(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 904 277 A1**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
03.11.2021 Bulletin 2021/44

(21) Application number: **19903263.2**

(22) Date of filing: **24.12.2019**

(51) Int Cl.:
B67D 1/08 *(2006.01)*

(86) International application number:
PCT/JP2019/050654

(87) International publication number:
WO 2020/138099 (02.07.2020 Gazette 2020/27)

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(30) Priority: **27.12.2018 JP 2018246031**

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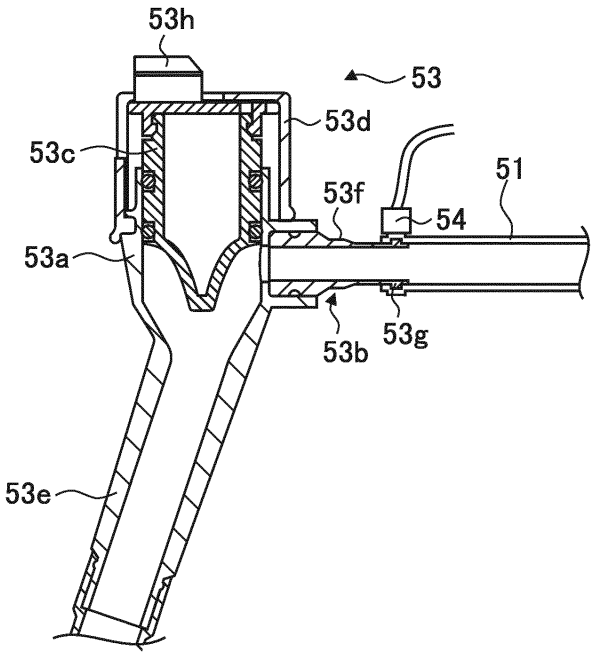
(54) **EFFERVESCENT-BEVERAGE POURING DEVICE**

(57) An effervescent-beverage pouring device comprising a first tube 51 for supplying the effervescent-beverage, a second tube 53b harder than the first tube 51 and to be inserted into the inside of the first tube 51, and an element 54 for applying ultrasonic waves to the first tube 51 at a position where the first tube 51 and the second tube 53b are superposed.

FIG. 3



EP 3 904 277 A1

Description

FIELD

[0001] The present invention relates to an effervescent-beverage pouring device.

BACKGROUND

[0002] Since the past, when an effervescent-beverage (for example, beer) was poured into a mug, glass, or other container, to improve the smell, taste, drinkability, and appearance, for example, often having a seven-tenths or so layer of a drink and, on top of that layer of drink, a three-tenths or so layer of foam has been preferred. The foam is preferably a fine one so as to delay the escape of the carbon dioxide from the drink and the oxidation of the drink. Further, the fine foam can keep the drink delicious.

[0003] For example, in beer halls, beer gardens, pubs, and other drinking places, beer stored in kegs is poured into containers by a specialized server and then provided to the customers. At this time, to form a layer of fine foam on a layer of beer, expert skill is required for various operations such as adjusting the angle of the container when pouring the beer, the opening degree of the stopcock, the amount poured, and/or the gas pressure and other various operations.

[0004] Therefore, various proposals have been disclosed for producing fine foam without requiring expert skill. For example, Patent Literature 1 (PTL1) discloses a tap for pouring an effervescent-beverage in which an ultrasonic wave generating element is embedded in the discharge outlet. Further, Patent Literature 2 (PTL2) discloses a pouring device for beer used attached to a pitcher. This device comprises an ultrasonic wave element set at a bottom side of a cross-section of a nozzle. Further, Patent Literature 3 (PTL3) discloses a pouring device for an effervescent-beverage used attached to a pitcher or other portable container. This device comprises a vibrating device for imparting vibration to a drink flowing through a passage inside the device.

[CITATIONS LIST]

[PATENT LITERATURE]

[0005]

[PTL 1] Japanese Unexamined Patent Publication No. 2000-327096
[PTL 2] Japanese Unexamined Patent Publication No. 2016-216080
[PTL 3] Japanese Patent No. 6227433

SUMMARY

[TECHNICAL PROBLEM]

[0006] When making an effervescent-beverage foam by an element generating ultrasonic waves, for example, if the time when the ultrasonic waves strike the drink is short (for example, if the flow rate of the drink is fast), there is a possibility that fine foam will not be sufficiently produced. Therefore, if an ultrasonic wave generating element is used for a pitcher, can, bottle, or other portable container in which a drink is poured at a slow flow rate by mainly gravity, a fine foam will be sufficiently produced, but if an ultrasonic wave generating element is used for a drink server in which a drink is poured at a fast flow rate, there is a possibility that a fine foam will not be sufficiently produced,

[0007] The present invention has as its object the provision of an effervescent-beverage pouring device able to produce fine foam.

