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Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a
patent (Rule 4.17(ii))
- as to the applicant's entitlement to claim the priority of the
earlier application (Rule 4.17(iii))

(54) Title: FULLY CUSTOMIZABLE POWDER DISPENSING PLATFORM

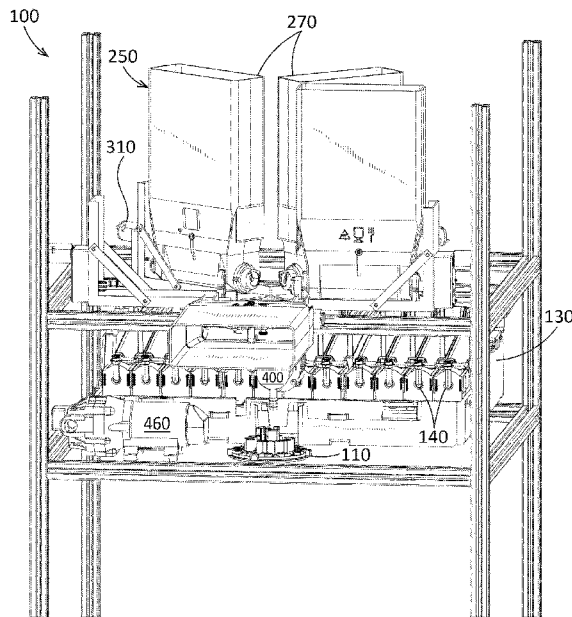


FIG. 2

(57) Abstract: The present application provides a beverage dispensing system for dispensing a beverage with a powder ingredient. The beverage dispensing system may include a powder hopper with the powder ingredient therein, a mixing bowl for mixing the powder ingredient and a flow of water into a blended powder solution, a nozzle, and a pump to pump to blended powder solution from the mixing bowl to the nozzle.



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FULLY CUSTOMIZABLE POWDER DISPENSING PLATFORM

CROSS-REFERENCE TO RELATED APPLICATIONS

5 {0101} This application claims priority to and benefit of U.S. provisional patent application No. 63/386,928, filed December 12, 2022, which is herein incorporated by reference.

TECHNICAL FIELD

10 {0102} The present application and the resultant patent relate generally to beverage dispensers and more particularly relate to beverage dispensers equipped to meter, mix, and dissolve various types of powder ingredients into a beverage stream for dispensing therefrom.

BACKGROUND OF THE INVENTION

15 {0103} Recent improvements in beverage dispensing technology have focused on the use of micro-ingredients. With micro-ingredients, traditional beverage bases may be separated into their constituent parts at much higher dilution or reconstitution ratios. For example, the “COCA-COLA FREESTYLE®” refrigerated beverage dispensing units offered by The Coca-Cola Company of Atlanta, Georgia provide a significant increase in
20 the number and types of beverages that may be offered by a beverage dispenser of a conventional size or footprint. Generally described, the “COCA-COLA FREESTYLE®” refrigerated beverage dispensing units create a beverage by combining a number of highly concentrated micro-ingredients with a macro-ingredient such as a sweetener and a diluent such as still or carbonated water. The micro-ingredients generally are stored in cartridges
25 positioned within or adjacent to the beverage dispenser itself. The number and type of beverages offered by the beverage dispenser thus may be limited only by the number and type of micro-ingredient cartridges positioned therein.

30 {0104} There is an increasing focus for some consumers in the category of Health & Wellness. This category may include vitamins, minerals, nutraceuticals, proteins, other types of supplements, and the like. Current beverage dispense dispensing technology generally only provides for the reliable delivery of liquid ingredients. Powder ingredients may present challenges for dispensing in the context of typical liquid dispensing technology

because these powder ingredients may not mix well, may not be sufficiently shelf-stable, and/or may lose their efficacy when dissolved in a liquid. This is particularly true for cold beverages. There is thus a desire for improved beverage dispensing systems and the like that can accommodate the dispensing of powder ingredients in a safe and efficient manner.

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SUMMARY OF THE INVENTION

{0105} The present application and the resultant patent thus provide a beverage dispensing system for dispensing a beverage with a powder ingredient. The beverage dispensing system may include a powder hopper with the powder ingredient therein, a mixing bowl for mixing the powder ingredient and a flow of water into a blended powder solution, a nozzle, and a pump to pump to blended powder solution from the mixing bowl to the nozzle.

{0106} The present application and the resultant patent further may provide a method of preparing a beverage with a powder ingredient therein. The method may include the steps of dosing the powder ingredient into a mixing bowl, flowing water into the mixing bowl, flowing the powder ingredient and the water to a blending chamber, mixing the powder ingredient and the water into a blending powder solution, and pumping the blended powder solution to a nozzle.

{0107} These and other features and improvements of the present application and the resultant patent will become apparent to one of ordinary skill in the art upon review of the following detailed description when taken in conjunction with the several drawings and the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

25 {0108} Fig. 1 is a schematic diagram of an exemplary beverage dispensing system.

{0109} Fig. 2 is a perspective view of an exemplary beverage dispensing system with a powder dispensing system as may be described herein.

{0110} Fig. 3 is sectional view of a powder hopper for use with the powder dispensing system of Fig. 2.

30 {0111} Fig. 4 is partial sectional view of the powder dispensing system of Fig. 2 showing powder hoppers, a mixing bowl, a blending chamber, a blending motor, and a nozzle.

{0112} Fig. 5 is a perspective view of a pump for use with the powder dispensing system of Fig. 2.

{0113} Fig. 6 is a flow chart showing exemplary dispensing steps of the powder dispensing system of Fig. 2.

