of multiple embodiments of methods for assembling the beverage cartridges illustrated in **FIGS. 1A – D**. In some embodiments, the soluble beverage component 500 can be composed of a fine (e.g. small, tiny) granular size as compared to the soluble component. Therefore, in some examples, the method for assembling the beverage cartridge can facilitate effective loading of the soluble beverage component 500 into the cartridge. As well, to facilitate the desired boldness and flavor profile of the prepared beverage, some embodiments of the method for assembling the beverage cartridge can facilitate the proper ratio of soluble beverage component 500 to non-soluble beverage component 400.

[0053] As an overview, in some embodiments, the filling systems for cartridges can be completed in discrete steps wherein the cartridge is moved down, for example, a conveyor mechanism. As illustrated in **FIGS. 2A – D**, each of the beverage cartridges shown on the conveyor mechanism represents a step in one embodiment of the assembling of the beverage cartridge. While the methods described in **FIG. 2A – D** illustrate the steps of adding the soluble beverage component 500 and non-soluble beverage component 400 at separate physical locations along an assembly process, the steps can also be done at the same location with different feed mechanisms than what is disclosed below.

[0054] In some embodiments, the cartridge assembly method includes separate filling mechanisms for the soluble beverage component 500, the non-soluble beverage component 400, and the mixed beverage component 600. In some examples, in areas where the beverage component is exposed, the beverage cartridge assembling system can be shielded under a blanket (e.g. nitrogen blanket) until the cartridge is sealed.

[0055] **FIG. 2A** illustrates a schematic representation for the method for assembling the beverage cartridge 700 with a beverage component 300 illustrated in **FIG. 1A**. As shown above, the beverage component illustrated in **FIG. 1A** includes a beverage component with a first layer of non-soluble beverage component 400 and a second layer of soluble beverage component 500.

[0056] In some embodiments, the method for assembling the beverage cartridge 700 can include preparing the cartridge 750 for assembly. In some examples, this can include obtaining (e.g., forming or otherwise manufacturing) the cartridge 750 according to the desired configuration, such as the configuration described above. In some embodiments, the method 700 can include block 710 that includes preparing the cup for assembly. In some embodiments, preparing the cup for assembly can include forming a cup according to one the embodiments described above with respect to **FIGS. 1A-E**. In some embodiments, forming a cup can include forming a cup with a bottom wall, a side wall and a lip onto which a lid can be attached. In some embodiments, preparing the cartridge 750 can include forming a cup, inserting a filter within the cup and securing the filter to the cup by, for example, welding the filter to the cup.

[0057] In some embodiments, the method for assembling the beverage cartridge 700 can first include filling the cartridge 750 with a non-soluble beverage component 400. In some embodiments, the beverage cartridge assembly system can include a filling system that contains a hopper filled with the non-soluble beverage component 400. In some embodiments the hopper can include one set of feed auger screws to load the non-soluble beverage component 400 into the cartridge 750.

[0058] In some embodiments, the method for assembling the beverage cartridge 700 can then include filling the cartridge 750 with a soluble beverage component 500. In some embodiments, the beverage cartridge assembly system can include a filling system that contains a hopper filled with the soluble beverage component. In some embodiments the hopper can include a screw auger that can be engineered to prevent free flow of the soluble beverage component 500 into the cartridge 750. Advantageously this can manage the fine (e.g. small, tiny) granules of the soluble beverage component and limit dusting in the feed process to prevent contamination of the edges of the lid 760 of the cartridge 750.

[0059] Thus, in the illustrated embodiments of **FIGS. 2A – D**, separate feed systems can be used for the non-soluble beverage component 400 and the soluble beverage component 500. In the illustrated embodiment, the feeding of non-soluble beverage component 400 and the soluble beverage component 500 is shown as being conducted at separate locations along an assembly path. However, in certain embodiments, the feeding of non-soluble beverage component 400 and the soluble beverage component 500 can occur at the same location along the assembly path but with different feed systems and/or steps and/or or a common feed system that includes components configured specifically for the non-soluble beverage component 400 or the soluble beverage component 500.

[0060] As discussed above, the method of assembling a beverage cartridge can facilitate a desired ratio of soluble beverage component 500 to non-soluble beverage component 400 is loaded (e.g. filled, assembled, poured) into the cartridge 750. In some embodiments, between 1 or about 1 to 4 or about 4 grams of soluble beverage component 500 can be filled into the cartridge 750. In some embodiments, between 22 or about 22 to 26 or about 26 grams of non-soluble beverage component 400 can be filled into the cartridge 750. The disclosed embodiments are not limited to these ranges and can also include the ranges and

ratios described above and the amount of soluble beverage component 500 and non-soluble beverage component 400 can vary according to the desired boldness and flavor of the prepared beverage. In certain arrangements the above ratios and/or weight percentages can apply to arrangements where the non-soluble beverage component and the soluble beverage component are components of the same beverage. In certain arrangements, the non-soluble component is roasted ground coffee the soluble beverage can be soluble coffee such as coffee extract, freeze-dried and/or instant coffee

[0061] Some embodiments of the method for assembling the beverage cartridge 700 can include attaching a lid 760 to the rim of the cartridge 750. In some embodiments, the lid 760 can be secured or adhered to the cartridge 750 using any suitable adhesive or sealing techniques and materials, such as heat-sealing, crimping, gluing, UV-curing, applying ultrasonic or microwave energy (e.g. sonic welding), and otherwise.

[0062] In some embodiments, one or more of the steps described with respect to **FIGS. 2A – D** can be performed within an inert atmosphere blanket. In some embodiments, an inert gas can be placed within the cartridge before the cartridge is sealed with a lid and/or air can be removed from the cartridge before the cartridge is sealed.

[0063] As described below, the method described above with respect to **FIG. 2A** can be modified to change the order of insertion of the non-soluble beverage component 400 and soluble beverage component 500. **FIGS. 2B-D** will describe examples of these modifications and additional details and embodiments can be found above with reference to the description of **FIG. 2A**.

[0064] **FIG. 2B** illustrates a schematic representation for the method for assembling the beverage cartridge 800 with a beverage component 300 illustrated in **FIG. 1B**. The method for assembling the beverage cartridge 800 of **FIG. 2B** is similar to the method for assembling the beverage cartridge 800 illustrated above in **FIG. 1B** but in this embodiment the soluble beverage component 500 is inserted into the cartridge 850 before the non-soluble beverage component 400.

[0065] In the embodiment of **FIG. 2B**, the method for assembling the beverage cartridge 800 can include preparing the cartridge 850 for assembly. In some examples, this can include manufacturing the cartridge 850 according to the desired conformation described

above and with respect to **FIG. 2A**. In certain arrangements, preparing the cartridge can include forming a cup, inserting a filter within the cup and securing the filter to the cup by, for example, welding the filter to the cup.

[0066] In some embodiments, the method for assembling the beverage cartridge 800 can first include filling the cartridge 850 with a soluble beverage component 500. In some embodiments, the beverage cartridge assembly system can include a filling system as described with respect to **FIG. 2A** that contains a hopper filled with the soluble beverage component 500. In some embodiments the hopper can include a screw auger that can be engineered to prevent free flow of the soluble beverage component 500 into the cartridge 850.

[0067] In some embodiments, the method for assembling the beverage cartridge 800 can then include filling the cartridge 850 with a non-soluble beverage component 400. In some embodiments, the beverage cartridge assembly system can include a filling system that contains a hopper filled with the non-soluble beverage component 400. In some embodiments the hopper can include one set of feed screws to load the non-soluble beverage component 400 into the cartridge 850.

[0068] As discussed above with reference to **FIG. 2A**, the method for assembling the beverage cartridge 800 can facilitate a desired ratio of soluble beverage component 500 to non-soluble beverage component 400 is loaded (e.g. filled, assembled, poured) into the cartridge 850.

[0069] As discussed for **FIG. 2A**, in some embodiments, the method for assembling the beverage cartridge 800 can include attaching a lid 860 to the rim of the cartridge 850. In some embodiments, the lid 860 can be secured or adhered to the cartridge 850 using any suitable adhesive or sealing techniques and materials, such as heat-sealing, crimping, gluing, UV-curing, applying ultrasonic or microwave energy (e.g. sonic welding), and otherwise.

[0070] **FIG. 2C** illustrates a schematic representation for the method for assembling the beverage cartridge 900 with a beverage component 300 illustrated in **FIG. 1C**.

[0071] As described above with respect to **FIG. 2A**, in some embodiments, the method for assembling the beverage cartridge 900 can include preparing the cartridge 950 for

assembly. In some examples, this can include manufacturing the cartridge 950 according to the configurations described above. In certain arrangements, preparing the cartridge can include forming a cup, inserting a filter within the cup and securing the filter to the cup by, for example, welding the filter to the cup.

[0072] In some embodiments, the method for assembling the beverage cartridge 900 can first include filling the cartridge 950 with a non-soluble beverage component 400 as described with respect to **FIG. 2A**. In some embodiments, the beverage cartridge assembly system can include a filling system that contains a hopper filled with the non-soluble beverage component 400. In some embodiments the hopper can include one set of feed screws to load the non-soluble beverage component 400 into the cartridge 950.

[0073] In some embodiments, the method for assembling the beverage cartridge 900 can then include filling the cartridge 950 with a soluble beverage component 500 as described with respect to **FIG. 2A**. In some embodiments, the beverage cartridge assembly system can include a filling system that contains a hopper filled with the soluble beverage component 500. In some embodiments the hopper can include a screw auger that can be engineered to prevent free flow of the soluble beverage component 500 into the cartridge 950.

[0074] In some embodiments, the method for assembling the beverage cartridge 900 can include filling the cartridge 950 with another layer of non-soluble beverage component 400. As discussed above, the beverage cartridge assembly system can include an identical filling system as that provided for the first layer of non-soluble beverage component 400.

[0075] As discussed above, the method for assembling the beverage cartridge 900 can facilitate a desired ratio of soluble beverage component 500 to non-soluble beverage component 400 is loaded (e.g. filled, assembled, poured) into the cartridge 950.

[0076] As discussed for **FIGS. 2A – B**, in some embodiments, the method for assembling the beverage cartridge 900 can include attaching a lid 960 to the rim of the cartridge 950. In some embodiments, the lid 960 can be secured or adhered to the cartridge 950 using any suitable adhesive or sealing techniques and materials, such as heat-sealing, crimping, gluing, UV-curing, applying ultrasonic or microwave energy (e.g. sonic

welding), and otherwise. In certain arrangements, the method of **FIG. 2C**, can be modified to include additional steps of feeding soluble and/or non-soluble components and/or one or more of steps can be rearranged in order.

[0077] **FIG. 2D** illustrates a schematic representation for the method for assembling the beverage cartridge 1000 with a beverage component 300 illustrated in **FIG. 1D**.

[0078] In some embodiments, the method for assembling the beverage cartridge 1000 can include preparing the cartridge 1050 for assembly as described with respect to **FIG. 2A**.

[0079] In some embodiments, the method for assembling the beverage cartridge 1000 can first include filling the cartridge 1050 with a beverage component 300. As discussed above, in some embodiments, the beverage component 300 can be prepared prior to the method for assembling the beverage cartridge 1000. In some embodiments, the beverage cartridge assembly system can include a filling system that contains a hopper filled with the beverage component 300. In some examples, the hopper can include one set of feed screws to load the non-soluble beverage component 400 into the cartridge 1050. In additional examples, the hopper can include a screw auger that can be engineered to prevent free flow of the beverage component 300 into the cartridge 1050. Advantageously this can manage the fine (e.g. small, tiny) granules of the soluble beverage component 500 in the beverage component 300 and limit dusting in the feed process to prevent contamination of the edges of the lid 1060 of the cartridge 1050.

[0080] In other embodiments, the beverage component 300 can be prepared as the cartridge 1050 is being filled. In some examples, the cartridge 1050 would receive soluble beverage component 500 and non-soluble beverage component 400 simultaneously from a plurality of hoppers described above.

[0081] As discussed for **FIGS. 2A – C**, in some embodiments, the method for assembling the beverage cartridge 1000 can include attaching a lid 1060 to the rim of the cartridge 1050. In some embodiments, the lid 1060 can be secured or adhered to the cartridge 1050 using any suitable adhesive or sealing techniques and materials, such as heat-

sealing, crimping, gluing, UV-curing, applying ultrasonic or microwave energy (e.g. sonic welding), and otherwise.

Certain Terminology

[0082] As used herein, the term “beverage” has its ordinary and customary meaning, and includes, among other things, any edible liquid or substantially liquid substance or product having a flowing quality (e.g., juices, coffee beverages, teas, frozen yogurt, beer, wine, cocktails, liqueurs, spirits, cider, soft drinks, flavored water, energy drinks, soups, broths, combinations of the same, or the like).

[0083] The term “pod,” as used herein, has its ordinary and customary meaning, and includes, among other things, cartridges, capsules, canisters, pucks, pads, and the like, whether or not such pods are capable of and/or configured to be pierced or otherwise ruptured to form an inlet into and/or outlet from the pod.

[0084] Although certain embodiments have been described herein with respect to coffee, the cartridges described herein can include particulate materials or components for producing many other types of beverages, such as a chocolate based product (e.g., hot cocoa), tea, juice, and other beverages. Further, although some embodiments have been disclosed in which liquid is introduced into the cartridge, the introduction of other phases is contemplated. For example, in some embodiments, steam or a combination of steam and liquid water is introduced into the cartridge. Additionally, although certain embodiments have been disclosed that include an instant beverage component, the term “instant beverage component” is not limited to only a single component. Rather, the instant beverage component can comprise one component (e.g., coffee) or a plurality of components (e.g., coffee and a sweetener).

[0085] Conditional language, for example, among others, “can,” “could,” “might,” or “may,” unless specifically stated otherwise, or otherwise understood within the context as used, is generally intended to convey that certain embodiments include, while other embodiments do not include, certain features, elements and/or steps. Thus, such conditional language is not generally intended to imply that features, elements, and/or steps are in any way required for one or more embodiments or that one or more embodiments necessarily include

logic for deciding, with or without user input or prompting, whether these features, elements, and/or steps are included or are to be performed in any particular embodiment.

[0086] Although certain embodiments and examples have been described herein, it will be understood by those skilled in the art that many aspects of the methods and devices shown and described in the present disclosure may be differently combined and/or modified to form still further embodiments or acceptable examples. All such modifications and variations are intended to be included herein within the scope of this disclosure. A wide variety of designs and approaches are possible. No feature, structure, or step disclosed herein is essential or indispensable.