[SOLUTION TO PROBLEM]

[0008] One embodiment of the present disclosure is an effervescent-beverage pouring device comprising a first tube for supplying the effervescent-beverage, a second tube harder than the first tube and to be inserted inside of the first tube, and an element for applying ultrasonic waves to the first tube at a position where the first tube and the second tube are superposed.

[0009] The inventors discovered that by inserting a second tube into a first tube to thereby form a constricted part with a small passage cross-sectional area and apply ultrasonic waves to that constricted part, it is possible to transmit the ultrasonic waves to the passage as a whole and therefore possible to produce a fine foam. According to one embodiment of the present disclosure, ultrasonic waves are applied to the above such constricted part combining the first tube and

the second tube. Further, the inventors discovered that if transmitting vibration to a drink (that is, a liquid), by transmitting the vibration from the second tube, which is harder than the first tube, compared to when transmitting vibration from the first tube, it is possible to efficiently transmit vibration to the drink without allowing the vibration to be absorbed. Therefore, it is possible to produce fine foam.

[0010] The pouring device may be configured so as to be assembled into a drink server for serving an effervescent-beverage stored in a drink container or the first tube may be configured by a hose connecting a drink container and a discharging part of a drink server. In the present aspect, the pouring device is configured so as to be assembled into a drink server. In the above way, in a drink server, a drink is poured by a fast flow rate, so the time during which the ultrasonic waves strike the drink is short. According to the present aspect, it is possible to produce fine foam even in such a drink server.

[0011] The second tube may be configured by a connector connecting the hose and a discharging part of the drink server. In this case, the position at which the ultrasonic waves are applied becomes close to the outlet of the effervescent-beverage. Therefore, when stopping production of foam, it is possible to reduce the foam remaining in the passage. Therefore, it is possible to prevent excess foam from being produced.

[ADVANTAGEOUS EFFECTS OF INVENTION]

[0012] According to one embodiment of the present disclosure, it is possible to produce fine foam.

BRIEF DESCRIPTION OF DRAWINGS

[0013]

FIG. 1 is a schematic view of the configuration showing a drink server including a pouring device according to an embodiment.

FIG. 2 is a schematic perspective view showing a hose unit removed from a drink server.

FIG. 3 is a schematic cross-sectional view showing a stopcock nozzle.

DESCRIPTION OF EMBODIMENTS

[0014] Below, referring to the attached drawings, a pouring device according to embodiments will be explained. Similar or corresponding elements will be assigned the same reference notations and overlapping explanations will be omitted. To facilitate understanding, the scale of the figures will sometimes be changed.

[0015] FIG. 1 is a schematic view of the configuration showing a drink server 10 including a pouring device according to the present embodiment. In the present embodiment, the pouring device is incorporated in a hose unit 5 built into the drink server 10. The drink server 10, for example, comprises a refrigerator 1, a tower 2, a control device 3, and a gas tank 4. The drink server 10 may further contain other component elements.

[0016] The refrigerator 1 is configured so as to hold and cool a drink container B. The drink server 10 is a so-called air-cooled type. The refrigerator 1 is configured so as to cool the drink together with the entire drink container B. The refrigerator 1, for example, may be configured to hold a drink container B which is in use and one or more spare drink containers B. The refrigerator 1 can have a door (not shown) enabling a drink container B to be taken out and put in.

[0017] The drink container B can, for example, be a beer keg. The drink container B can store various effervescent-beverages (for example, beer, alcoholic effervescent-beverages other than beer (for example, low malt beer, beer flavored carbonated alcoholic drinks made from materials other than malt and in which other alcoholic drinks are mixed (so-called "third sector beer"), spirits with soda, or whiskey with soda), or nonalcoholic effervescent-beverages (nonalcohol beer or carbonated juice) etc.). The drink to which the pouring device of the present disclosure is applied is not limited to a beer taste drink and can be any effervescent-beverage in which foam is desirable at the time of drinking.

[0018] During use, the drink container B has a dispenser head H attached to it. The dispenser head H has the gas tank 4 and a probe 52 of the hose unit 5 attached to it. Using gas supplied from the gas tank 4, the drink inside the drink container B is pushed out through the dispenser head H and the probe 52 to the hose 51 of the hose unit 5.