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DETAILED DESCRIPTION

{0114} Referring now to the drawings, in which like numerals refer to like elements throughout the several views, Fig. 1 shows an example of a beverage dispensing system 100 as may be described herein. The beverage dispensing system 100 may be used for dispensing many different types of beverages. Specifically, the beverage dispensing system 100 may be used with diluents, macro-ingredients, micro-ingredients, and other types of fluids and ingredients such as powders. The diluents generally include plain water (still water or non-carbonated water), carbonated water, and other fluids. Any type of fluid may be used herein.

15 {0115} Generally described, the macro-ingredients may have reconstitution ratios in the range from full strength (no dilution) to about six (6) to one (1) (but generally less than about ten (10) to one (1)). The macro-ingredients may include sugar syrup, HFCS (“High Fructose Corn Syrup”), concentrated extracts, purees, and similar types of ingredients. Other ingredients may include dairy products, soy, and rice concentrates. Similarly, a macro-ingredient base product may include the sweetener as well as flavorings, acids, and other common components as a beverage syrup. The beverage syrup with sugar, HFCS, or other macro-ingredient base products generally may be stored in a conventional bag-in-box container remote from the beverage dispenser. The viscosity of the macro-ingredients may range from about 1 to about 10,000 centipoise and generally over 100 centipoises when chilled. Other types of macro-ingredients and the like may be used herein.

25 {0116} The micro-ingredients may have reconstitution ratios ranging from about ten (10) to one (1) and higher. Specifically, many micro-ingredients may have reconstitution ratios in the range of about 20:1, to 50:1, to 100:1, to 300:1, or higher. The viscosities of the micro-ingredients typically range from about one (1) to about six (6) centipoise or so, but may vary from this range. Examples of micro-ingredients include natural or artificial flavors; flavor additives; natural or artificial colors; artificial sweeteners (high potency, nonnutritive, or otherwise); antifoam agents, nonnutritive ingredients, additives for controlling tartness, *e.g.*, citric acid or potassium citrate; functional additives such as

vitamins, minerals, herbal extracts, nutraceuticals; and over the counter (or otherwise) medicines such as turmeric, acetaminophen; and similar types of ingredients. Various types of alcohols may be used as either macro-ingredients or micro-ingredients. The micro-ingredients may be in liquid, gaseous, or powder form (and/or combinations thereof including soluble and suspended ingredients in a variety of media, including water, organic solvents, and oils). Other types of micro-ingredients may be used herein.

{0117} The various fluids used herein may be mixed in or about a dispensing nozzle 110. The dispensing nozzle 110 may be a conventional multi-flavor nozzle and the like. The dispensing nozzle 110 may have any suitable size, shape, or configuration. The dispensing nozzle 110 may be positioned within a dispensing tower 120. The dispensing tower 120 may have any suitable size, shape, or configuration. The dispensing tower 120 may extend from a countertop and the like and/or the dispensing tower 120 may be a free-standing structure. The dispensing tower 120 may have a number of the dispensing nozzles 110 thereon.

{0118} The micro-ingredients may be stored in a number of micro-ingredient containers 130 or other types of micro-ingredient sources. The micro-ingredient containers 130 may have any suitable size, shape, or configuration. Any number of the micro-ingredient containers 130 may be used herein. The micro-ingredient containers 130 may be in communication with the dispensing nozzle 110 via a number of micro-ingredient pumps 140 positioned on a number of micro-ingredient conduits 145. The micro-ingredient pumps 140 may be any type of a conventional fluid moving device and made have any suitable volume or capacity. The micro-ingredient containers 130 may be positioned in, adjacent to, and/or remote from the dispensing nozzle 110. For example, the micro-ingredient containers 130 may be positioned under the counter top upon which the dispensing tower 120 rests. Some or all of the micro-ingredient containers 130 may be agitated.

{0119} A still water source 150 may be in communication with the dispensing nozzle 110 via a still water conduit 160. Other types of diluents may be used herein. Still water or other types of diluents may be pumped to the dispensing nozzle 110 via a still water pump 170. The still water pump 170 may be any type of conventional fluid moving device and made have any suitable volume or capacity. Alternatively, the pressure in a conventional municipal water source may be sufficient without the use of a pump. Any number of still water sources 150 may be used herein.

{0120} A carbonated water source 180 may be in communication with the dispensing nozzle 110 via a carbonated water conduit 190. The carbonated water source 180 may be a conventional carbonator and the like. The carbonator may have any suitable size, shape, or configuration. Carbonated water or other types of diluents may be pumped
5 to the dispensing nozzle 110 via a carbonated water pump 200. The carbonated water pump 200 may be any type of conventional fluid moving device and made have any suitable volume or capacity. Any number of carbonated water sources 180 may be used herein. A carbonated water recirculation line also may be used herein.

{0121} One or more macro-ingredient sources 210 may be in communication with
10 the dispensing nozzle 110 via one or more macro-ingredient conduits 220. As described above, the macro-ingredient sources 210 may include sweeteners such as high fructose corn syrup, sugar solutions, and the like. The macro-ingredient sources 210 may be a conventional bag-in-box or other type of container in any suitable size, shape, or configuration. Any number of the macro-ingredient sources 210 may be used herein. The
15 macro-ingredients may flow to the dispensing nozzle 110 via a macro-ingredient pump 230. In this case, the macro-ingredient pump 230 may be a controlled gear pump and the like. Other types of pumps or conventional fluid moving devices may be used herein.

{0122} Operation of the beverage dispensing system 100 and the component therein may be controlled by a control device 240. The control device 240 may be a conventional
20 microcomputer and the like capable of executing programmable commands. The control device 240 may be internal or external from the beverage dispensing system 100. The functionality of the control device 240 may be implemented in software, firmware, hardware, or any combination thereof. One control device 240 may control multiple beverage dispensing systems 100 and/or one beverage dispensing system 100 may have
25 multiple control devices 240 with specific tasks. Other components and other configurations may be used herein.