[0087] Some embodiments have been described in connection with the accompanying drawings. However, it should be understood that the figures are not drawn to scale. Distances, angles, etc. are merely illustrative and do not necessarily bear an exact relationship to actual dimensions and layout of the devices illustrated. Components can be added, removed, and/or rearranged. Further, the disclosure herein of any particular feature, aspect, method, property, characteristic, quality, attribute, element, or the like in connection with various embodiments can be used in all other embodiments set forth herein. Additionally, it will be recognized that any methods described herein may be practiced using any device suitable for performing the recited steps.

[0088] The terms “approximately,” “about,” and “substantially” as used herein represent an amount close to the stated amount that still performs a desired function or achieves a desired result. For example, in some embodiments, as the context may dictate, the terms “approximately,” “about,” and “substantially” may refer to an amount that is within less than or equal to 10% of the stated amount or equal to or greater than 10% of the stated amount. The term “generally” as used herein represents a value, amount, or characteristic that predominantly includes or tends toward a particular value, amount, or characteristic. The ranges disclosed herein also encompass any and all overlap, sub-ranges, and combinations thereof. Language such as “up to,” “at least,” “greater than,” “less than,” “between,” and the like include the number recited. Numbers preceded by a term such as “about” or “approximately” include the recited numbers and should be interpreted based on the

circumstances (e.g., as accurate as reasonably possible under the circumstances, for example. For example, “about 1 gram” includes “1 gram.”

Summary

[0089] Although this disclosure describes certain embodiments and examples of beverage preparation systems, many aspects of the methods and devices shown and described in the present disclosure may be combined differently and/or modified to form still further embodiments or acceptable examples. All such modifications and variations are intended to be included herein within the scope of this disclosure. Indeed, a wide variety of designs and approaches are possible and are within the scope of this disclosure. For example, although some embodiments have been disclosed in which liquid water is introduced into the cartridge, the introduction of other liquids (e.g., milk) and/or other phases (e.g., steam) is contemplated as well. While illustrative embodiments have been described herein, the scope of any and all embodiments having equivalent elements, modifications, omissions, combinations (e.g., of aspects across various embodiments), adaptations and/or alterations as would be appreciated by those in the art based on the present disclosure.

[0090] Also, although there may be some embodiments within the scope of this disclosure that are not expressly recited above or elsewhere herein, this disclosure contemplates and includes all embodiments within the scope of what this disclosure shows and describes. Further, this disclosure contemplates and includes embodiments comprising any combination of any structure, material, step, or other feature disclosed anywhere herein with any other structure, material, step, or other feature disclosed anywhere herein.

[0091] Furthermore, certain features that are described in this disclosure in the context of separate implementations, arrangements and/or embodiments can also be implemented in combination in a single implementation arrangements and/or embodiments. Conversely, various features that are described in the context of a single implementation arrangements and/or embodiments can also be implemented in multiple implementations arrangements and/or embodiments separately or in any suitable subcombination. Moreover, although features may be described above as acting in certain combinations, one or more features from a claimed combination can, in some cases, be excised from the combination, and the combination may be claimed as a subcombination or variation of a subcombination.

[0092] For purposes of this disclosure, certain aspects, advantages, and novel features are described herein. Not necessarily all such advantages may be achieved in accordance with any particular embodiment. Thus, for example, those skilled in the art will recognize that the disclosure may be embodied or carried out in a manner that achieves one advantage or a group of advantages as taught herein without necessarily achieving other advantages as may be taught or suggested herein.

[0093] Some embodiments have been described in connection with the accompanying drawings. However, the figures are not drawn to scale. Distances, angles, etc. are merely illustrative and do not necessarily bear an exact relationship to actual dimensions and layout of the devices illustrated. Components can be added, removed, and/or rearranged. Further, the disclosure herein of any particular feature, aspect, method, property, characteristic, quality, attribute, element, or the like in connection with various embodiments can be used in all other embodiments set forth herein. Also, any methods described herein may be practiced using any device suitable for performing the recited steps.

[0094] Moreover, while components and operations may be depicted in the drawings or described in the specification in a particular arrangement or order, such components and operations need not be arranged and performed in the particular arrangement and order shown, nor in sequential order, nor include all of the components and operations, to achieve desirable results. Other components and operations that are not depicted or described can be incorporated in the embodiments and examples. For example, one or more additional operations can be performed before, after, simultaneously, or between any of the described operations. Further, the operations may be rearranged or reordered in other implementations. Also, the separation of various system components in the implementations described above should not be understood as requiring such separation in all implementations, and it should be understood that the described components and systems can generally be integrated together in a single product or packaged into multiple products.

[0095] In summary, various illustrative embodiments and examples of beverage preparations systems, components, and related methods have been disclosed. Although the systems have been disclosed in the context of those embodiments and examples, this disclosure extends beyond the specifically disclosed embodiments to other alternative

embodiments and/or other uses of the embodiments, as well as to certain modifications and equivalents thereof. This disclosure expressly contemplates that various features and aspects of the disclosed embodiments can be combined with, or substituted for, one another. Accordingly, the scope of this disclosure should not be limited by the particular disclosed embodiments described above, but should be determined only by a fair reading of the claims that follow as well as their full scope of equivalents.



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(71) Applicant: STARBUCKS CORPORATION D/B/A
STARBUCKS COFFEE COMPANY [US/US]; 2401
Utah Avenue South, Seattle, WA 98134-1435 (US).

(72) Inventors: CAMERA, Paul, N.; 2401 Utah Avenue
South, Seattle, WA 98134-1435 (US). BROCKMAN,
John; 2401 Utah Avenue South, Seattle, WA 98134-1435
(US).

(74) Agent: CHRISTENSEN, Michael, R.; Knobbe Martens
Olson & Bear, LLP, 2040 Main Street, 14th Floor, Irvine,
CA 92614 (US).

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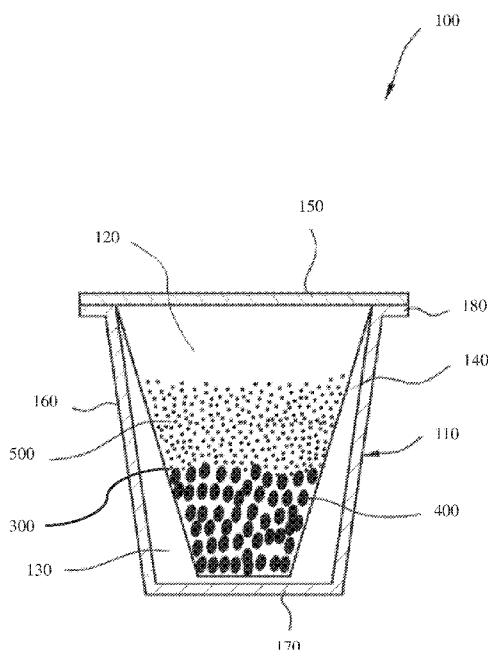


FIG. 1A

(57) Abstract: Present embodiments generally related to a single-serve beverage cartridge for use with a beverage machine. In some embodiments, the cartridge includes a cup, a lid, and a beverage component disposed in the cup. The beverage component can include a soluble beverage component and a non-soluble beverage component. In certain instances, the beverage component in the beverage cartridge can include a first layer of non-soluble beverage component and a second layer of soluble beverage component. In other instances, the beverage component can include a first layer of soluble beverage component and a second layer of non-soluble beverage component. In other instances, the beverage component can include a first layer of non-soluble beverage component, a second layer of soluble beverage component, and a third layer of non-soluble beverage component. In other instances, the beverage component can include a mixture of soluble beverage component and non-soluble beverage component. The soluble and non-soluble beverage components can be the soluble and non-soluble components of a same or similar type

of beverage.

BEVERAGE CARTRIDGES AND METHODS

CROSS REFERENCE

[0001] This application claims a priority benefit under 35 U.S.C. § 119 of U.S. Patent Application No. 62/131,732, filed March 11, 2015, the entirety of which is hereby incorporated by reference herein.

FIELD

[0002] The present disclosure relates to a sealed cartridge with a soluble beverage component and an insoluble beverage component for producing a beverage when fluid is introduced into the cartridge. The cartridge can be configured for use with single-serve beverage machines.

DESCRIPTION OF CERTAIN RELATED ART

[0003] Single-serve beverage machines are devices that are designed to produce a single serving, or sometimes a single cup, of a desired beverage. In comparison to other types of beverage machines (such as drip coffee makers having a multi-cup carafe), single-serve beverage machines can enhance convenience by reducing the time to prepare the beverage. Furthermore, single-serve beverage machines can reduce waste by decreasing the likelihood of producing excess amounts of the beverage, which may go unused and be subsequently discarded.

[0004] Some single-serve beverage machines use a cartridge (also called a pod or capsule) containing substantially non-soluble coffee grounds to produce the beverage. Generally, such cartridges are received in the single-serve beverage machine, are used to produce the single serving of the beverage, and are subsequently manually removed from the machine and discarded.

SUMMARY OF THE DISCLOSURE

[0005] In certain applications, the size and/or volume of a cartridge for a single-serve beverage machine may be limited. As a result, the cartridge may not provide enough room to accommodate the recommended quantity of non-soluble beverage component to dispense a beverage of a certain volume from a beverage machine. Accordingly, in some embodiments, a cartridge is provided with a soluble beverage component in conjunction with

a non-soluble beverage component. The soluble beverage component can provide additional flavor per unit volume within the cartridge than a cartridge with only a non-soluble component. In this manner, the intended flavor profile can be achieved for a greater range of beverage volumes formed from a fixed cartridge volume while still providing the flavor advantages and benefits of the non-soluble component. In certain embodiments, the soluble beverage component and the non-soluble beverage component are soluble and non-soluble components of the same or similar type of beverage, such as coffee. Thus, in an embodiment where the beverage is coffee, the soluble beverage component can comprise instant coffee and the non-soluble component can comprise roasted ground coffee. In an embodiment where the beverage is tea, the soluble beverage component can comprise instant tea and the non-soluble component can comprise tea leaves. A combination of a soluble beverage component and a non-soluble beverage component can enhance the desired body and flavor profile for a cartridge over a wider range of beverage volumes provided by a beverage machine.

[0006] In certain configurations, the cartridge can include a beverage component composed of a predetermined ratio of soluble beverage component and non-soluble beverage component. Similarly, the soluble beverage component and non-soluble beverage component can be provided in one or more layers within the cartridge or thoroughly mixed prior to placement within the cartridge. In some configurations, the soluble beverage component comprises dry coffee extract and the non-soluble beverage component comprises roasted ground coffee. In certain configurations, the soluble beverage component can include microground coffee and dry coffee extract. In certain embodiments, the cartridge can include a lid and a bottom wall that can be configured to be pierced to allow the flow of liquid therethrough. In certain embodiments, the cartridge can include a filter element to retain the non-soluble beverage component within the cartridge.

[0007] In some embodiments, a method of assembling a cartridge for producing a beverage is described. In some arrangements, a method for filling a cartridge with a predetermined ratio of soluble beverage component and non-soluble beverage component is provided. In some arrangements, the soluble beverage component and the non-soluble beverage component are introduced into the cartridge via separate feed mechanisms and/or

discrete steps. In some arrangements, the soluble beverage component and the non-soluble beverage component are fed into the cartridge such that the cartridge has a first layer of soluble beverage component and a second layer of non-soluble beverage component. In some arrangements, the cartridge has a first layer of non-soluble beverage component and a second layer of soluble beverage component. In some arrangements, the cartridge has a first layer of soluble beverage component, a second layer of non-soluble beverage component, and a third layer of soluble beverage component. In some arrangements, a predetermined ratio of the soluble beverage component and non-soluble beverage component is first mixed before filling the cartridge.

BRIEF DESCRIPTION OF THE FIGURES

[0008] Various embodiments are depicted in the accompanying drawings for illustrative purposes, and should in no way be interpreted as limiting the scope of the embodiments. Furthermore, various features of different disclosed embodiments can be combined to form additional embodiments, which are part of this disclosure.

[0009] FIG. 1A illustrates a cross-sectional view of an embodiment of a cartridge with a beverage component including a first layer of non-soluble beverage component and a second layer of soluble beverage component.

[0010] FIG. 1B illustrates a cross-sectional view of an embodiment of a cartridge of FIG. 1A with a beverage component including a first layer of soluble beverage component and a second layer of non-soluble beverage component.

[0011] FIG. 1C illustrates a cross-sectional view of an embodiment of a cartridge of FIG. 1A with a beverage component including a first layer of non-soluble beverage component, a second layer of soluble beverage component, and a third layer of non-soluble beverage component.

[0012] FIG. 1D illustrates a cross-sectional view of an embodiment of a cartridge of FIG. 1A with a beverage component including a combination of soluble beverage component and non-soluble beverage component.

[0013] FIG. 1E illustrates a cross-sectional view of an alternative embodiment of a cartridge with the beverage component illustrated in FIG. 1A including a combination of non-soluble beverage component and soluble beverage component.

[0014] FIG. 2A illustrates a schematic representation of an embodiment of a method for assembling the beverage cartridge illustrated in FIG. 1A.

[0015] FIG. 2B illustrates a schematic representation of an embodiment of a method for assembling the beverage cartridge illustrated in FIG. 1B.

[0016] FIG. 2C illustrates a schematic representation of an embodiment of a method for assembling the beverage cartridge illustrated in FIG. 1C.

[0017] FIG. 2D illustrates a schematic representation of an embodiment of a method for assembling the beverage cartridge illustrated in FIG. 1D.

[0018] FIG. 3A illustrates a flow chart of a method for assembling a beverage cartridge as illustrated in FIG. 2A.

[0019] FIG. 3B illustrates a flow chart of a method for assembling a beverage cartridge as illustrated in FIG. 2B.

DETAILED DESCRIPTION

[0020] The following discussion is presented to enable a person skilled in the art to make and use one or more of the described embodiments. The general principles described herein may be applied to embodiments and applications other than those detailed below without departing from the spirit and scope of the disclosure. Indeed, the described embodiments are not intended to be limited to the particular embodiments shown, but are to be accorded the widest scope consistent with the principles and features disclosed or suggested herein.

Certain Cartridge Structures

[0021] **FIGS. 1A – D** illustrate cross-sectional views of some embodiments of a cartridge 100. The specific structure of the cartridge 100 described below is not intended to be limiting but provides one example carrier for the beverage component 300 described below.