[0019] FIG. 2 is a schematic perspective view showing the hose unit 5 detached from the drink server 10. The hose unit 5 may intentionally be replaced periodically at predetermined timings or at any timings. The hose unit 5 may be disposable as well. The hose unit 5, for example, has a hose (first tube) 51, probe 52, tap nozzle 53, and element 54 for applying ultrasonic waves (FIG. 3). The hose unit 5 may further have other component elements.

[0020] Referring to FIG. 1, the hose 51 can be prepared by various flexible synthetic resin. For example, it may be prepared by polyethylene. One end part of the hose 51 at the probe 52 side is connected to a drink container B, while the other end part at the tap nozzle 53 side is connected to a discharging part 22 of the tower 2.

[0021] The probe 52 is connected to one end part of the hose 51 and is configured to connect that end part to the

drink container B (specifically, dispenser head H). More specifically, the probe 52 may, for example, be configured so as to be fit inside the dispenser head H. The probe 52 may be prepared by a synthetic resin or metal or other various materials.

[0022] The tap nozzle 53 is connected to the other end part of the hose 51 and is configured to connect that end part to the discharge part 22 of the tower 2. Specifically, the tap nozzle 53 may be configured to be fit in the discharge part 22 so that the nozzle part 53e sticks out from the discharge part 22 (that is, the tap nozzle 53 may be configured as an outlet of the drink at the drink server 10). The tap nozzle 53 may be prepared by a synthetic resin or metal or other various materials.

[0023] FIG. 3 is a schematic cross-sectional view showing a tap nozzle 53. The tap nozzle 53, for example, includes a main body 53a, connector (second tube) 53b, valve 53c, and valve lid 53d. The tap nozzle 53 may further include other component elements.

[0024] The main body 53a includes a nozzle part 53e and is configured to be fit into the discharge part 22 of the tower 2.

[0025] The connector 53b is configured so as to connect the hose 51 and the discharge part 22 (specifically, the main body 53a fit into the discharge part 22). More specifically, the first end part of the connector 53b (end part at right side in FIG. 3) is configured so as to be inserted into the end part of the hose 51. For example, the outer surface of the first end part of the connector 53b may be provided with a taper 53f for facilitating insertion into the hose 51. The taper 53f may be provided with a ridge part 53g for preventing the hose 51 from easily detaching from the connector 53b. The second end part of the connector 53b (end part at left side in FIG. 3) includes a male screw part for engaging with the main body 53a. The connector 53b can be prepared by a material harder than the hose 51. For example, the connector 53b may be prepared by various nonflexible synthetic resins. For example, it may be prepared by polypropylene.

[0026] The inside diameters and thicknesses of the hose 51 and connector 53b can be selected so that the desired foam is produced in the drink by the ultrasonic waves from the element 54. For example, in one embodiment, the hose 51 can have an approximately 3 mm inside diameter and an approximately 1.25 mm thickness while the connector 53b can have an approximately 2.5 mm inside diameter. The inside diameter and thickness of the hose 51 may, for example, be changed in accordance with the intensity of the ultrasonic waves from the element 54 or other various factors.

[0027] The valve 53c is configured to close or open the effervescent-beverage passage. The valve 53c is configured to be inserted into the main body 53a. For example, the tap nozzle 53 may include a spring or other elastic element (not shown) for biasing the valve 53c to an open position (position shown in FIG. 3). On the top surface of the valve 53c, a projection 53h for engaging with the stopcock 23c of the tower 2 (explained in detail later) is provided. By operating the stopcock 23c, the valve 53c can be moved to a closed position lower than the position shown in FIG. 3. The valve 53c may contain an O-ring or other seal member (not shown) for closing the drink passage in the closed position. The valve lid 53d is attached to the main body 53a so as to cover the valve 53c.

[0028] The element 54 can be a piezoelectric element and can be connected to a not shown transmitter. The element 54 is configured so as to apply ultrasonic waves to the hose 51 at the part where the hose 51 and the connector 53b are superposed. The element 54 can be fastened to the outer surface of the hose 51 by various methods. For example, the element 54 may also be fastened to the outer surface of the hose 51 by an adhesive. Further, for example, the hose 51 may also include a projection for attachment of the element 54. The projection may be configured so that the element 54 is fit into it. In this case, at the time of replacing the hose unit 5, the element 54 can be detached from the used hose unit 5 and can be easily reattached to the new hose unit 5. Further, as another method of fastening, for example, the element 54 may have a spring or other elastic material attached to it and the element 54 fastened to the hose by the elastic force of the elastic material.