{0123} Fig. 2 shows a further embodiment of the beverage dispensing system 100. In addition to the nozzle 110, the micro-ingredient containers 130, the water sources 150, 180, the macro-ingredient source 210, and the respective conduits and pumps, the beverage
30 dispensing system 100 also includes a powder dispensing system 250. The powder dispensing system 250 may be used to dispense any type of a powder ingredient 260, *i.e.*, a substantially dry, flowable, fine granular substance and the like. As described above, examples include, but are not limited to, vitamins, minerals, nutraceuticals, proteins, other

types of supplements, and the like. The powder ingredient 260 may be a micro-ingredient or a macro-ingredient. Any food grade flowable substance may be used herein.

5 {0124} The powder dispensing system 250 may include a number of powder hoppers 270 with a volume of the powder ingredient 260 therein. The powder hoppers 270 may have any suitable size, shape, and configuration. The powder hoppers 270 may be made out of, for example, food grade thermoplastics, or any type of substantially rigid materials or composites thereof. In this example, the powder dispensing system 250 may accommodate five powder hoppers 270 as is shown, although any number of the powder hoppers 270 may be used.

10 {0125} As is shown in Fig. 3, the powder hoppers 270 may have an orifice 280 at a bottom end thereof. The orifice 280 may be in communication with an auger/screw mechanism 290. The auger/screw mechanism 290 may have an auger 300 driven by an auger motor 310. The auger 300 may be of conventional design and may include a number of screw threads 320 to push the powder ingredient 260 towards the orifice 280. The auger motor 310 may be a conventional DC motor and the like. The auger motor 310 may have a rotary decoder attached thereto so as to measure precisely the amount of powder dispensed per revolution of the auger motor 310 so as to control the amount of the powder ingredient 260 being dispensed. The auger motor 310 may be in communication with the control device 240. The auger/screw mechanism 290 also may include an internal gear wheel 330 to ensure that the powder ingredient 260 therein is flowable. The gear wheel 330 may have a number of gear teeth 340 that cooperate with the screw threads 320 of the auger 300 so as to rotate the gear wheel 330 and keep the powder ingredient 260 flowing. Other types of metering devices may be used herein. Other components and other configurations may be used herein.

25 {0126} As is shown in Fig. 4, the powder dispensing system 250 may include a mixing bowl 350 positioned adjacent to the powder hoppers 270. The mixing bowl 350 may be largely circular in shape with a raised rim 360 and a concave floor 370. The raised rim 360 may have a number of water ports 380 therein. The water ports 380 may be in communication with the still water source 150 or other type of water source to provide a swirl of water 385 therein. A metering device may be used therewith. The concave floor 370 may include a central drain 390 therein. The powder ingredient 260 from the powder hoppers 270 may begin to mix with the flow of water 385 as the water exits the water ports 380 and circulates about the raised rim 360 and the concave floor 370. The mixing bowl

350 may have any suitable size, shape, or configuration. Other components and other configurations may be used herein.

{0127} The powder dispensing system 250 may include a blending chamber 400 position beneath the mixing bowl 350. The blending chamber 400 may have an entrance
5 port 410 and an exit port 420. The entrance port 410 may be in communication with the central drain 390 of the mixing bowl 350. The blending chamber 400 may include a blending impeller 430 positioned therein. The blending impeller 430 may be driven by a impeller motor 440. The blending motor 440 may be a conventional DC motor and the like. The impeller motor 440 may be in communication with the control device 240. The partially
10 blended powder ingredient 260 and the flow of water 385 from the mixing bowl 350 may be fully blended in the blending chamber 400 via the blending impeller 430 such that a blended powder solution 450 may leave the exit port 420. The blending chamber 400 may have any suitable size, shape, or configuration. Other components and other configurations may be used herein.

{0128} As is shown in Fig. 5, the powder dispensing system 250 may include a
15 booster pump 460. The booster pump 460 may be a conventional diaphragm pump and the like. The booster pump 460 may be positioned between the blending chamber 400 and the nozzle 110. The velocity of the somewhat viscous blended powder solution 450 leaving the blending chamber 400 may be insufficient to flow to the nozzle 110 via gravity alone. The
20 booster pump 460 thus ensures a consistent flow rate of the blended powder solution 450 to the nozzle 110. The booster pump 460 may have any suitable size, shape, or configuration. Other components and other configurations may be used herein.

{0129} In use as is shown in Fig. 6, a consumer requests a beverage and/or a
beverage with additives at the beverage dispensing system 100. The control device 240
25 determines the recipe and initiates the dispense of the beverage. In addition to dispensing the micro-ingredients, the macro-ingredients, and diluents, the control device 240 also initiates the dispense of a predetermined volume of one or more of the powder ingredients 260. Specifically, the control device 240 initiates the operation of the auger motor 310 such that the auger 300 dispenses the predetermined volume of the powder ingredient 260 from
30 one or more of the powder hoppers 270 to the mixing bowl 350. The control device 240 likewise initiates a flow of water 385 from the water source 150 to the mixing bowl 350 via the water ports 380. The water 385 may prewash the mixing bowl 350 to prevent any of the powder ingredient 260 from sticking thereon.

{0130} The powder ingredient 260 and the flow of water 385 begin to mix in the mixing bowl 350 and flow into the blending chamber 400. The control device 240 turns on the impeller motor 440 therein to further mix the powder ingredient 260 and the flow of water 385 into the blended powder solution 450. The somewhat viscous blended powder solution 450 then may be pumped to the nozzle 110 via the booster pump 460. The blended powder solution 450 may be dispensed from the nozzle 110 and mixed with the flow of the beverage therein. The control device 240 then may initiate a water rinse to eliminate any powder residue or carry over. Other and different dispensing steps may be used herein in any order or combination.