[0022] As described herein, the size and/or volume of a cartridge for a beverage machine may be limited. As a result, the cartridge may not provide enough room to accommodate the recommended quantity of non-soluble beverage component to dispense a beverage of a certain volume from a beverage machine. Accordingly, in certain embodiments

describe below, the cartridge 100 can be provided with a soluble beverage component in combination with a non-soluble beverage component. As described herein, the soluble beverage component and the non-soluble beverage component can be soluble and non-soluble components of the same type of beverage, such as coffee. Thus, in an embodiment where the beverage is coffee, the soluble beverage component can comprise instant coffee and the non-soluble component can comprise roasted ground coffee. A combination of a soluble beverage component and a non-soluble beverage component can enhance the desired body and flavor profile for a cartridge over a wider range of beverage volumes provided by a beverage machine

[0023] Referring to **FIGS. 1A – D**, a cartridge 100 can include a cup 110, a lid 150 and a filter element 140. In some embodiments, the cartridge has no filter. In some embodiments, the cup 110 can have a generally hollow structure having a bottom wall 170, a protruding lip 180 and a sidewall 160. In other embodiments, the cartridge 100 can have a gradually tapered, generally cylindrical shape; however, other shapes can be used without departing from the spirit and/or scope of the disclosure.

[0024] The cup can include an outwardly protruding lip 180. In some embodiments, the lid 150 is secured to the radially outwardly protruding lip 180 surrounding an access opening. The lid 150 can be secured, adhered, or otherwise connected with the outwardly protruding lip 180 or adjacent thereto, thereby forming a sealed cartridge 100. The seal can be an airtight seal to reduce entry of ambient air into the cartridge 100 and thus promote freshness of the beverage component 300. The lid 150 can be secured or adhered to the cartridge 100 using any suitable adhesive or sealing techniques and materials, such as heat-sealing, crimping, gluing, UV-curing, applying ultrasonic or microwave energy (e.g., sonic welding), and otherwise.

[0025] In additional variants, the filter element 140 can be disposed within the cup 110 and attached to the cup 110 adjacent the lid 150. The filter element 140 can define a first chamber 120 and a second chamber 130. In some examples, the first chamber 120 can contain a beverage component 300 for producing a brewed beverage when water is introduced into the cartridge 100. In some embodiments, during the brewing process, the lid 150 is pierced so that liquid is introduced into the first chamber 120 and mixes with the

beverage component 300. In some examples, the brewed beverage can then pass through the filter element 140 (which removes non-soluble components of the used beverage component 300 from the brewed beverage) and into the second chamber 130. In some examples, the brewed beverage then exits the cartridge 100 through the bottom wall 170 of the cartridge 100, which has also been pierced to produce an opening.

[0026] The cup 110 and the lid 150 can be constructed of a liquid-impermeable material that is capable of being pierced or perforated by a piercing member of a single-serve beverage machine to allow the introduction of liquid (e.g., hot water or cold water) into the cartridge 100. For example, the cup 110 and the lid 150 can be made of one or more metallic (e.g., aluminum), paper-based, polymeric (e.g., plastic, polyethylene, polyurethane, nylon), and/or biodegradable materials. In some embodiments, the cup 110 and/or the lid 150 is constructed of a flexible material. In certain instances, the lid 150 of the cartridge 100 can be pierced or perforated by a piercing member. In such cases, liquid can be injected or otherwise delivered through a piercing member and/or the opening created therefrom into the cup 110, thereby forming a beverage within the cup 110. In other instances, the lid 150 may be constructed of a gas and/or water permeable material that allows a liquid, such as water, to pass through without requirement piercing of the lid.

[0027] In some embodiments, the introduction of liquid into the cartridge 100 encourages mixing of the liquid and the beverage component 300. For example, the liquid can be introduced as a pressurized (e.g., between about 0.5 bars and about 20 bars) stream, which can impinge the beverage component 300 and/or the cup 110 (e.g., the bottom wall 170) and facilitate mixing. In some embodiments, the liquid is injected in a manner such that liquid and instant beverage component are effectively churned or swirled within the cup 110, thereby allowing the beverage particles to be dispersed and/or dissolved more readily. For example, in some such cases the liquid is injected in a cyclonic fashion.

[0028] In some embodiments, the liquid introduced into the cartridge is water. For example, in some embodiments, use other types of liquid. For example, in certain embodiments, the liquid is milk, such as for the preparation of hot cocoa. In other embodiments, the liquid is a juice. In some embodiments, the liquid is carbonated, such as for the preparation of a soft drink. In certain embodiments, the liquid is alcoholic, such as for

the preparation of a shot or a cocktail. In some instances, a hot liquid is introduced, e.g., for hot beverages. In other instances, a cold liquid is introduced, e.g., for iced beverages. The amount of liquid introduced can be predetermined or adjusted based on a desired strength of the beverage.

[0029] In some embodiments, after the cartridge has been pierced by a first piercing member, the liquid has been introduced into the cartridge, and the beverage components have been at least partly mixed with and/or dissolved into the liquid, the beverage is ready to exit the cartridge. Accordingly, in some instances, the cup 110 can be configured to provide a location for the liquid to exit the cartridge 100. For example, the bottom wall 170 can be configured to be pierced or perforated by a piercing member to allow the prepared beverage to exit the cartridge 100. The piercing member can be a hollow needle or cannula-like element, such that the prepared beverage can flow through the second piercing member for delivery to a cup or other beverage receptacle for consumption (e.g., via a discharge spout). In some embodiments, the prepared beverage does not flow through a piercing member, rather the prepared beverage exits via a hole or opening formed by a piercing member. In certain embodiments, a piercing member pierces approximately the center (e.g., radial center) of the bottom wall 170. In yet other embodiments the cartridge may be fabricated with one or more holes or openings in the bottom wall 170. In such embodiments, the hole(s) may be sealed by a removable tab or other covering that may be stripped from the bottom wall 170 prior to use. In yet other embodiments, the bottom wall 170 is constructed of a gas and/or impermeable material that can allow the formed beverage to pass through without requiring piercing or removal of any tab or covering.

[0030] In certain arrangements, components of the cartridge 100 are constructed of a flexible material. For example, in some embodiments, the cup 110 is sufficiently flexible to be able to collapse and expand. Such a configuration can, for example, reduce the storage space occupied by the cartridge 100 and reduce the likelihood of air or other gasses spoiling or otherwise degrading the beverage component 300. In some cases, the cup 110 is collapsed around the beverage component 300. In some cases, air or other gases are substantially evacuated from the cartridge 100. In some embodiments, the cup 110 is

configured to expand when the liquid is introduced into the cartridge 100. In certain such cases, the cup 110 expands to about its size and shape prior to collapse.

[0031] **FIG. 1E** illustrates another example of a cartridge 200. In some embodiments, the cartridge 200 includes a cup 210 with a bottom wall 230, a sidewall 240, and a lid 220. The lid 220 can be sealed with a lip 250 of the cartridge 200. The cartridge 200 can include a barrier 260 to prevent leakage of the coffee grounds from the cartridge 200 when the capsule is pierced during the coffee brewing process. During the brewing process, the bottom wall 230 of the capsule is pierced so that water is introduced into the cartridge 200 and mixes with the beverage component 300. The brewed espresso beverage then exits through the lid 220 of the cartridge 200, which lid 220 has been ruptured to produce a number of openings or perforations. As illustrated, the beverage cartridge 200 can include a first layer of non-soluble beverage component 400 and a second layer of soluble beverage component 500.

[0032] In various embodiments, the cartridges described herein can be made of biodegradable or otherwise “environmental friendly” materials. The cartridges described herein can be configured for single use. The cartridges described herein can be compatible with one or more existing single-serve beverage machines or technologies. The cartridge described herein can be configured to deliver a “single-serving” of beverage. The term “single serving” has its ordinary and customary meaning, and includes, among other things, a portion of beverage that is customarily consumed by one person. For example, some single-serving beverage pods are configured to produce less than or equal to about 20 fluid ounces (about 600 milliliters) of beverage. While several embodiments described herein are described with respect to single serving applications, this disclosure is not limited to such applications and certain embodiments can also be applied to cartridges configured for larger than a single serving.

[0033] In some embodiments, the cartridge can be vacuum sealed or pressurized. In some embodiments, the oxygen or ambient air in the cartridge is replaced with nitrogen (or another generally non-reactive gas). In certain other embodiments, the oxygen or ambient air in the cartridge is replaced with a combination of nitrogen and carbon-dioxide. Replacement of the oxygen or ambient air in the cartridge can, for example, enhance the shelf-life of the

cartridge and reduce the chance of spoliation or degradation of the contents of the cartridge. In some embodiments, one or more portions of the cartridge (e.g., the cup and/or the lid) are configured to limit or otherwise control the transmission of water vapor and/or oxygen between the beverage component and an external environment (e.g., ambient air) in order to provide an acceptable shelf life. For example, in some cases, the lid has a water vapor transmission rate of less than or equal to about $0.050 \text{ g/m}^2/\text{day}$ (measured as per ASTM F-1249). In certain embodiments, the lid has an oxygen transmission rate of less than or equal to about $0.500 \text{ cc/m}^2/\text{day}$ (measured as per ASTM D3985). Those skilled in the art will recognize that such transmission rates are illustrative and thus, should not be construed as limiting. In some instances, an acceptable shelf life is between about 6 months and about 12 months after assembly of the cartridge. However, depending on the contents of the cartridge, a shelf life that is shorter (e.g., about 3 months) or longer (e.g., about 18 months) may be applicable and is contemplated by this disclosure.

[0034] The cartridge can include a single serving, or single-serve portion, of the beverage component, such as instant coffee, tea, fruit juice, soft drink, or any other beverage that can be produce by mixing one or more substantially soluble beverage components with a fluid. The term soluble as used herein shall be given its ordinary and customary meaning, and shall include, without limitation, products that readily dissolve or disperse in a liquid, such as water or milk. Similarly, the term non-soluble as used herein shall be given its ordinary and customary meaning, and shall include, without limitation, products that do not readily dissolve in a liquid, such as water or milk. As will be described below, the cartridge can include a combination of soluble beverage component and a non-soluble beverage component. The soluble beverage component and a non-soluble beverage component can be components of the same type of beverage, such as coffee.

[0035] In some embodiments the soluble beverage component can be composed of dissolvable beverage components such as a dried (e.g. freeze-dried, hot air dried, or any other drying process) coffee, tea, fruit juice, dairy or cocoa-based beverage. In other embodiments, the soluble beverage component can be composed of other dissolvable beverage components that can include, but is not limited to, dairy, soy, sugar, artificial

sweeteners, nutrients, flavorings, or other soluble components, in addition to, for example, coffee, tea, fruit juice, dairy or cocoa-based beverage.

[0036] In some embodiments, the soluble beverage component can include a portion of microground or pulverized coffee, such as that described in U.S. Patent Application Publication No. 2010/0009039, filed July 9, 2008, and titled “METHOD OF MAKING BEVERAGES WITH ENHANCED FLAVORS AND AROMAS,” the entirety of which is incorporated herein by reference. For example, in some cases, the soluble beverage component can include coffee having a median or mean particle size of about 350 microns or less. In some embodiments, the soluble beverage component includes a combination of freeze-dried coffee and microground coffee.

[0037] In some embodiments, the non-soluble beverage component can be composed of a beverage component that is not readily dissolvable such as coffee grounds, tea leaves, fruits, and any other particles that can be used to impart flavor into the beverage without being readily dissolvable. In some embodiments, the non-soluble beverage component is retained within the cartridge 100 by a filter element (e.g., such as the filter element 140 described above) such that the prepared beverage does not contain undesirable textures associate with components that are not readily dissolvable.

Certain Cartridge Components

[0038] As described above, the cartridge can include soluble and non-soluble beverage components. In certain embodiments, the soluble beverage component and the non-soluble beverage component can be combined within the cartridge to form a mixed beverage component. As discussed, in some examples, the soluble beverage component and the non-soluble beverage component can be at a predetermine ratio. In some embodiments, additional beverage components can be combined within the cartridge, including but not limited to dairy, soy, sugar, artificial sweeteners, nutrients, flavorings, or other soluble components, in addition to, for example, coffee, tea, fruit juice, dairy or cocoa-based beverage. As mentioned above, the non-soluble beverage component and the soluble beverage can be soluble and non-soluble components of the same beverage, such as coffee.

[0039] The type and amount of beverage component and/or the ratio of soluble to non-soluble components can be selected to provide a beverage having certain desired

characteristics. For example, the amount of soluble beverage component 500 can be selected to deliver a predetermined strength of beverage given a fixed cartridge size and/or volume. The type and amount soluble and non-soluble beverage components within the cartridge can also depend upon the size and/or type of cartridge and the beverage sized delivered by the cartridge. Accordingly, the ratio of soluble beverage component to non-soluble beverage component can vary in light of the disclosure herein to provide a beverage having certain desired characteristics and are not limited to the following non-limiting example arrangements and embodiments.

[0040] In certain arrangements, the ratio of soluble beverage component to non-soluble beverage component can include ratios of, for example, 1:22, 1:23, 1:24, 1:25, 1:26, 2:22, 2:23, 2:24, 2:25, 2:26, 3:22, 3:23, 3:24, 3:25, 3:26, 4:22, 4:23, 4:24, 4:25, 4:26, values between the aforementioned values, or other values. In certain arrangements, the soluble beverage component can comprise 3% to 16% of the total weight of the soluble and non-soluble beverage components 500, 400 within the cartridge and in certain arrangements 2% to 18% of the total weight of the soluble and non-soluble beverage components 500, 400 within the cartridge, and in certain embodiments 1% to 22% of the total weight of the soluble and non-soluble beverage components 500, 400 within the cartridge. In certain arrangements, the soluble beverage component 500 can comprise about 3% to about 16% of the total weight of the soluble and non-soluble beverage components 500, 400 within the cartridge and in certain arrangements about 2% to about 18% of the total weight of the soluble and non-soluble beverage components 500, 400 within the cartridge, and in certain embodiments about 1% to about 22% of the total weight of the soluble and non-soluble beverage components 500, 400 within the cartridge. In certain embodiments, the ratio of non-soluble beverage component 400 to soluble beverage component 500 can include ratios of 26:1, 26:2, 26:3 and in certain arrangements 14:1, 14:2, and 14:3 and in certain arrangements 7:1 7:2 and these arrangements can also include values between the aforementioned values, or other values. In certain arrangements, the above ratios and/or weight percentages can apply to arrangements where the non-soluble beverage component 400 and the soluble beverage 500 can be soluble and non-soluble components of the same beverage, such as coffee, tea or any of the beverages described herein. In certain

arrangements, the above ratios and/or weight percentages can apply to arrangements where the non-soluble beverage component is roasted ground coffee and the soluble beverage can be soluble coffee such as coffee extract, freeze-dried and/or instant coffee.