[0029] As can be understood from FIG. 1, in the present embodiment, at the downstream side from the dispenser head H, all of the drink passage is configured by the replaceable hose unit 5. Therefore, it is possible to keep the drink passage clean without scavenging the drink passage. Accordingly, the burden on the operator can be lightened.

[0030] The tower 2 sticks out from the refrigerator 1 (specifically, the ceiling of the refrigerator 1) upward. The tower 2 is hollow. The inside of the tower 2 and the inside of the refrigerator 1 are communicated with each other. The tower 2, for example, has the main body 21, discharging part 22, and lid 23. The tower 2 may further have other component elements.

[0031] The main body 21 is a tubular (for example, hollow circular columnar shape or polygonal columnar shape). The hose unit 5 is communicated with the inside of the main body 21. The hose 51 is arranged at the inside of the main body 21. The top end part of the main body 21 is open and has an opening 24. The opening 24 is configured to enable the hose unit 5 to be taken out. The bottom end part of the main body 21 is open and is communicated with the inside of the refrigerator 1.

[0032] Referring to FIG. 2, the discharging part 22 extends from the top end part of the main body 21 in the horizontal direction. In the present embodiment, the discharging part 22 has an arc-shaped cross-section open upward. The tap nozzle 53 of the hose unit 5 can be fit into the discharging part 22 from above. The discharging part 22 has a through hole for passage of the nozzle part 53e of the tap nozzle 53. The nozzle part 53e is configured to be exposed at the outer side of the discharging part 22.

[0033] The lid 23 is configured so as to cover the opening 24 of the main body 21 and the open part of the discharging part 22. The lid 23 can be attached to and detached from the main body 21 and discharging part 22. Referring to FIG. 1, the lid 23, for example, may be attached to the main body 21 to be able to rotate through a hinge 23a or other rotatable element. Referring to FIG. 2, due to such a configuration, the lid 23 can be opened so as to allow the hose unit 5 to be taken out.

[0034] The lid 23 may have a button 23b provided at it for preventing the lid 23 from being unintentionally opened. The lid 23 can be opened only when the button 23b is pushed. The lid 23 may have a stopcock 23c attached to it for opening and closing the valve 53c of the tap nozzle 53. The stopcock 23c is configured so as to engage with the above projection 53h of the valve 53c.

[0035] For example, the stopcock 23c can have a first position for opening the valve 53c, a second position for closing the valve 53c, and a third position for producing foam. At the third position, the stopcock 23c adjusts the position of the valve 53c so as to make the drink passage narrower and thereby produce foam. Further, the drink server 10 may be configured so that when the stopcock 23c is at the third position, the element 54 generates ultrasonic waves. For example, the stopcock 23c may be provided with a stopcock-use sensor for detecting a position of the stopcock 23c.

[0036] Referring to FIG. 1, the control device 3 is configured so as to monitor the drink server 10. For example, the control device 3 may be configured so as to control the element 54 so that the element 54 generates ultrasonic waves when the stopcock 23c is at the third position. For example, the control device 3 may send a signal to the element 54 so as to generate ultrasonic waves if the stopcock-use sensor detects that the stopcock 23c is at the third position. The control device 3 may be connected to the element 54 and stopcock-use sensor wirelessly or by a cable.

[0037] The control device 3, for example, can include a processor, memory, operating part, or other component element. The control device 3 may also include other component elements. The processor can, for example, include one or more CPUs (central processing units). Instead of the processor, an independent integrated circuit, microprocessor, and/or firmware may also be used. The memory, for example, can include a flash memory or other ROM (read only memory) and RAM (random access memory) or other storage device. The memory can store various programs run by the processor. The programs, for example, may be installed in the memory using known setup programs etc. from a CD-ROM (compact disk read only memory), DVD-ROM (digital versatile disk read only memory), or other computer readable portable recording medium. The operating part can have an input function and a display function, for example, can include a touch panel. Alternatively or additionally, the operating part may include other component elements (for example, a liquid crystal display, mouse, and/or keyboard etc.) .

[0038] The gas tank 4 is connected to the dispenser head H and can supply the drink container B through the dispenser head H with for example carbon dioxide gas, nitrogen gas, a mixed gas of the same, or other gas.