10 {0131} The powder dispensing system 250 thus accurately and safely dispenses doses of one or more of the powder ingredients 260 to the nozzle 110. The powder dispensing system 250 may be compatible with existing macro-ingredients (such as bag-in-box sweeteners) and micro-ingredients to produce an enhanced core brand and/or flavored beverages. Specifically, the powder dispensing system 250 may provide vitamins, minerals, 15 nutraceuticals, proteins, other types of supplements, and the like in a conventional beverage dispensing system.

{0132} It should be apparent that the foregoing relates only to certain embodiments of the present application and the resultant patent. Numerous changes and modifications may be made herein by one of ordinary skill in the art without departing from the general 20 spirit and scope of the invention as defined by the following claims and the equivalents thereof.

CLAIMS

We claim:

1. A beverage dispensing system for dispensing a beverage with a powder ingredient, comprising:
 - a powder hopper with the powder ingredient therein;
 - a mixing bowl for mixing the powder ingredient and a flow of water into a blended powder solution;
 - a nozzle; and
 - a pump to pump to blended powder solution from the mixing bowl to the nozzle.
2. The beverage dispensing system of claim 1, further comprising a blending chamber.
3. The beverage dispensing system of claim 2, wherein the blending chamber comprises an impeller therein.
4. The beverage dispensing system of claim 3, wherein the impeller comprises an impeller motor.
5. The beverage dispensing system of claim 2, wherein the blending chamber is positioned between the mixing bowl and the pump.
6. The beverage dispensing system of claim 1, wherein the powder hopper comprises an auger therein.
7. The beverage dispensing system of claim 6, wherein the auger comprises an auger motor.
8. The beverage dispensing system of claim 6, wherein the powder hopper comprises a gear wheel therein.

9. The beverage dispensing system of claim 1, further comprising a plurality of powder hoppers positioned about the mixing bowl.

10. The beverage dispensing system of claim 1, wherein the mixing bowl comprises one or more water ports.

11. The beverage dispensing system of claim 1, wherein the mixing bowl comprises a concave floor.

12. The beverage dispensing system of claim 1, wherein the pump comprises a booster pump.

13. The beverage dispensing system of claim 1, further comprising a plurality of micro-ingredient containers with micro-ingredients therein in communication with the nozzle.

14. The beverage dispensing system of claim 1, further comprising a macro-ingredient source with a macro-ingredient therein in communication with the nozzle.

15. A method of preparing a beverage with a powder ingredient therein, comprising:

dosing the powder ingredient into a mixing bowl;

flowing water into the mixing bowl;

flowing the powder ingredient and the water to a blending chamber;

mixing the powder ingredient and the water into a blending powder solution; and

pumping the blended powder solution to a nozzle.