[0041] In some arrangements configured for single servings, the cartridge comprises 22 to 26 grams of non-soluble beverage component and 1 to 4 grams of soluble beverage component. In some arrangements configured for single servings, the cartridge comprises about 22 to about 26 grams of non-soluble beverage component and about 1 to about 4 grams of soluble beverage component. In some arrangements, the cartridge comprises 22 to 26 grams of non-soluble coffee component such as roasted ground coffee and 1 to 4 grams of soluble coffee component such as coffee extract, freeze-dried and/or instant coffee. In some arrangements, the cartridge comprises about 22 to about 26 grams of non-soluble coffee component such as roasted ground coffee and about 1 to about 4 grams of soluble coffee component such as coffee extract, freeze-dried and/or instant coffee.

[0042] **FIG. 1A** illustrates a cartridge 100 with a first layer of non-soluble beverage component 400 and a second layer of soluble beverage component 500. In this arrangement, the layer of soluble beverage component 500 can be positioned on top of the layer of non-soluble beverage component 400. In the illustrated arrangement, the second layer of soluble beverage component 500 can form the upper most or top layer of the beverage components positioned within the cartridge 100. In one embodiment, the layer of soluble beverage component 500 is positioned within the top half of the depth of components within the cartridge, in another embodiment, within the top third, and in another embodiment, within the top quarter of the depth of the components within the cartridge.

[0043] **FIG. 1B** illustrates a cartridge with a first layer of soluble beverage component 500 and a second layer with a non-soluble beverage component 400. In this arrangement, the layer of soluble beverage component 500 can be positioned below the layer of non-soluble beverage component. In this arrangement, the soluble beverage component 500 can form the lower-most or bottom layer of the beverage components within the cartridge 100. In one embodiment, the layer of soluble beverage component 500 is positioned within the bottom half of the depth of components within the cartridge, in another

embodiment, within the bottom third, and in another embodiment, within the bottom quarter of the depth of the components within the cartridge.

[0044] Layering of the soluble 500 and non-soluble beverage components 400 of the beverage component 300 (such as is illustrated in **FIGS. 1A – B**) can aid in providing the cartridge with a prescribed amount and/or proportion of soluble beverage component 500 to non-soluble beverage component 400. For example, as will be discussed in more detail below, layering can reduce or avoid problems associated with the fine granular size of the soluble beverage component 500. In some embodiments, layering can avoid or reduce problems associated with mixing the non-soluble and soluble components together before insertion into the cartridge. For example, layering can reduce or avoid issues associated with mixing components of different densities

[0045] In some instances, layering can facilitate transport and/or manufacturability of the cartridge. For example, in the layered approach, the soluble and non-soluble components can be maintained, transported, and/or inserted into the cartridge as separate components. In contrast, in a mixed approach, the soluble and non-soluble components are mixed, transported, and inserted into the cartridge as combined components. In certain instances, the mixed components can stratify during mechanical transport (e.g., before insertion into a pod), which can lead to and inconsistent proportions of the soluble and non-soluble components being inserted into the cartridge during manufacturing.

[0046] **FIG. 1C – D** illustrates certain additional configurations of the beverage component 300. **FIG. 1C** illustrates a cartridge with a first layer of non-soluble beverage component 400, a second layer of soluble beverage component 500, and non-soluble beverage component 400. Thus, in the illustrated arrangement, the soluble beverage component 500 can comprise one or more layers between layers of the non-soluble beverage component 400 or the non-soluble beverage component 400 can comprise one or more layers between layers of soluble beverage component 500.

[0047] **FIG. 1D** illustrates a cartridge with a beverage component 300 composed of a mixed beverage component 600. In some embodiments, the mixed beverage component 600 is mixed in the desired ratio of soluble beverage component 500 to non-soluble beverage component 400 described above. The combination of the soluble beverage

component and non-soluble beverage component can be combined by one or more of many different methods, e.g., centrifugal equipment, lightning mixer, ribbon blender, PK blender, sonic methods, etc. In some embodiments, other compounds may be added during the mixing process, including beverage component oils, beverage component aromas, etc. The soluble beverage component 500 and the non-soluble beverage component 400 can be mixed before and/or after insertion into the cartridge.

[0048] The beverage component 300 can be provided in the cup in many forms. For example, in some embodiments, the beverage component 300 is generally loose and non-compressed. In another embodiment, the beverage component 300 is generally compressed and/or compacted.

Certain Methods Related to Cartridges with Multiple Components

[0049] As discussed above, the cartridge 100 can include various layers and/or combinations of soluble beverage component 500 and non-soluble beverage component 400. **FIGS. 3A – B** illustrate flow-charts that provide an overview of methods for assembling a beverage cartridge with a non-soluble beverage component 400 and a soluble beverage component 500 according to certain embodiments. Each of the steps described below in **FIGS. 3A – B** is described in further detail according to certain embodiments with regard to **FIGS. 2A – D**.

[0050] **FIGS. 2A** and **3A** illustrate a method 700 for assembling a beverage cartridge 750. In some embodiments, the method 700 can include block 710 that includes preparing the cup for assembly. In some embodiments, preparing the cup for assembly can include forming a cup according to one the embodiments described above with respect to **FIGS. 1A-E**. In some embodiments, forming a cup can include forming a cup with a bottom wall, a side wall and a lip onto which a lid can be attached. In some embodiments, preparing the cup can include forming a cup, inserting a filter within the cup and securing the filter to the cup by, for example, welding the filter to the cup. In some embodiments, the method for assembling the beverage cartridge 700 can include block 720 which describes first filling the cartridge 750 with a non-soluble beverage component 400. The method 700 can include block 730, which describes filling the cartridge 750 with a soluble beverage component 500. In some embodiments, the method 700 can include block 740 which describes placing and

sealing the lid 760 to the cartridge 750. In some embodiments, an inert gas can be placed within the cartridge 750 before the cartridge is sealed with a lid and/or air can be removed from the cartridge before the cartridge is sealed. During this process, the soluble and/or insoluble components can be shielded under an inert gas (e.g., nitrogen) blanket until the cartridge is sealed.

[0051] **FIGS. 2B and 3B** illustrates a method 800 for assembling a beverage cartridge 850 that is also illustrated in **FIG. 1B**. In some embodiments, the method 800 can include block 810 that includes preparing the cup for assembly. In some embodiments, the method 700 can include block 710 that includes preparing the cup for assembly. In some embodiments, preparing the cup for assembly can include forming a cup according to one the embodiments described above with respect to **FIGS. 1A-E**. In some embodiments, preparing the cup can include forming a cup, inserting a filter within the cup and securing the filter to the cup by, for example, welding the filter to the cup. In some embodiments, forming a cup can include forming a cup with a bottom wall, a side wall and a lip onto which a lid can be attached. The method 800 can include block 820 which describes first filling the cartridge 850 with a soluble beverage component 500. The method 800 can include block 830, which describes filling the cartridge 850 with a non-soluble beverage component 400. In some embodiments, the method 800 can include block 840 which describes placing and sealing the lid 860 to the cartridge 850. In some embodiments, an inert gas can be placed within the cartridge 850 before the cartridge is sealed with a lid and/or air can be removed from the cartridge before the cartridge is sealed. During this process, the soluble and/or insoluble components can be shielded under an inert gas (e.g., nitrogen) blanket until the cartridge is sealed.

[0052] **FIGS. 2A – D** also illustrate schematic representations of multiple embodiments of methods for assembling the beverage cartridges illustrated in **FIGS. 1A – D**. In some embodiments, the soluble beverage component 500 can be composed of a fine (e.g. small, tiny) granular size as compared to the soluble component. Therefore, in some examples, the method for assembling the beverage cartridge can facilitate effective loading of the soluble beverage component 500 into the cartridge. As well, to facilitate the desired boldness and flavor profile of the prepared beverage, some embodiments of the method for

assembling the beverage cartridge can facilitate the proper ratio of soluble beverage component 500 to non-soluble beverage component 400.

[0053] As an overview, in some embodiments, the filling systems for cartridges can be completed in discrete steps wherein the cartridge is moved down, for example, a conveyor mechanism. As illustrated in **FIGS. 2A – D**, each of the beverage cartridges shown on the conveyor mechanism represents a step in one embodiment of the assembling of the beverage cartridge. While the methods described in **FIG. 2A – D** illustrate the steps of adding the soluble beverage component 500 and non-soluble beverage component 400 at separate physical locations along an assembly process, the steps can also be done at the same location with different feed mechanisms than what is disclosed below.

[0054] In some embodiments, the cartridge assembly method includes separate filling mechanisms for the soluble beverage component 500, the non-soluble beverage component 400, and the mixed beverage component 600. In some examples, in areas where the beverage component is exposed, the beverage cartridge assembling system can be shielded under a blanket (e.g. nitrogen blanket) until the cartridge is sealed.

[0055] **FIG. 2A** illustrates a schematic representation for the method for assembling the beverage cartridge 700 with a beverage component 300 illustrated in **FIG. 1A**. As shown above, the beverage component illustrated in **FIG. 1A** includes a beverage component with a first layer of non-soluble beverage component 400 and a second layer of soluble beverage component 500.

[0056] In some embodiments, the method for assembling the beverage cartridge 700 can include preparing the cartridge 750 for assembly. In some examples, this can include obtaining (e.g., forming or otherwise manufacturing) the cartridge 750 according to the desired configuration, such as the configuration described above. In some embodiments, the method 700 can include block 710 that includes preparing the cup for assembly. In some embodiments, preparing the cup for assembly can include forming a cup according to one the embodiments described above with respect to **FIGS. 1A-E**. In some embodiments, forming a cup can include forming a cup with a bottom wall, a side wall and a lip onto which a lid can be attached. In some embodiments, preparing the cartridge 750 can

include forming a cup, inserting a filter within the cup and securing the filter to the cup by, for example, welding the filter to the cup.

[0057] In some embodiments, the method for assembling the beverage cartridge 700 can first include filling the cartridge 750 with a non-soluble beverage component 400. In some embodiments, the beverage cartridge assembly system can include a filling system that contains a hopper filled with the non-soluble beverage component 400. In some embodiments the hopper can include one set of feed auger screws to load the non-soluble beverage component 400 into the cartridge 750.

[0058] In some embodiments, the method for assembling the beverage cartridge 700 can then include filling the cartridge 750 with a soluble beverage component 500. In some embodiments, the beverage cartridge assembly system can include a filling system that contains a hopper filled with the soluble beverage component. In some embodiments the hopper can include a screw auger that can be engineered to prevent free flow of the soluble beverage component 500 into the cartridge 750. Advantageously this can manage the fine (e.g. small, tiny) granules of the soluble beverage component and limit dusting in the feed process to prevent contamination of the edges of the lid 760 of the cartridge 750.

[0059] Thus, in the illustrated embodiments of **FIGS. 2A – D**, separate feed systems can be used for the non-soluble beverage component 400 and the soluble beverage component 500. In the illustrated embodiment, the feeding of non-soluble beverage component 400 and the soluble beverage component 500 is shown as being conducted at separate locations along an assembly path. However, in certain embodiments, the feeding of non-soluble beverage component 400 and the soluble beverage component 500 can occur at the same location along the assembly path but with different feed systems and/or steps and/or or a common feed system that includes components configured specifically for the non-soluble beverage component 400 or the soluble beverage component 500.

[0060] As discussed above, the method of assembling a beverage cartridge can facilitate a desired ratio of soluble beverage component 500 to non-soluble beverage component 400 is loaded (e.g. filled, assembled, poured) into the cartridge 750. In some embodiments, between 1 or about 1 to 4 or about 4 grams of soluble beverage component 500

can be filled into the cartridge 750. In some embodiments, between 22 or about 22 to 26 or about 26 grams of non-soluble beverage component 400 can be filled into the cartridge 750. The disclosed embodiments are not limited to these ranges and can also include the ranges and ratios described above and the amount of soluble beverage component 500 and non-soluble beverage component 400 can vary according to the desired boldness and flavor of the prepared beverage. In certain arrangements the above ratios and/or weight percentages can apply to arrangements where the non-soluble beverage component and the soluble beverage component are components of the same beverage. In certain arrangements, the non-soluble component is roasted ground coffee the soluble beverage can be soluble coffee such as coffee extract, freeze-dried and/or instant coffee

[0061] Some embodiments of the method for assembling the beverage cartridge 700 can include attaching a lid 760 to the rim of the cartridge 750. In some embodiments, the lid 760 can be secured or adhered to the cartridge 750 using any suitable adhesive or sealing techniques and materials, such as heat-sealing, crimping, gluing, UV-curing, applying ultrasonic or microwave energy (e.g. sonic welding), and otherwise.

[0062] In some embodiments, one or more of the steps described with respect to **FIGS. 2A – D** can be performed within an inert atmosphere blanket. In some embodiments, an inert gas can be placed within the cartridge before the cartridge is sealed with a lid and/or air can be removed from the cartridge before the cartridge is sealed.

[0063] As described below, the method described above with respect to **FIG. 2A** can be modified to change the order of insertion of the non-soluble beverage component 400 and soluble beverage component 500. **FIGS. 2B-D** will describe examples of these modifications and additional details and embodiments can be found above with reference to the description of **FIG. 2A**.

[0064] **FIG. 2B** illustrates a schematic representation for the method for assembling the beverage cartridge 800 with a beverage component 300 illustrated in **FIG. 1B**. The method for assembling the beverage cartridge 800 of **FIG. 2B** is similar to the method for assembling the beverage cartridge 800 illustrated above in **FIG. 1B** but in this embodiment the soluble beverage component 500 is inserted into the cartridge 850 before the non-soluble beverage component 400.

[0065] In the embodiment of **FIG. 2B**, the method for assembling the beverage cartridge 800 can include preparing the cartridge 850 for assembly. In some examples, this can include manufacturing the cartridge 850 according to the desired conformation described above and with respect to **FIG. 2A**. In certain arrangements, preparing the cartridge can include forming a cup, inserting a filter within the cup and securing the filter to the cup by, for example, welding the filter to the cup.

[0066] In some embodiments, the method for assembling the beverage cartridge 800 can first include filling the cartridge 850 with a soluble beverage component 500. In some embodiments, the beverage cartridge assembly system can include a filling system as described with respect to **FIG. 2A** that contains a hopper filled with the soluble beverage component 500. In some embodiments the hopper can include a screw auger that can be engineered to prevent free flow of the soluble beverage component 500 into the cartridge 850.