[0039] Next, the operation of the drink server 10 will be explained.

[0040] If pouring the effervescent-beverage in a glass, mug, or other container, the operator moves the stopcock 23c from the second position for closing the valve 53c to the first position for opening the valve 53c. Due to this operation, the valve 53c is opened and the effervescent-beverage is supplied from the nozzle part 53e. When the effervescent-beverage is dispensed up to the desired height inside the container, the operator moves the stopcock 23c from the first position to the third position for producing foam. Due to this operation, the drink passage is narrowed by the valve 53c and foam is supplied from the nozzle part 53e.

[0041] In the drink server 10 of the present disclosure, when supplying foam, ultrasonic waves are applied from the element 54 to the drink. For example, in one embodiment, when the stopcock 23c is moved to the third position, the stopcock-use sensor sends a signal to the control device 3. The control device 3 sends a signal to the element 54 whereby ultrasonic waves are applied from the element 54 to the effervescent-beverage. Due to this, a finer foam is produced in the drink.

[0042] When foam is poured to the desired height in the container, the operator returns the stopcock 23c to the second position. Due to this operation, the valve 53c is closed and the series of operations is ended.

[0043] In the above such drink server 10, ultrasonic waves are applied to the effervescent-beverage at the constricted part where the hose 51 and connector 53b are superposed. The inventors discovered that, as explained in detail below, by inserting the connector 53b in the hose 51 to thereby form a constricted part with a small passage cross-sectional area and by applying ultrasonic waves to that constricted part, it is possible to transmit the ultrasonic waves to the passage as a whole and thereby possible to produce fine foam. Further, it is surmised that if transmitting vibration to the drink (that is, the liquid), by transmitting the vibration from the connector 53b which is harder than the hose 51, vibration can be efficiently transmitted to the drink without the vibration being absorbed compared with the case of transmitting vibration from the hose 51. Therefore, in the drink server 10, fine foam can be produced.

[0044] Further, in the present embodiment, the pouring device is configured so as to be assembled into the drink server 10 for supplying the effervescent-beverage stored in the drink container B. The first tube is configured by a hose 51 connecting the drink container B and a discharge part 22 of the drink server 10. In general, in the drink server, the drink is poured by a fast flow rate, so the time period during which the ultrasonic waves strike the drink is short. However, according to the present embodiment, even in such a drink server 10, fine foam can be produced.

[0045] Further, in the present embodiment, the second tube is configured by a connector 53b connecting the hose 51 and the discharge part 22 of the drink server 10. Therefore, the position to which the ultrasonic waves are applied is close to the outlet of the effervescent-beverage. Therefore, when stopping the production of foam, it is possible to reduce the foam remaining in the passage. Therefore, it is possible to prevent the production of excess foam.

[0046] Embodiments of the pouring device were explained, but the present invention is not limited to the above embodiments. A person skilled in the art would understand that various modifications may be made to the above embodiments.

[0047] For example, in the above embodiments, the second tube was configured by the connector 53b of the tap nozzle 53 and was inserted into the end part of the hose 51. However, in another embodiment, the second tube may be formed as a member separate from the connector 53b and may be inserted at a position other than the end part in the hose 51 (for example, a position separated from the end part by a predetermined distance). Therefore, the element 54 may also be fixed at a position other than the end part at the hose 51 in accordance with the position of the second tube.

[0048] Further, in the above embodiments, the pouring device was applied to a drink server. However, in another embodiment, the pouring device may be configured to be attached to a pitcher or other portable container. In this case, for example, the pouring device may comprise a nozzle configured to be attached to the portable container while the first tube may be configured so as to transfer the effervescent-beverage inside the portable container to the nozzle. The second tube can be a connector provided at the nozzle for attaching the first tube. Alternatively, the second tube may be formed as a member separate from the connector and may be inserted at a position other than the end part in the first tube (for example, a position away from the end part by a predetermined distance).

[0049] Further, in the above embodiments, the pouring device was applied to an air-cooled type drink server. However, in another embodiment, the pouring device may be applied to a so-called instant cooling type drink server for cooling the drink flowing through the passage without cooling the drink container.

EXAMPLES

[0050] The average particle size of the foam produced under the following conditions was measured. For the measurement, a digital microscope VHX-6000 made by Keyence and an ultrasmall type high performance zoom lens VH-Z20R/Z20T made by Keyence were used.