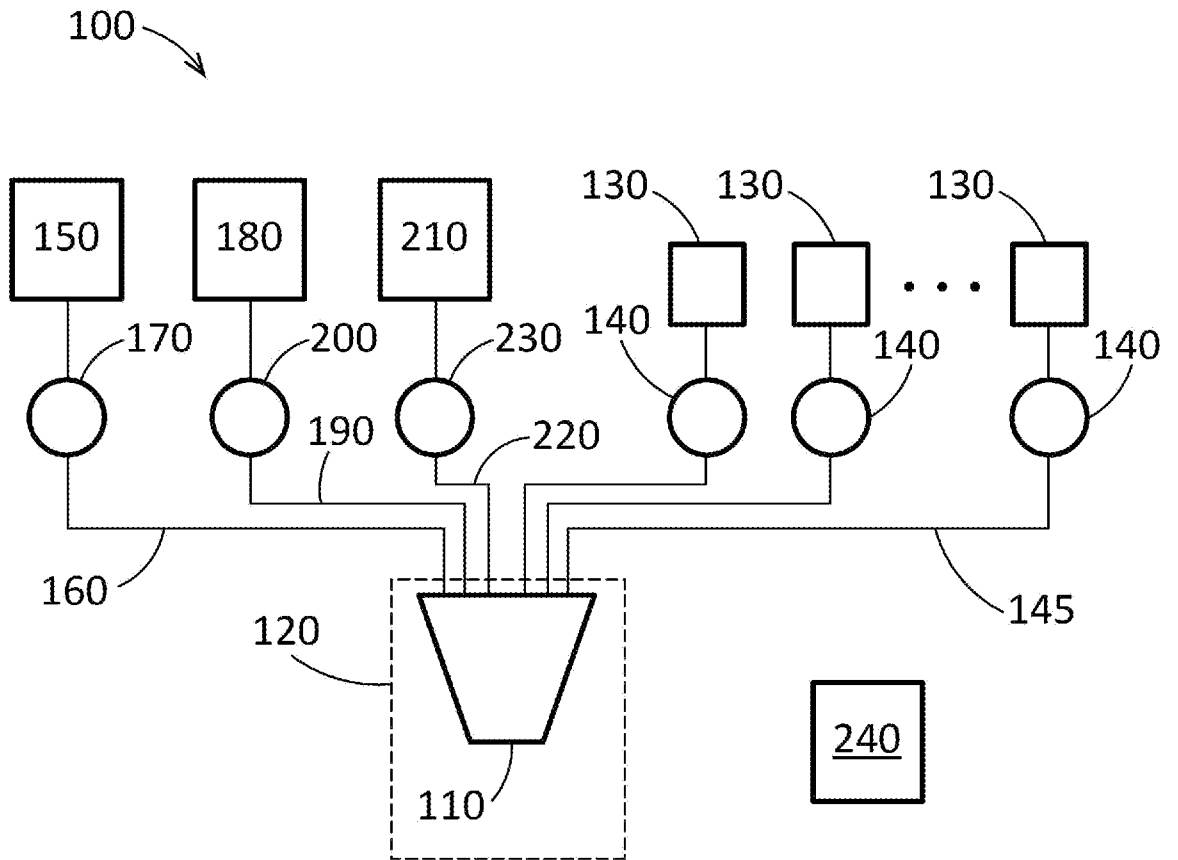


FIG. 1

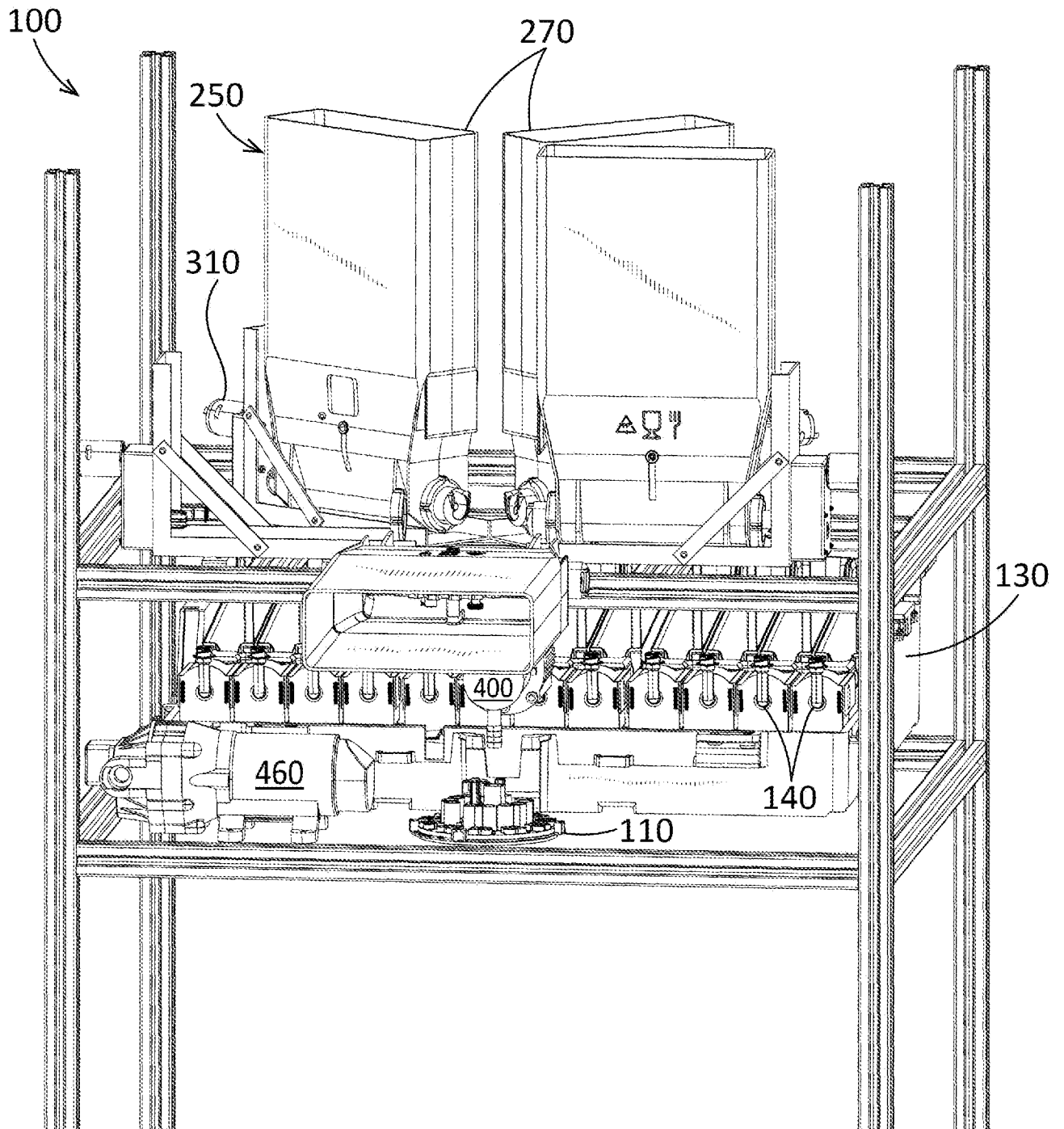


FIG. 2

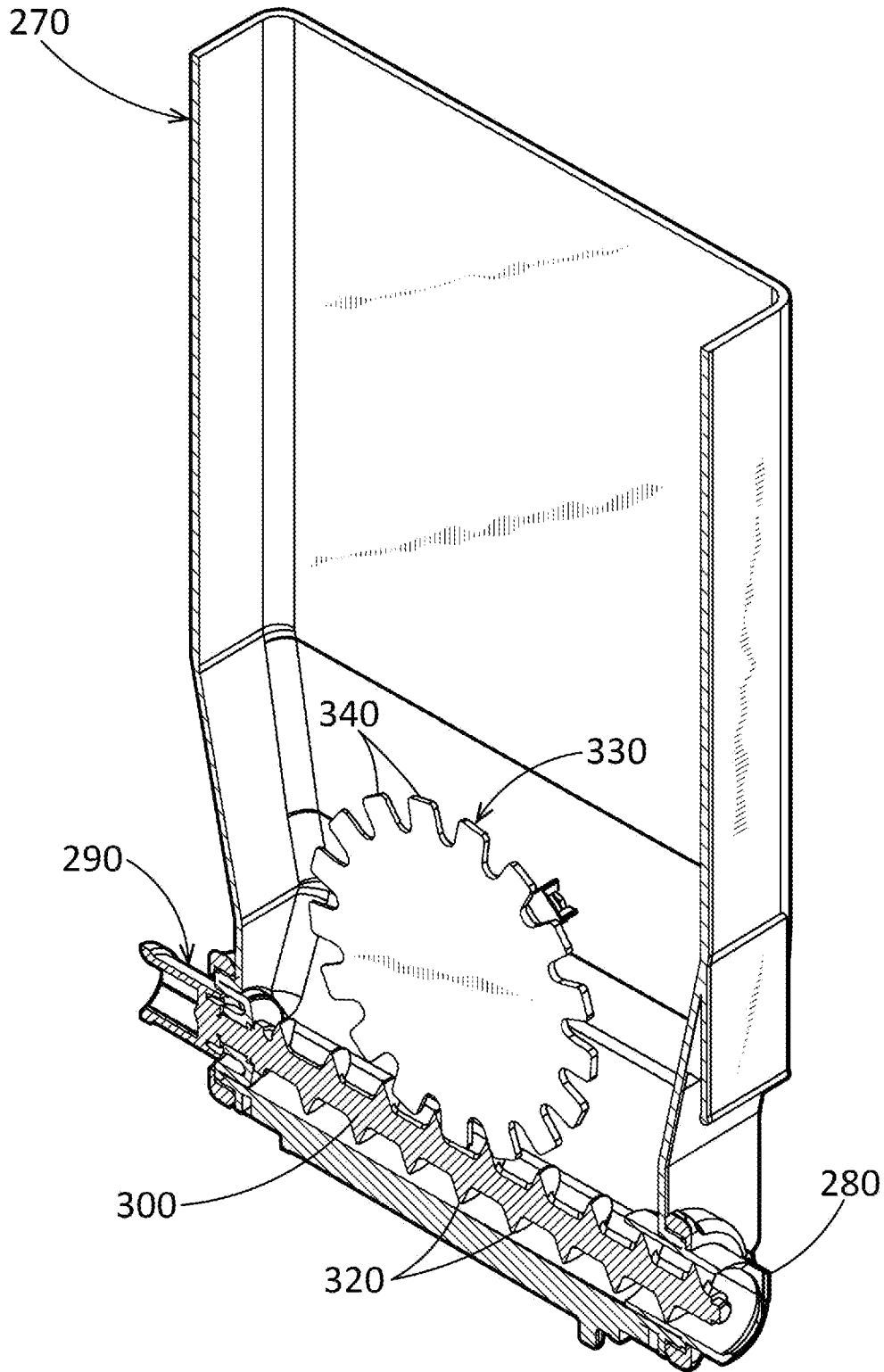


FIG. 3

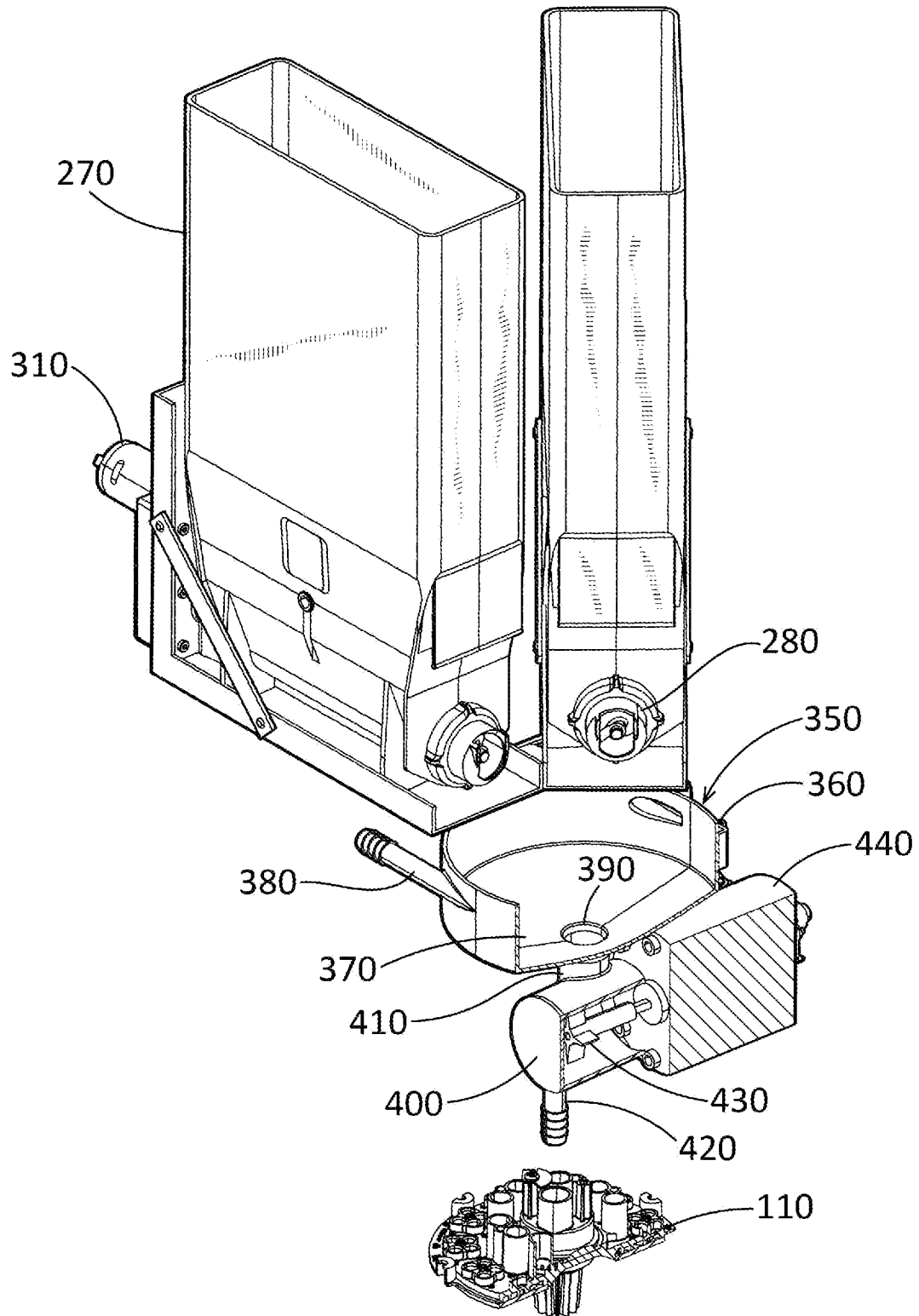


FIG. 4

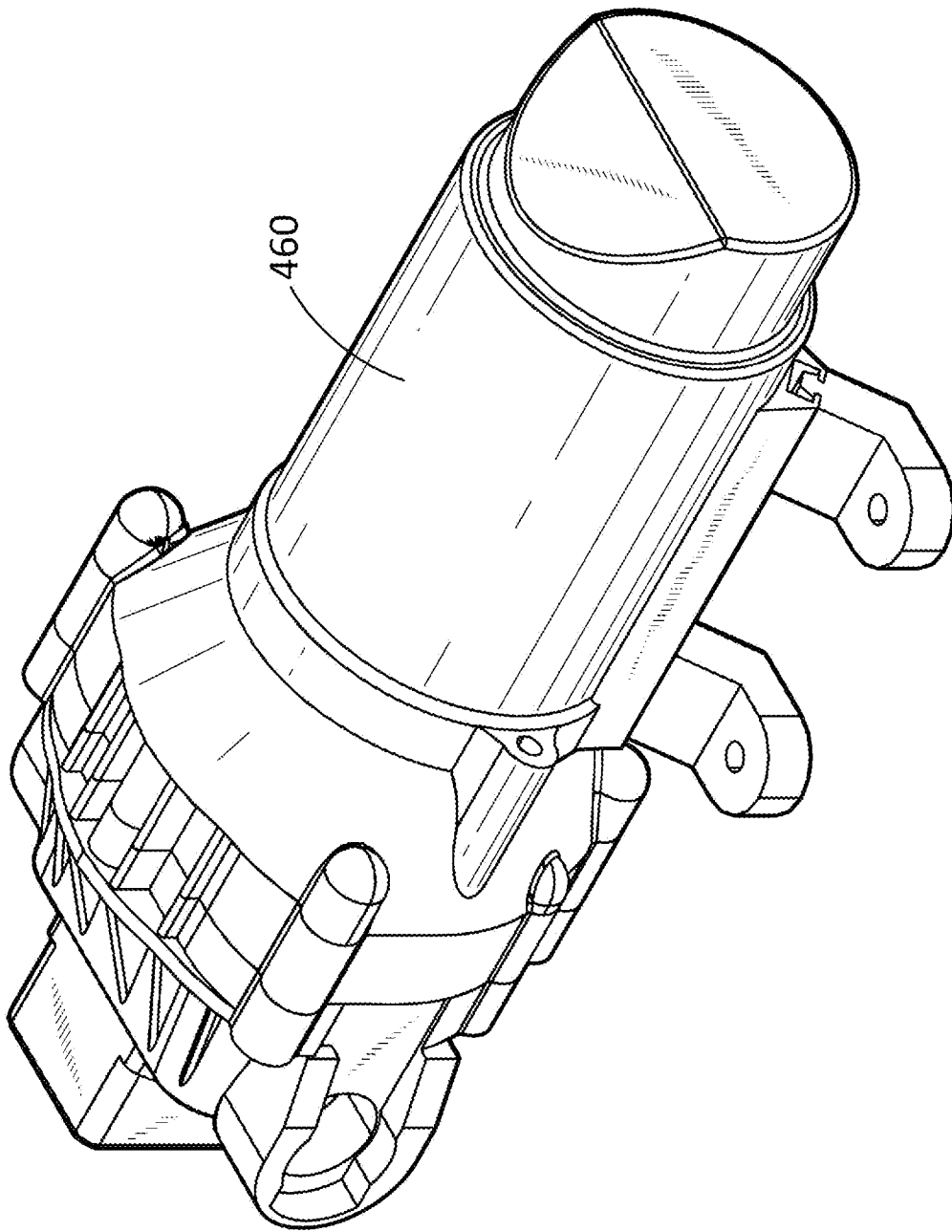


FIG. 5

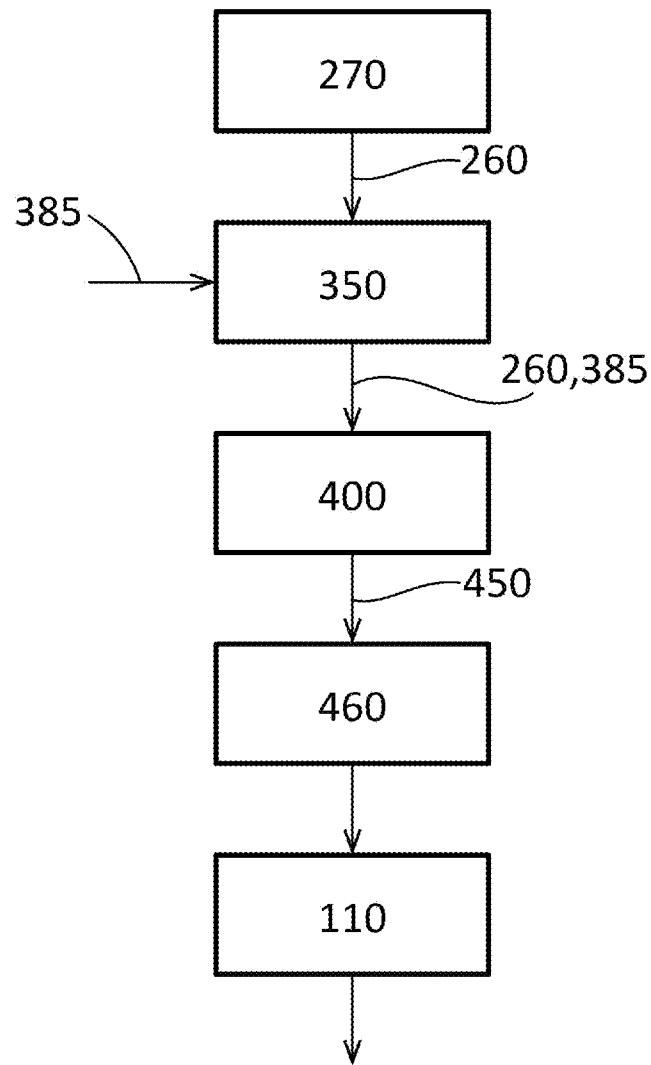


FIG. 6

INTERNATIONAL SEARCH REPORT

International application No.

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A. CLASSIFICATION OF SUBJECT MATTER A47J 31/40(2006.01)i; A47J 31/46(2006.01)i 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) A47J 31/40(2006.01); A23C 7/00(2006.01); A23F 3/00(2006.01); A23L 1/00(2006.01); A47J 31/00(2006.01); A47J 31/46(2006.01); F16K 11/00(2006.01) Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Korean utility models and applications for utility models Japanese utility models and applications for utility models Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) eKOMPASS(KIPO internal) & Keywords: beverage dispensing system, powder ingredient, hopper, mixing bowl, nozzle, pump		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4493249 A (STOVER, KENNETH W.) 15 January 1985 (1985-01-15) column 2, line 7 - column 4, line 18 and figures 1-4	1,6-12