[0067] In some embodiments, the method for assembling the beverage cartridge 800 can then include filling the cartridge 850 with a non-soluble beverage component 400. In some embodiments, the beverage cartridge assembly system can include a filling system that contains a hopper filled with the non-soluble beverage component 400. In some embodiments the hopper can include one set of feed screws to load the non-soluble beverage component 400 into the cartridge 850.

[0068] As discussed above with reference to **FIG. 2A**, the method for assembling the beverage cartridge 800 can facilitate a desired ratio of soluble beverage component 500 to non-soluble beverage component 400 is loaded (e.g. filled, assembled, poured) into the cartridge 850.

[0069] As discussed for **FIG. 2A**, in some embodiments, the method for assembling the beverage cartridge 800 can include attaching a lid 860 to the rim of the cartridge 850. In some embodiments, the lid 860 can be secured or adhered to the cartridge 850 using any suitable adhesive or sealing techniques and materials, such as heat-sealing, crimping, gluing, UV-curing, applying ultrasonic or microwave energy (e.g. sonic welding), and otherwise.

[0070] **FIG. 2C** illustrates a schematic representation for the method for assembling the beverage cartridge 900 with a beverage component 300 illustrated in **FIG. 1C**.

[0071] As described above with respect to **FIG. 2A**, in some embodiments, the method for assembling the beverage cartridge 900 can include preparing the cartridge 950 for assembly. In some examples, this can include manufacturing the cartridge 950 according to the configurations described above. In certain arrangements, preparing the cartridge can include forming a cup, inserting a filter within the cup and securing the filter to the cup by, for example, welding the filter to the cup.

[0072] In some embodiments, the method for assembling the beverage cartridge 900 can first include filling the cartridge 950 with a non-soluble beverage component 400 as described with respect to **FIG. 2A**. In some embodiments, the beverage cartridge assembly system can include a filling system that contains a hopper filled with the non-soluble beverage component 400. In some embodiments the hopper can include one set of feed screws to load the non-soluble beverage component 400 into the cartridge 950.

[0073] In some embodiments, the method for assembling the beverage cartridge 900 can then include filling the cartridge 950 with a soluble beverage component 500 as described with respect to **FIG. 2A**. In some embodiments, the beverage cartridge assembly system can include a filling system that contains a hopper filled with the soluble beverage component 500. In some embodiments the hopper can include a screw auger that can be engineered to prevent free flow of the soluble beverage component 500 into the cartridge 950.

[0074] In some embodiments, the method for assembling the beverage cartridge 900 can include filling the cartridge 950 with another layer of non-soluble beverage component 400. As discussed above, the beverage cartridge assembly system can include an identical filling system as that provided for the first layer of non-soluble beverage component 400.

[0075] As discussed above, the method for assembling the beverage cartridge 900 can facilitate a desired ratio of soluble beverage component 500 to non-soluble beverage component 400 is loaded (e.g. filled, assembled, poured) into the cartridge 950.

[0076] As discussed for **FIGS. 2A – B**, in some embodiments, the method for assembling the beverage cartridge 900 can include attaching a lid 960 to the rim of the cartridge 950. In some embodiments, the lid 960 can be secured or adhered to the cartridge 950 using any suitable adhesive or sealing techniques and materials, such as heat-sealing, crimping, gluing, UV-curing, applying ultrasonic or microwave energy (e.g. sonic welding), and otherwise. In certain arrangements, the method of **FIG. 2C**, can be modified to include additional steps of feeding soluble and/or non-soluble components and/or one or more of steps can be rearranged in order.

[0077] **FIG. 2D** illustrates a schematic representation for the method for assembling the beverage cartridge 1000 with a beverage component 300 illustrated in **FIG. 1D**.

[0078] In some embodiments, the method for assembling the beverage cartridge 1000 can include preparing the cartridge 1050 for assembly as described with respect to **FIG. 2A**.

[0079] In some embodiments, the method for assembling the beverage cartridge 1000 can first include filling the cartridge 1050 with a beverage component 300. As discussed above, in some embodiments, the beverage component 300 can be prepared prior to the method for assembling the beverage cartridge 1000. In some embodiments, the beverage cartridge assembly system can include a filling system that contains a hopper filled with the beverage component 300. In some examples, the hopper can include one set of feed screws to load the non-soluble beverage component 400 into the cartridge 1050. In additional examples, the hopper can include a screw auger that can be engineered to prevent free flow of the beverage component 300 into the cartridge 1050. Advantageously this can manage the fine (e.g. small, tiny) granules of the soluble beverage component 500 in the beverage component 300 and limit dusting in the feed process to prevent contamination of the edges of the lid 1060 of the cartridge 1050.

[0080] In other embodiments, the beverage component 300 can be prepared as the cartridge 1050 is being filled. In some examples, the cartridge 1050 would receive soluble beverage component 500 and non-soluble beverage component 400 simultaneously from a plurality of hoppers described above.

[0081] As discussed for **FIGS. 2A – C**, in some embodiments, the method for assembling the beverage cartridge 1000 can include attaching a lid 1060 to the rim of the cartridge 1050. In some embodiments, the lid 1060 can be secured or adhered to the cartridge 1050 using any suitable adhesive or sealing techniques and materials, such as heat-sealing, crimping, gluing, UV-curing, applying ultrasonic or microwave energy (e.g. sonic welding), and otherwise.

Certain Terminology

[0082] As used herein, the term “beverage” has its ordinary and customary meaning, and includes, among other things, any edible liquid or substantially liquid substance or product having a flowing quality (e.g., juices, coffee beverages, teas, frozen yogurt, beer, wine, cocktails, liqueurs, spirits, cider, soft drinks, flavored water, energy drinks, soups, broths, combinations of the same, or the like).

[0083] The term “pod,” as used herein, has its ordinary and customary meaning, and includes, among other things, cartridges, capsules, canisters, pucks, pads, and the like, whether or not such pods are capable of and/or configured to be pierced or otherwise ruptured to form an inlet into and/or outlet from the pod.

[0084] Although certain embodiments have been described herein with respect to coffee, the cartridges described herein can include particulate materials or components for producing many other types of beverages, such as a chocolate based product (e.g., hot cocoa), tea, juice, and other beverages. Further, although some embodiments have been disclosed in which liquid is introduced into the cartridge, the introduction of other phases is contemplated. For example, in some embodiments, steam or a combination of steam and liquid water is introduced into the cartridge. Additionally, although certain embodiments have been disclosed that include an instant beverage component, the term “instant beverage component” is not limited to only a single component. Rather, the instant beverage component can comprise one component (e.g., coffee) or a plurality of components (e.g., coffee and a sweetener).

[0085] Conditional language, for example, among others, “can,” “could,” “might,” or “may,” unless specifically stated otherwise, or otherwise understood within the context as used, is generally intended to convey that certain embodiments include, while

other embodiments do not include, certain features, elements and/or steps. Thus, such conditional language is not generally intended to imply that features, elements, and/or steps are in any way required for one or more embodiments or that one or more embodiments necessarily include logic for deciding, with or without user input or prompting, whether these features, elements, and/or steps are included or are to be performed in any particular embodiment.

[0086] Although certain embodiments and examples have been described herein, it will be understood by those skilled in the art that many aspects of the methods and devices shown and described in the present disclosure may be differently combined and/or modified to form still further embodiments or acceptable examples. All such modifications and variations are intended to be included herein within the scope of this disclosure. A wide variety of designs and approaches are possible. No feature, structure, or step disclosed herein is essential or indispensable.

[0087] Some embodiments have been described in connection with the accompanying drawings. However, it should be understood that the figures are not drawn to scale. Distances, angles, etc. are merely illustrative and do not necessarily bear an exact relationship to actual dimensions and layout of the devices illustrated. Components can be added, removed, and/or rearranged. Further, the disclosure herein of any particular feature, aspect, method, property, characteristic, quality, attribute, element, or the like in connection with various embodiments can be used in all other embodiments set forth herein. Additionally, it will be recognized that any methods described herein may be practiced using any device suitable for performing the recited steps.

[0088] The terms “approximately,” “about,” and “substantially” as used herein represent an amount close to the stated amount that still performs a desired function or achieves a desired result. For example, in some embodiments, as the context may dictate, the terms “approximately”, “about”, and “substantially” may refer to an amount that is within less than or equal to 10% of the stated amount or equal to or greater than 10% of the stated amount. The term “generally” as used herein represents a value, amount, or characteristic that predominantly includes or tends toward a particular value, amount, or characteristic. The ranges disclosed herein also encompass any and all overlap, sub-ranges, and combinations

thereof. Language such as “up to,” “at least,” “greater than,” “less than,” “between,” and the like include the number recited. Numbers preceded by a term such as “about” or “approximately” include the recited numbers and should be interpreted based on the circumstances (e.g., as accurate as reasonably possible under the circumstances, for example. For example, “about 1 gram” includes “1 gram.”

Summary

[0089] Although this disclosure describes certain embodiments and examples of beverage preparation systems, many aspects of the methods and devices shown and described in the present disclosure may be combined differently and/or modified to form still further embodiments or acceptable examples. All such modifications and variations are intended to be included herein within the scope of this disclosure. Indeed, a wide variety of designs and approaches are possible and are within the scope of this disclosure. For example, although some embodiments have been disclosed in which liquid water is introduced into the cartridge, the introduction of other liquids (e.g., milk) and/or other phases (e.g., steam) is contemplated as well. While illustrative embodiments have been described herein, the scope of any and all embodiments having equivalent elements, modifications, omissions, combinations (e.g., of aspects across various embodiments), adaptations and/or alterations as would be appreciated by those in the art based on the present disclosure.

[0090] Also, although there may be some embodiments within the scope of this disclosure that are not expressly recited above or elsewhere herein, this disclosure contemplates and includes all embodiments within the scope of what this disclosure shows and describes. Further, this disclosure contemplates and includes embodiments comprising any combination of any structure, material, step, or other feature disclosed anywhere herein with any other structure, material, step, or other feature disclosed anywhere herein.

[0091] Furthermore, certain features that are described in this disclosure in the context of separate implementations, arrangements and/or embodiments can also be implemented in combination in a single implementation arrangements and/or embodiments. Conversely, various features that are described in the context of a single implementation arrangements and/or embodiments can also be implemented in multiple implementations arrangements and/or embodiments separately or in any suitable subcombination. Moreover,

although features may be described above as acting in certain combinations, one or more features from a claimed combination can, in some cases, be excised from the combination, and the combination may be claimed as a subcombination or variation of a subcombination.

[0092] For purposes of this disclosure, certain aspects, advantages, and novel features are described herein. Not necessarily all such advantages may be achieved in accordance with any particular embodiment. Thus, for example, those skilled in the art will recognize that the disclosure may be embodied or carried out in a manner that achieves one advantage or a group of advantages as taught herein without necessarily achieving other advantages as may be taught or suggested herein.

[0093] Some embodiments have been described in connection with the accompanying drawings. However, the figures are not drawn to scale. Distances, angles, etc. are merely illustrative and do not necessarily bear an exact relationship to actual dimensions and layout of the devices illustrated. Components can be added, removed, and/or rearranged. Further, the disclosure herein of any particular feature, aspect, method, property, characteristic, quality, attribute, element, or the like in connection with various embodiments can be used in all other embodiments set forth herein. Also, any methods described herein may be practiced using any device suitable for performing the recited steps.

[0094] Moreover, while components and operations may be depicted in the drawings or described in the specification in a particular arrangement or order, such components and operations need not be arranged and performed in the particular arrangement and order shown, nor in sequential order, nor include all of the components and operations, to achieve desirable results. Other components and operations that are not depicted or described can be incorporated in the embodiments and examples. For example, one or more additional operations can be performed before, after, simultaneously, or between any of the described operations. Further, the operations may be rearranged or reordered in other implementations. Also, the separation of various system components in the implementations described above should not be understood as requiring such separation in all implementations, and it should be understood that the described components and systems can generally be integrated together in a single product or packaged into multiple products.

[0095] In summary, various illustrative embodiments and examples of beverage preparations systems, components, and related methods have been disclosed. Although the systems have been disclosed in the context of those embodiments and examples, this disclosure extends beyond the specifically disclosed embodiments to other alternative embodiments and/or other uses of the embodiments, as well as to certain modifications and equivalents thereof. This disclosure expressly contemplates that various features and aspects of the disclosed embodiments can be combined with, or substituted for, one another. Accordingly, the scope of this disclosure should not be limited by the particular disclosed embodiments described above, but should be determined only by a fair reading of the claims that follow as well as their full scope of equivalents.

WHAT IS CLAIMED IS:

1. A beverage cartridge for use with a single-serve beverage machine, the cartridge including:

a cup having a bottom wall, a side wall and a lid;

a beverage component disposed in the cup, wherein the beverage component includes a soluble beverage component and a non-soluble beverage component, wherein the soluble beverage component and the non-soluble beverage component are soluble and non-soluble components of a same type of beverage.

2. The single-serve beverage cartridge of Claim 1, wherein the non-soluble beverage component forms a first layer of the beverage component and the soluble beverage component forms a second layer.

3. The single-serve beverage cartridge of Claim 1, wherein the soluble beverage component forms a first layer of the beverage component and the non-soluble beverage component forms a second layer.

4. The single-serve beverage cartridge of Claim 1, wherein the non-soluble beverage component forms a first layer of the beverage component, the soluble beverage component forms a second layer, and the non-soluble beverage component forms a third layer of the beverage component.

5. The single-serve beverage cartridge of Claim 1, wherein cup includes a shoulder disposed generally opposite the bottom wall and the lid is joined to the shoulder.

6. The single-serve beverage cartridge of Claim 1, wherein the non-soluble beverage component is ground coffee.

7. The single-serve beverage cartridge of Claim 6, wherein the soluble beverage component is freeze-dried or instant coffee.

8. The single-serve beverage cartridge of Claim 7, wherein the non-soluble beverage component includes 22-26 grams of roast and/or ground coffee.

9. The single-serve beverage cartridge of Claim 8, wherein the soluble beverage component includes 1-4 grams of freeze-dried or instant coffee.

10. The single-serve beverage cartridge of Claim 6, wherein the soluble beverage component includes a portion of microground coffee.