[0051] Example 1: An air-cooling type drink server similar to the drink server 10 of the above embodiments was used. At a constricted part where the hose and connector of the tap nozzle are superposed, an element for applying ultrasonic waves was attached to the hose. The hose was made of polyethylene, while the connector was made of polypropylene. The inside diameter of the hose was approximately 3 mm while the inside diameter of the connector was approximately 2.5 mm. The stopcock was set at the third position for producing foam. The average particle size of the foam obtained from the tap nozzle was measured.

[0052] Example 2: The drink server of Example 1 in which the stopcock was set to the first position for opening the valve instead of the third position for producing foam. The average particle size of the foam obtained from the tap nozzle was measured.

[0053] Comparative Example 1: The drink server of Example 1 in which the tap nozzle was detached (that is, no stopcock) and an effervescent-beverage was directly supplied from the hose. In this state, ultrasonic waves were applied to the drink. The average particle size of the foam obtained from the hose was measured.

[0054] Comparative Example 2: The drink server of Comparative Example 1 in which the hose was replaced with another hose with an inside diameter of approximately 2 mm. The replacement hose was also made of polyethylene. An effervescent-beverage was directly supplied from the hose. In this state, ultrasonic waves were applied to the drink. The average particle size of the foam obtained from the hose was measured.

[0055] Comparative Example 3: The drink server of Example 1 in which no ultrasonic waves were applied to the drink. The average particle size of the foam obtained from the tap nozzle was measured.

[0056] Comparative Example 4: A generally available instant cooling type drink server was used to produce foam by operation of the stopcock without applying ultrasonic waves to the drink. The average particle size of the obtained form was measured.

[0057] The measurement results are shown in the following Table 1.

[Table 1]

	Example 1	Example 2	Comparative Example 1	Comparative Example 2	Comparative Example 3	Comparative Example 4
First tube	3 mm	3 mm	3 mm	2 mm	3 mm	-

(continued)

	Example 1	Example 2	Comparative Example 1	Comparative Example 2	Comparative Example 3	Comparative Example 4
Second tube	2.5 mm	2.5 mm	-	-	2.5 mm	-
Stopcock position	Third position	First position	Corresponding to first position (no stopcock)	Corresponding to first position (no stopcock)	Third position	Third position
Application of ultrasonic waves	Yes	Yes	Yes	Yes	No	No
Average particle size (μm)	74.1	84.0	89.3	86.3	115.1	97.3

[0058] Referring to Example 1 and Comparative Example 3, it will be understood that by applying ultrasonic waves, the average particle size of the foam is reduced from 115.1 μm to 74.1 μm. Further, referring to Comparative Example 3 and Comparative Example 4, it is learned that the air-cooled type drink server of Comparative Example 3 (average particle size: 115.1 μm) is inferior to the instant cooling type drink server (average particle size: 97.3 μm) on the point of producing fine foam, but this point can be improved by application of ultrasonic waves (Example 1).

[0059] Further, referring to Example 2 and Comparative Example 1, it is learned that by the second tube being inserted into the first tube, the average particle size of the foam is decreased from 89.3 μm to 84.0 μm.

[0060] Further, if referring to Example 2, Comparative Example 1, and Comparative Example 2, it will be understood that inserting a hard second tube into a first tube (Example 1) enables the fineness of the foam to be improved compared with decreasing the inside diameter of the first tube from 3 mm (Comparative Example 1) to 2 mm (Comparative Example 2).

REFERENCE SIGNS LIST

[0061]

10 drink server
22 discharging part
51 hose (first tube)
53b connector (second tube)
54 element for applying ultrasonic waves
B drink container

Claims

1. An effervescent-beverage pouring device,
the pouring device comprising:

a first tube for supplying the effervescent-beverage,
a second tube harder than the first tube and to be inserted inside of the first tube, and
an element for applying ultrasonic waves to the first tube at a position where the first tube and the second tube are superposed.

2. The pouring device according to claim 1, wherein

the pouring device is configured to be built into a drink server for serving an effervescent-beverage stored in a drink container and
the first tube is configured by a hose connecting the drink container and a discharge part of the drink server.

3. The pouring device according to claim 2, wherein the second tube is configured by a connector connecting the first tube and the discharge part of the drink server.