Y		2-5,13-15
Y	US 7976883 B2 (GUERRERO et al.) 12 July 2011 (2011-07-12) column 11, line 57 - column 12, line 25 and figures 1-2	2-5,15
Y	US 2014-0263407 A1 (THE COCA-COLA COMPANY) 18 September 2014 (2014-09-18) paragraphs [0017]-[0018] and figure 1	13-14
A	US 2008-0166463 A1 (GREEN et al.) 10 July 2008 (2008-07-10) paragraphs [0014]-[0025] and figures 1-2	1-15
A	US 8230774 B1 (HUNTE, KAREN A.) 31 July 2012 (2012-07-31) column 6, line 37 - column 7, line 61 and figure 3	1-15
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> 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 "D" document cited by the applicant in the international application "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 22 February 2024		Date of mailing of the international search report 23 February 2024
Name and mailing address of the ISA/KR Korean Intellectual Property Office 189 Cheongsa-ro, Seo-gu, Daejeon 35208, Republic of Korea Facsimile No. +82-42-481-8578		Authorized officer PARK, Tae Wook Telephone No. +82-42-481-3405

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

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Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)			Publication date (day/month/year)
US	4493249	A	15 January 1985	CA	1200418	A	11 February 1986
US	7976883	B2	12 July 2011	AT	E398956	T1	15 July 2008
				AU	2005-311505	A1	08 June 2006
				AU	2005-311505	B2	19 May 2011
				BR	PI0518710	A2	02 December 2008
				CA	2588282	A1	08 June 2006
				CN	100584257	C	27 January 2010
				CN	101068491	A	07 November 2007
				EP	1827183	A1	05 September 2007
				EP	1827183	B1	25 June 2008
				EP	1827183	B2	11 April 2012
				ES	2309818	T3	16 December 2008
				ES	2309818	T5	26 July 2012
				HK	1111323	A1	08 August 2008
				JP	2008-522261	A	26 June 2008
				MY	140661	A	15 January 2010
				NZ	555041	A	27 August 2010
				RU	2007124598	A	10 January 2009
				RU	2380020	C2	27 January 2010
				US	2006-0115572	A1	01 June 2006
				US	2008-0020115	A1	24 January 2008
				WO	2006-058713	A1	08 June 2006
US	2014-0263407	A1	18 September 2014	CN	105026306	A	04 November 2015
				CN	105026306	B	07 May 2019