11. The single-serve beverage cartridge of Claim 1 wherein the lid and the bottom wall are each configured to be pierced to allow the flow of liquid therethrough.
12. The single-serve beverage cartridge of Claim 1 wherein the cartridge includes an element configured to retain the non-soluble components within the cartridge.
13. The single-serve beverage cartridge of Claim 12 wherein the element is a filter.
14. A method of assembling a single-serve beverage cartridge, method including:
filling a cup with a beverage component including a soluble beverage component and a non-soluble beverage component; and
sealing the beverage component within the cup.
15. The method of Claim 14, wherein filling the cup includes providing a first layer of non-soluble beverage component and providing a second layer of soluble beverage component.
16. The method of Claim 14, wherein filling the cup includes providing a first layer of soluble beverage component and providing a second layer of non-soluble beverage component.
17. The method of Claim 14, wherein filling the cup includes providing a first layer of non-soluble beverage component, providing a second layer of soluble beverage component, and providing a third layer of non-soluble beverage component.
18. The method of Claim 14, wherein filling the cup includes providing a beverage component with a combination of soluble beverage component and non-soluble beverage component.
19. The method of Claim 14, wherein the non-soluble beverage component is ground coffee.
20. The method of Claim 19, wherein the soluble beverage component is freeze-dried or instant coffee.
21. The method of Claim 20, wherein the non-soluble beverage component includes 22-26 grams of roast and/or ground coffee
22. The method of Claim 21, wherein the soluble beverage component includes 1-4 grams of freeze-dried or instant coffee.

23. The method of Claim 20, wherein the soluble beverage component includes a portion of microground coffee.

24. The method of Claim 14, wherein the soluble beverage component and a non-soluble beverage component are soluble and non-soluble components of a same type of beverage.

25. The method of Claim 14 comprising forming a cup having a bottom wall and a shoulder disposed generally opposite the bottom wall.

26. The method of Claim 25 wherein sealing the beverage component within the cup comprises joining a lid with the shoulder.

27. The method of Claim 14 comprising removing air from the cup and/or filling the cup with an inert gas before sealing the beverage component within the cup.

FIG. 1A

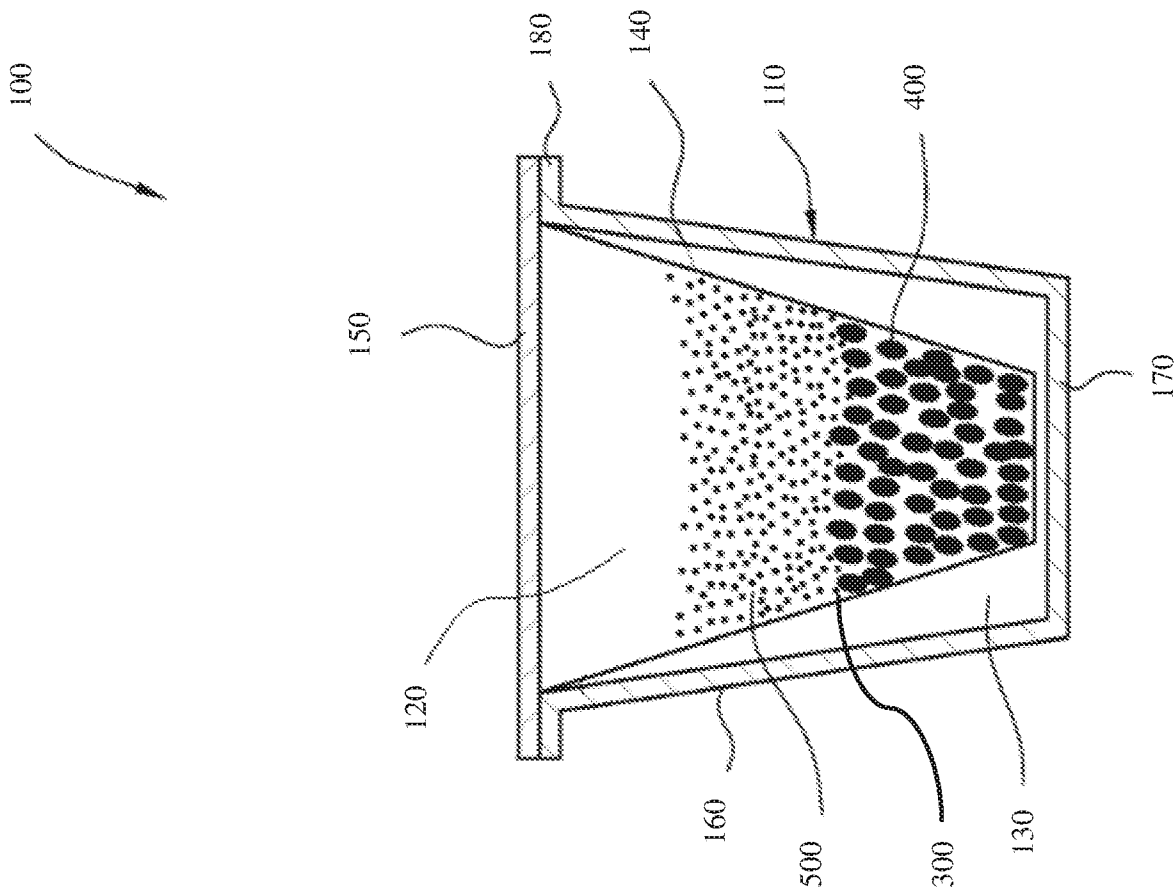


Fig. 3.

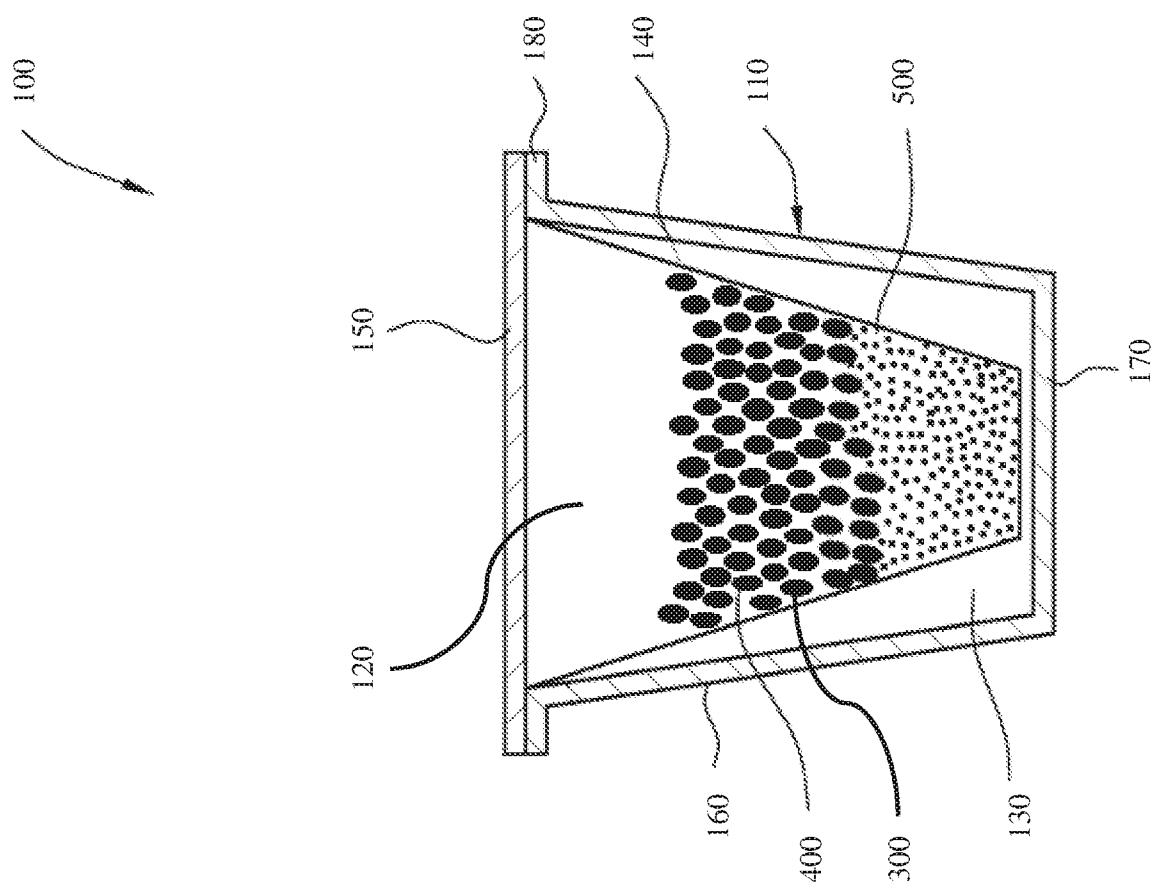


FIG.

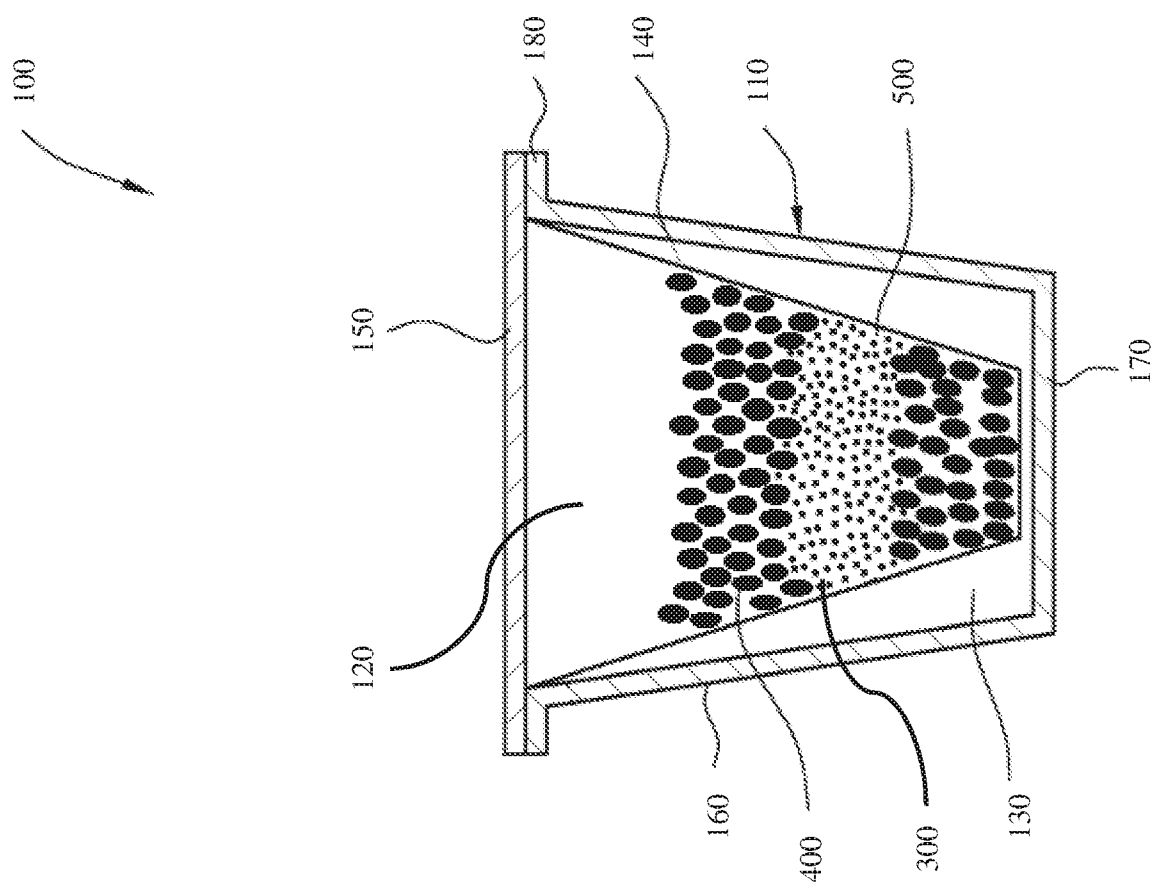
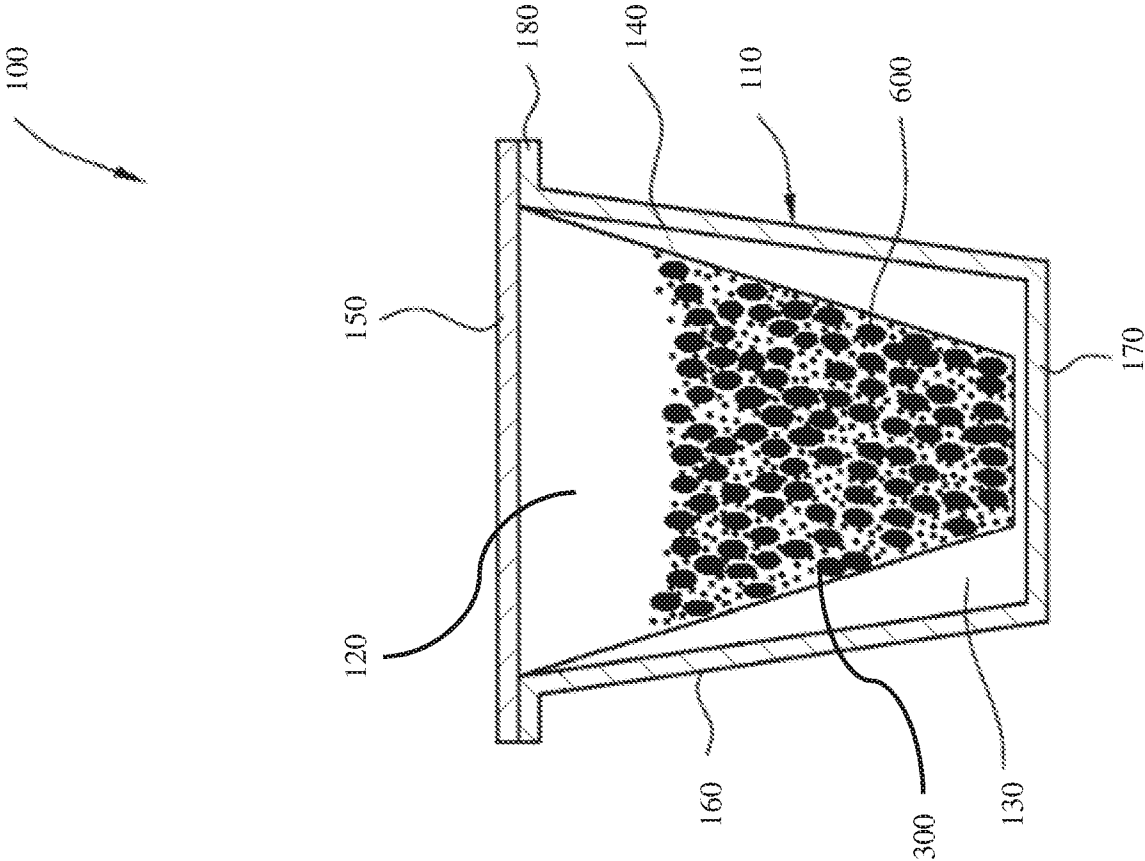
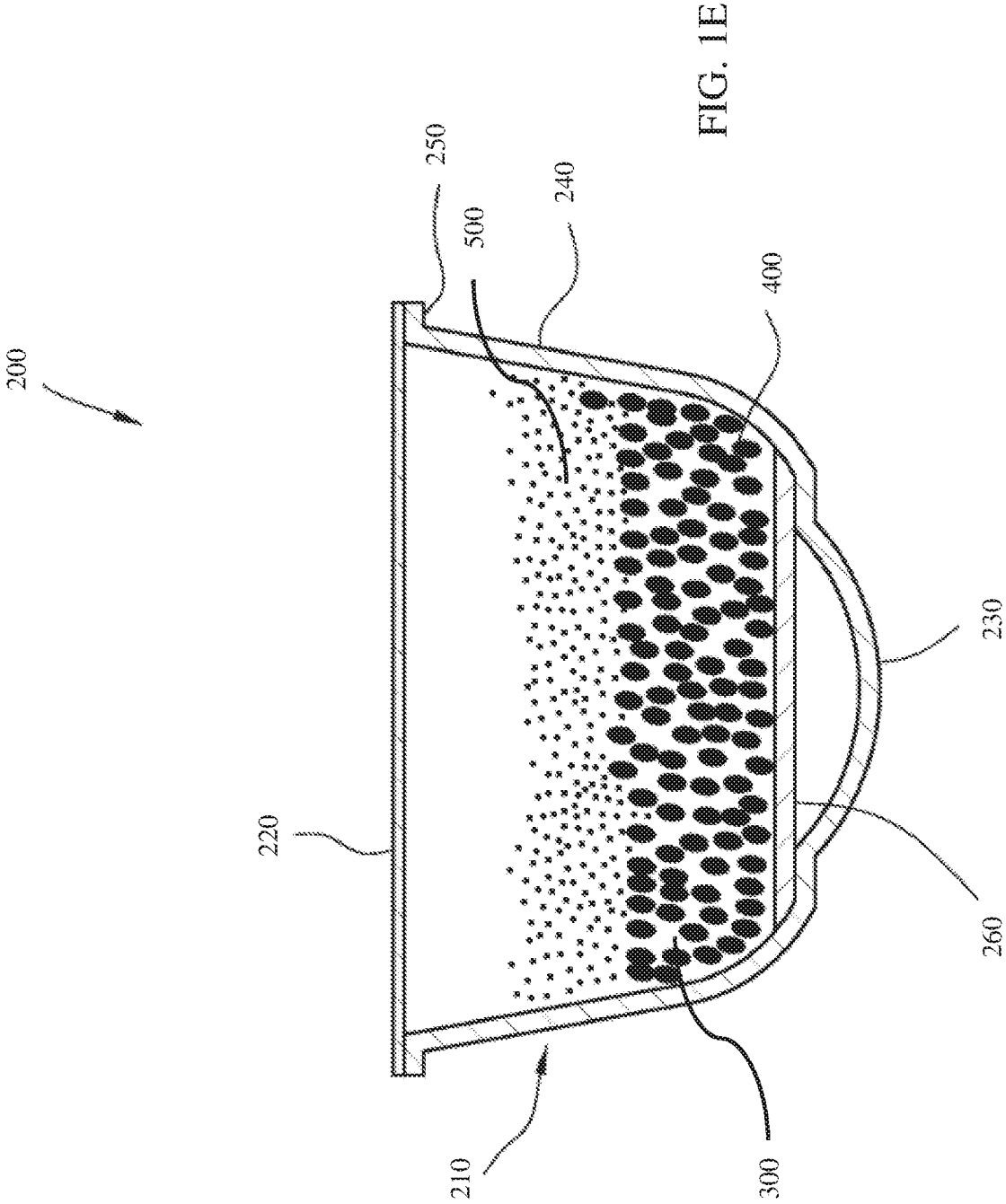