FIG. 1

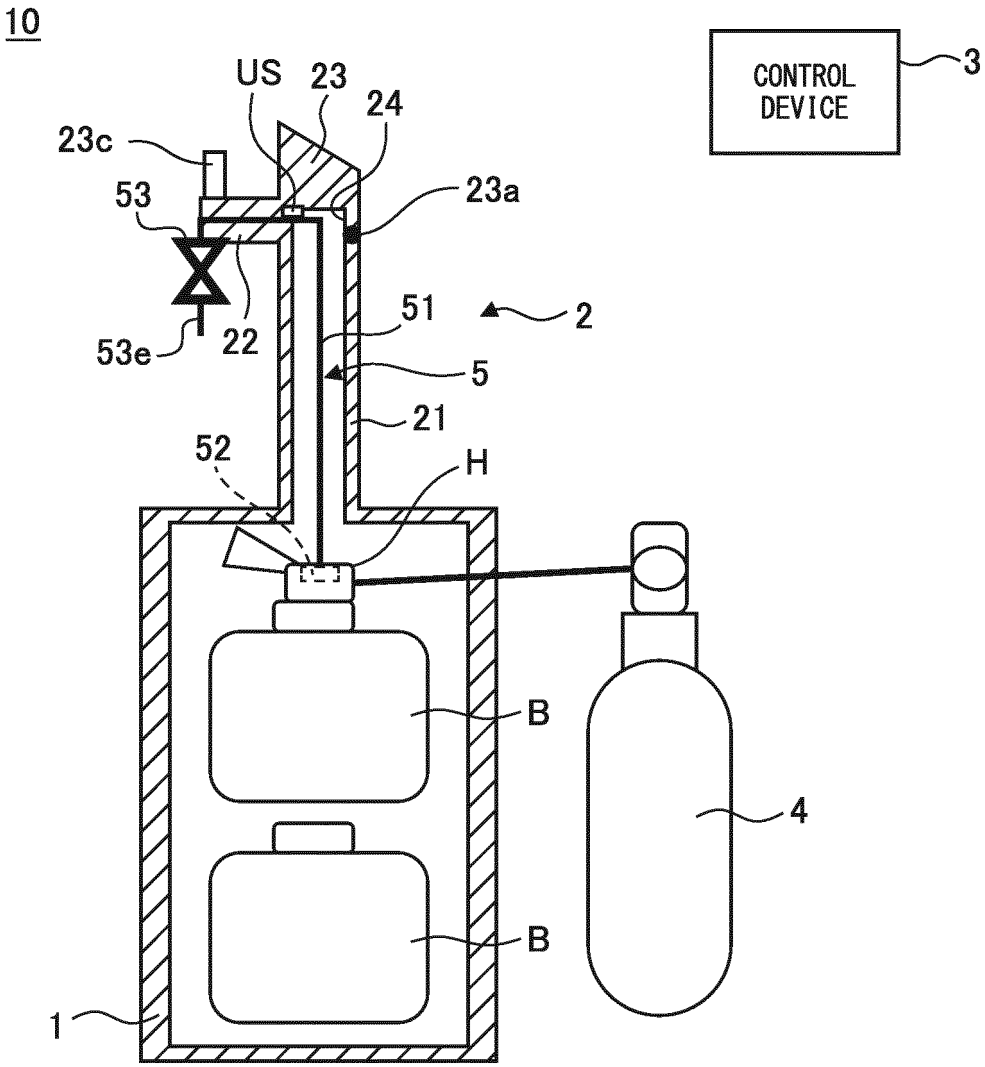


FIG. 2

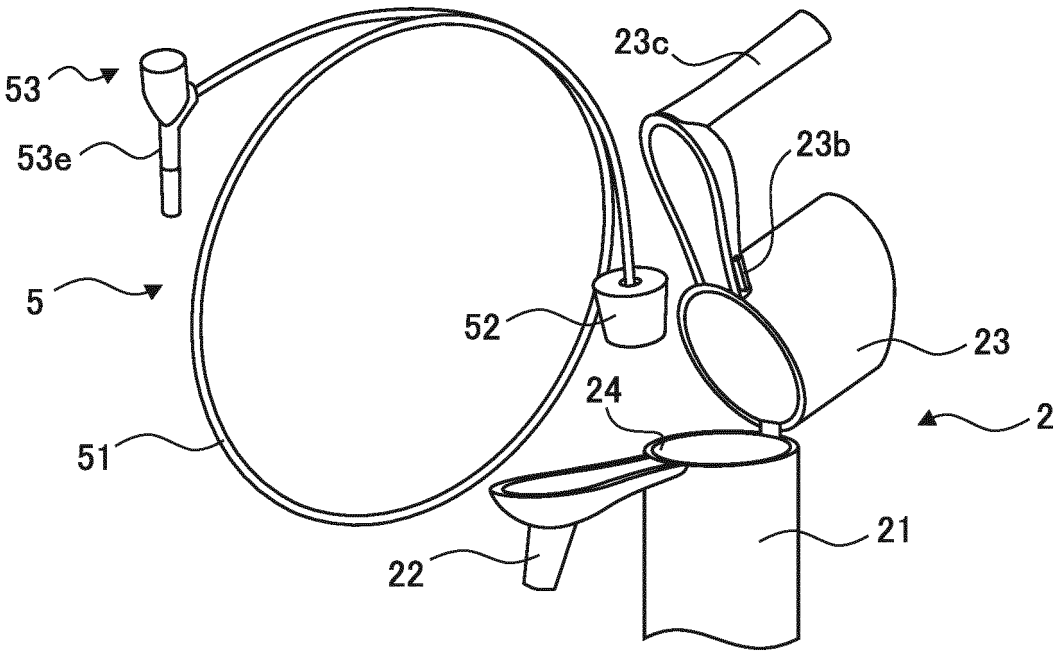
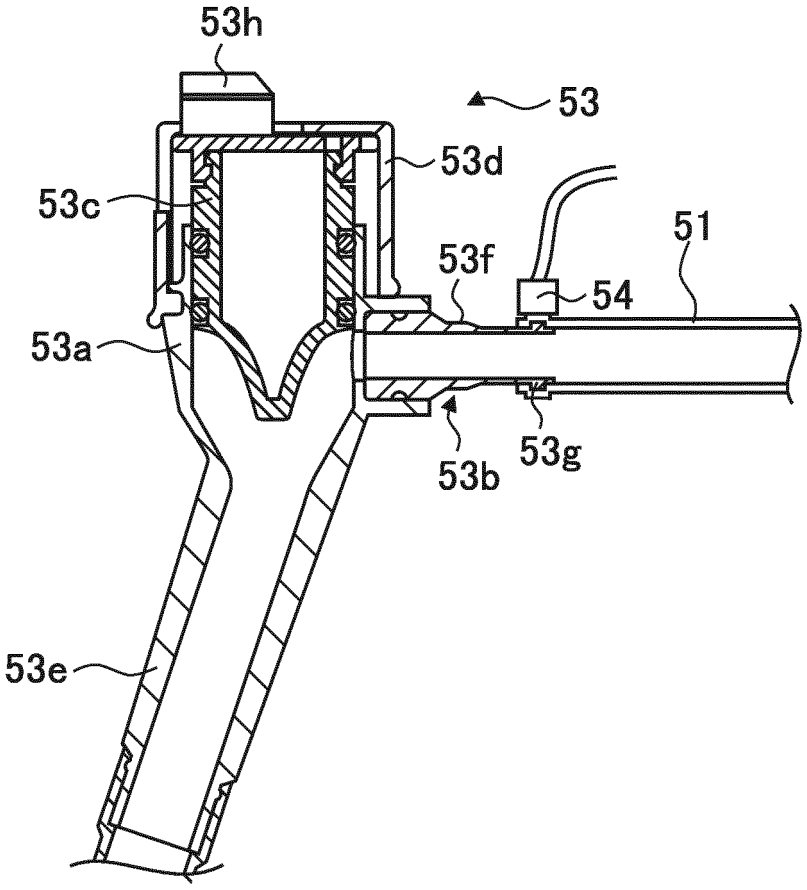


FIG. 3



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2019/050654

A. CLASSIFICATION OF SUBJECT MATTER
Int. Cl. B67D1/08(2006.01)i
FI: B67D1/08 Z

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)
Int. Cl. B67D1/08

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Published examined utility model applications of Japan 1922-1996
Published unexamined utility model applications of Japan 1971-2020
Registered utility model specifications of Japan 1996-2020
Published registered utility model applications of Japan 1994-2020

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2017-186053 A (GREEN HOUSE KK) 12 October 2017, paragraphs [0033], [0041], fig. 4, 8	1-3
A	JP 2014-150727 A (TEX E.G CO., LTD., CHANTY KK) 25 August 2014, paragraph [0029], fig. 4	1-3
A	JP 6227433 B2 (SUNTORY HOLDINGS LTD.) 08 November 2017, paragraphs [0050], [0064], [0065], [0068], fig. 5	1-3

☐ Further documents are listed in the continuation of Box C.
☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
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