				EP	2969901	A1	20 January 2016
				EP	2969901	B1	24 October 2018
				MX	2015011030	A	22 October 2015
				US	10426290	B2	01 October 2019
				WO	2014-159182	A1	02 October 2014
US	2008-0166463	A1	10 July 2008	AR	064723	A1	22 April 2009
				AT	E543420	T1	15 February 2012
				BR	PI0721271	A2	01 April 2014
				BR	PI0721271	B1	14 August 2018
				CA	2672309	A1	17 July 2008
				CN	101573062	A	04 November 2009
				CN	101573062	B	27 March 2013
				EP	2104445	A2	30 September 2009
				EP	2104445	B1	01 February 2012
				ES	2381594	T3	29 May 2012
				JP	2010-515484	A	13 May 2010
				JP	5274480	B2	28 August 2013
				MX	2009007131	A	03 September 2009
				NO	20092458	L	10 July 2009
				RU	2009128618	A	10 February 2011
				RU	2461349	C2	20 September 2012
				US	8820214	B2	02 September 2014
				WO	2008-085643	A2	17 July 2008
				WO	2008-085643	A3	23 October 2008
				ZA	200904696	B	28 April 2010

INTERNATIONAL SEARCH REPORT
Information on patent family members

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Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
US 8230774 B1	31 July 2012	None	