FIG. 1D





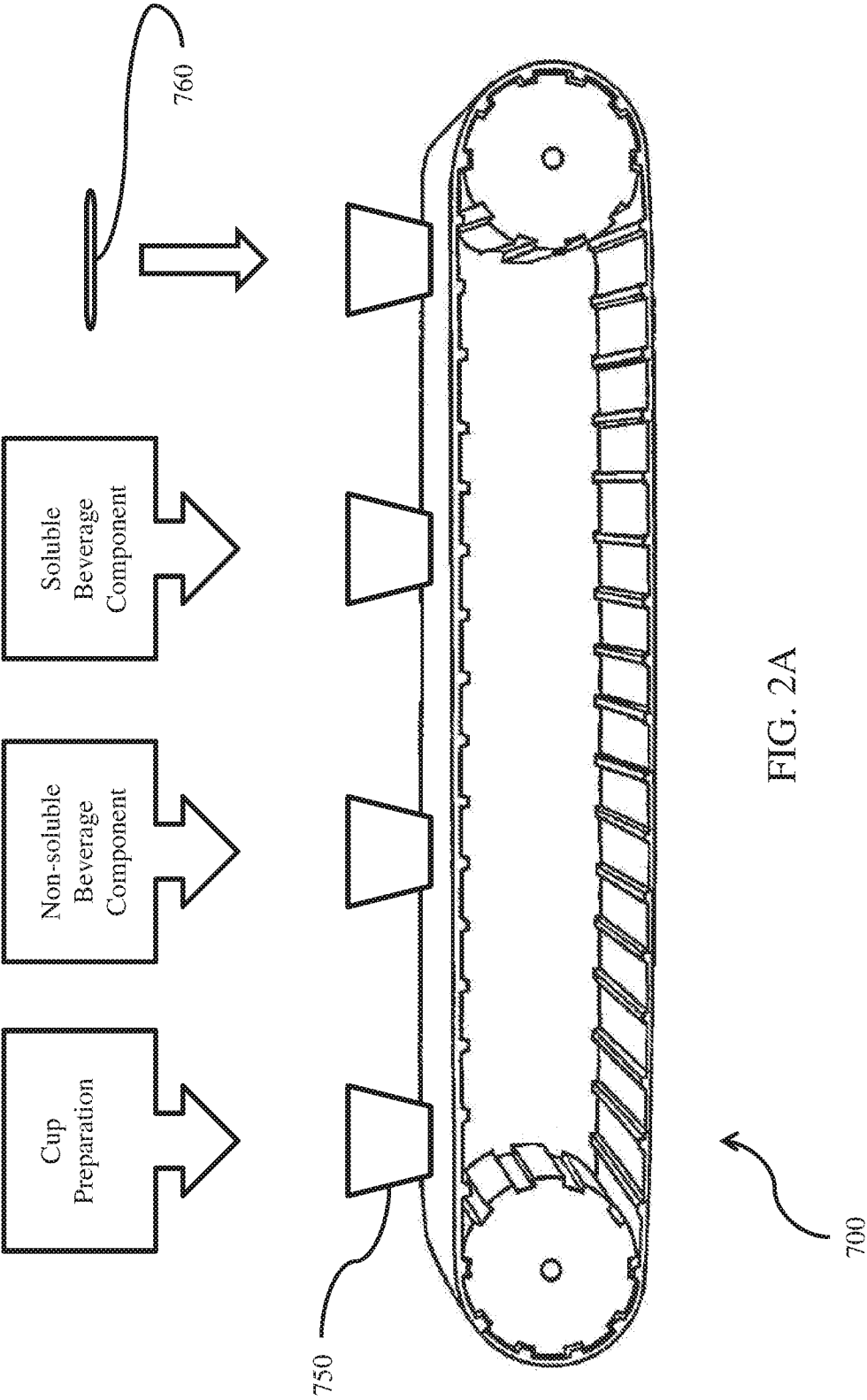


FIG. 2A

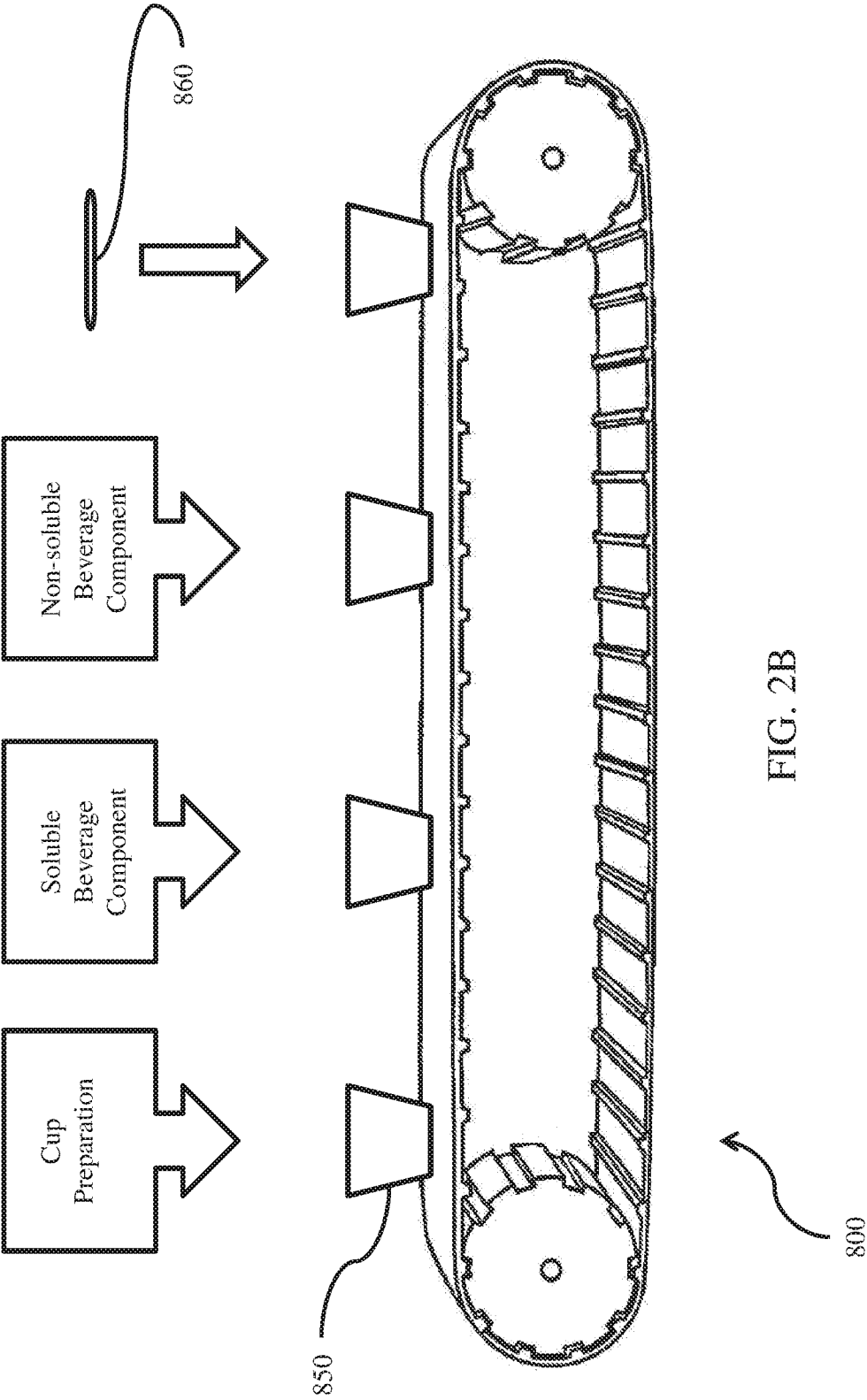


FIG. 2B

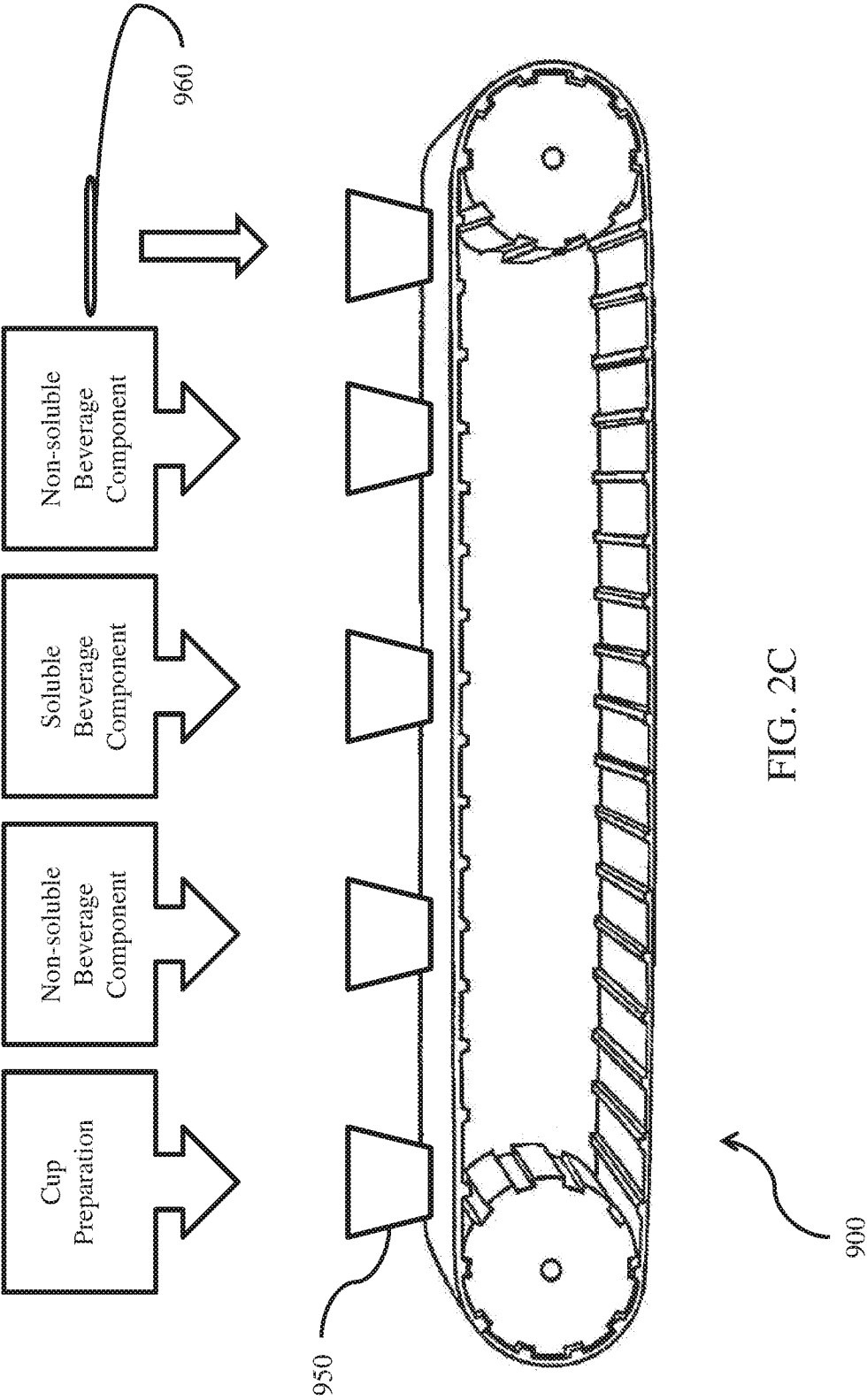


FIG. 2C

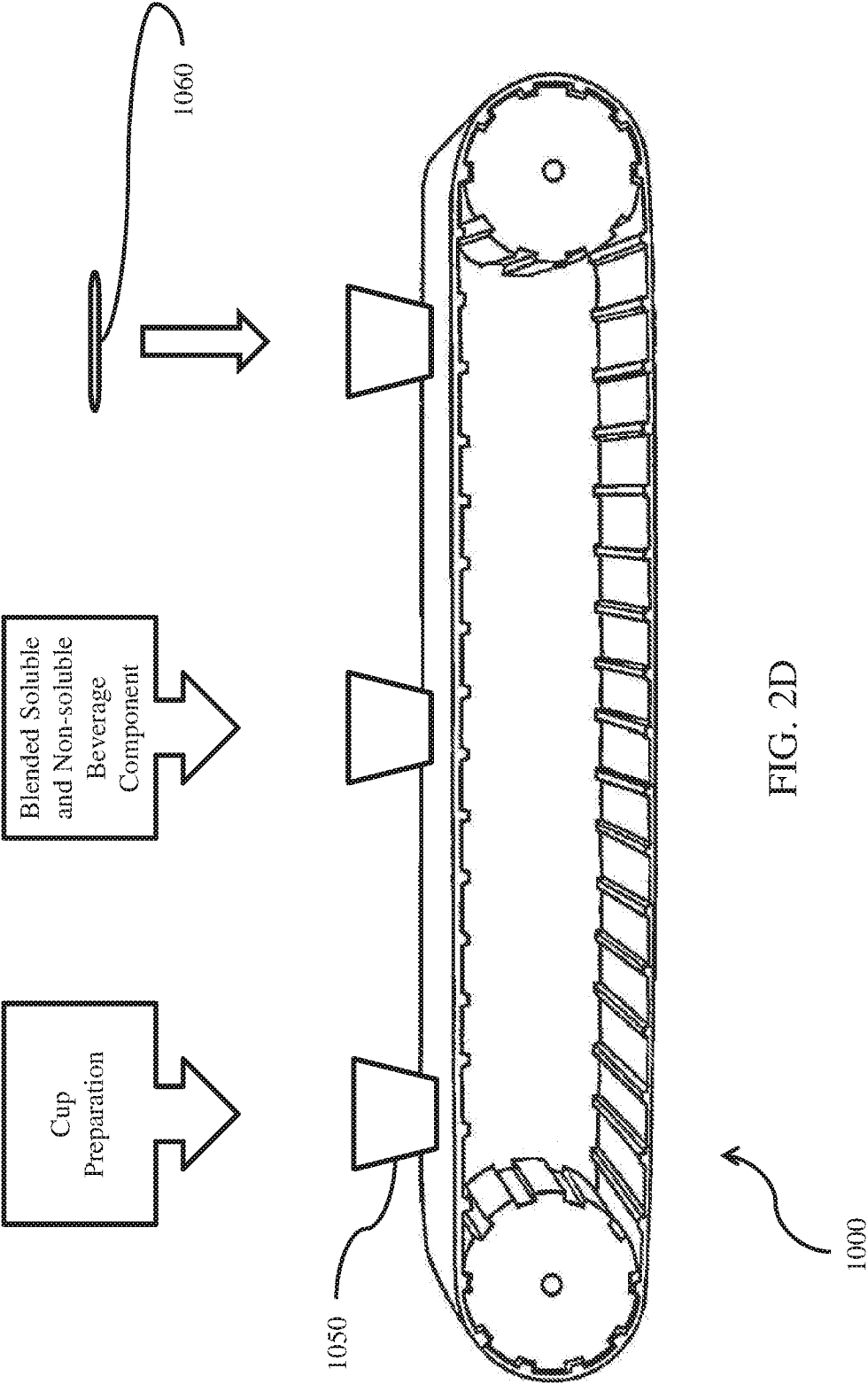
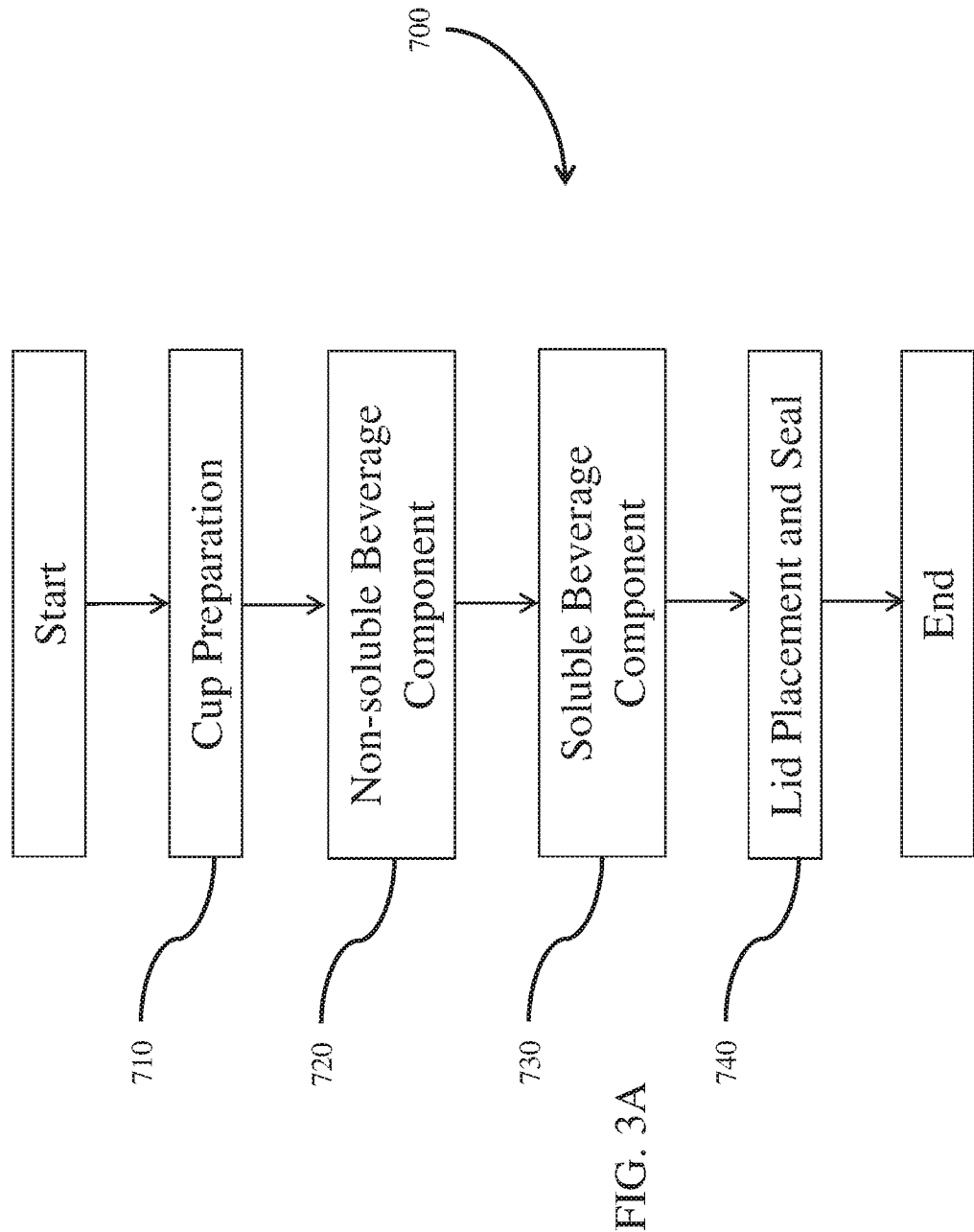
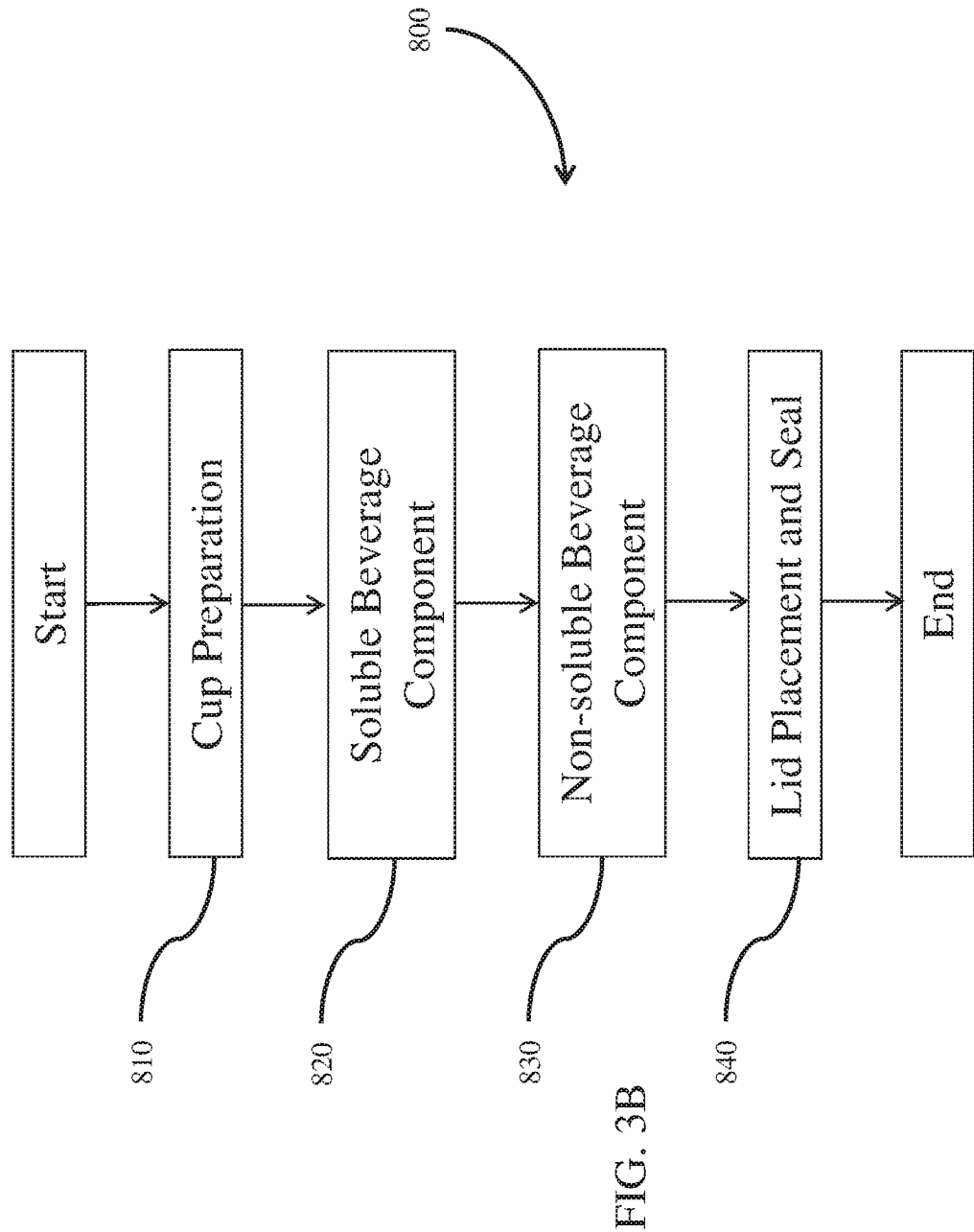


FIG. 2D





INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2016/021449

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - A47J 31/02; A47J 31/06; B65D 85/804; B65D 85/808; B65D 85/816 (2016.01)

CPC - A23F 5/262; A47J 31/0668; B65D 85/804; B65D 85/8043; B65D 85/8046 (2016.02)

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) - A47J 31/02; A47J 31/06; B65D 85/804; B65D 85/808; B65D 85/816 (2016.01)

CPC - A23F 5/262; A47J 31/0668; B65D 85/804; B65D 85/8043; B65D 85/8046 (2016.02)

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

USPC - 99/295; 426/77, 86, 115, 394, 425, 431, 433 (keyword delimited)

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Orbit, Google Patents, Google Scholar, Google

Search terms used: beverage, cartridge, single, serve, machine, coffee, pod, capsule, first, second, layer, soluble, non-soluble, insoluble, assembling, instant, coffee, freeze-dried, cup, wall, bottom, lid, flow, liquid, microground, air, inert, gas

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 8,361,527 B2 (WINKLER et al) 29 January 2013 (29.01.2013) entire document	1, 5-7, 11-14, 18-20, 24-26
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Y		8-10, 21-23, 27
Y	US 8,474,368 B2 (KILBER et al) 02 July 2013 (02.07.2013) entire document	8, 9, 21, 22
Y	US 2014/0272018 A1 (STARBUCKS CORPORATION DBA STARBUCKS COFFEE COMPANY) 18 September 2014 (18.09.2014) entire document	9, 10, 22, 23
Y	US 2012/0070542 A1 (CAMERA et al) 22 March 2012 (22.03.2012) entire document	27
A	US 2013/0101716 A1 (KEURIG, INCORPORATED) 25 April 2013 (25.04.2013) entire document	1-27
A	US 8,425,964 B2 (DOGLIONI MAJER) 23 April 2013 (23.04.2013) entire document	1-27



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

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"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

29 April 2016

Date of mailing of the international search report

17 MAY 2016

Name and mailing address of the ISA/

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