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(54) **LIQUID DISPENSING ASSEMBLY**

(57) The invention relates to units for dispensing liquids, such as syrups, beverage concentrates, flavoring additives and the like and can be used in devices for preparing cold and/or hot drinks in domestic conditions, offices, cafes, public institutions and other places. The liquid dispensing unit consists of a housing, a gas supply means and at least one at least partially thin-walled capsule filled with liquid installed inside the housing, characterized in that the unit is designed to be capable of compressing walls of the capsule by gas pressure during a process of controlled delivery of a portion of liquid, and is equipped with a control unit.

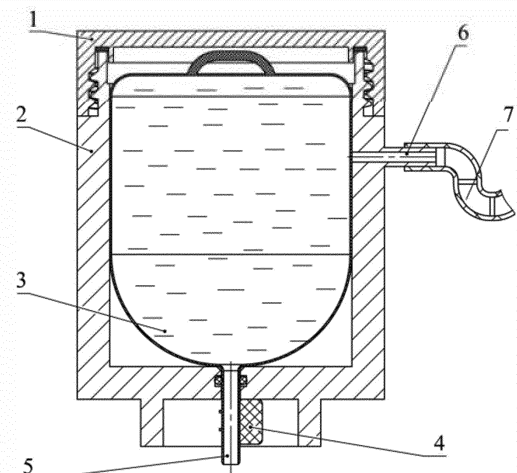


Figure 1

EP 4 417 541 A1

Description

[0001] The invention relates to units for dispensing liquids, such as syrups, drink concentrates, flavoring additives and others, and can be used in devices for preparing cold and/or hot drinks in domestic conditions, offices, cafes, public institutions and other places.

[0002] A liquid dispensing unit is known from the state of the art according to US patent 5169037 (prior. 01/26/1990, applicant CCL Industries Inc, IPC B65D83/62). It consists of a housing into which a flat-bottomed capsule with flexible walls is inserted, tightly connected to a valve located in the upper part of the housing. Initially, the capsule is folded. When the housing is sealed, liquid is pumped into the capsule. In this case, the capsule expands, and its bottom opens along the inner surface of the bottom of the housing. After filling the capsule with liquid, a gas injection means is connected to the housing, with the help of which the liquid is squeezed out of the capsule. As the amount of liquid in the capsule decreases, the pressure will gradually decrease. The process stops after all the liquid has been squeezed out of the capsule. After which the capsule can be filled with liquid again. The disadvantage of this unit is that the dispensing volume is equal to the volume of the capsule; the consumer cannot regulate the size of the received portion of liquid. Another disadvantage is that the dispensing rate is uneven, since the pressure decreases during the process, which limits the use of this invention.

[0003] A liquid dispensing unit is known from the state of the art according to US patent 5607082 (prior. 06/01/1995, Applicant HD Hudson Manufacturing Co, IPC B05B9/0838). The assembly consists of a housing in which a capsule with flexible walls is located, connected to the neck of the housing, and a gas injection means connected to the capsule. Initially, the capsule is folded. The unit according to patent US5607082 works as follows. The folded capsule is placed in the housing, after which it is filled with liquid and closed. Through the gas injection means, compressed gas is supplied into the space inside the housing around the capsule, which pushes the contents of the capsule through a tube inserted into the neck of the housing. Once all the liquid has been squeezed out, the dispensing process stops. The disadvantage of this unit is that the dispensing volume is equal to the volume of the capsule; the consumer cannot regulate the size of the received portion of liquid, that is, there is no possibility of regulating the supplied volume of liquid.

[0004] From the state of the art, a liquid dispensing unit is known according to application US2007/0235471 (prior. 05/27/2007, Applicant Marty Radermacher, IPC B05C17/015), chosen by the applicant as the closest analogue. The unit consists of an outer casing, an inner casing into which a flexible capsule with liquid is inserted, a means of supplying compressed gas, and a pressure relief valve. The compressed gas supply means is con-

nected to the capsule through a flexible tube on which a pressure relief valve is installed. The inner housing with the capsule is equipped with an outlet tube with an automatic valve.

[0005] The liquid dispensing unit according to application US2007/0235471 operates as follows. The user installs the capsule inside the housing. The user then starts the supply of compressed gas by turning on the compressed gas supply means. In this case, compressed gas is supplied through a flexible tube into the capsule, displacing the liquid in the capsule. In this way, dispensing is carried out. The end of the liquid in the capsule is a signal to turn off the compressed gas supply and complete the dispensing process.

[0006] The disadvantage of the closest analogue is that dispensing is always one-time; there is no possibility of multiple dispensing without replacing the capsule with a new one. That is, the capsule is used once, and the capsule has a polymer shell. Disposable use of capsules with a polymer shell is not environmentally friendly, since each dispensing is accompanied by disposal of the capsule shell, thus increasing the amount of polymer waste, that is, increasing the burden on the environment. Also, the disadvantage of the closest analogue is that the portion of liquid is always equal to the volume of the capsule; there is no way to adjust the dispensing volume to suit the user's needs. In addition, during operation of the device there is contact between compressed gas and liquid, which imposes restrictions on the choice of compressed gas; the gas should not react with the liquid and/or be a source of impurities, which limits the scope of application of the dispensing unit, and if there is an error in the choice of gas, it reduces the safety of the unit dosing. Also, contact between liquid and gas can lead to sugaring of the liquid, especially if the liquid is syrup, which precludes the possibility of reusing the capsule. In addition, since there is direct contact between the liquid and the compressed gas, the liquid is dispensed in the form of an aerosol, that is, there is always a risk of splashing and contamination of the surface around, this is not ergonomic.

[0007] The object of the invention and the technical result achieved with its help is to develop a new liquid dispensing unit with improved ergonomic characteristics and the ability to reduce the impact on the environment, while simultaneously increasing the controllability of the dispensing process.

[0008] The stated task and the required technical result are achieved by the fact that the liquid dispensing unit consists of a housing, a gas supply means and at least one at least partially thin-walled capsule filled with liquid installed inside, and is configured to compress the walls of the capsule due to gas pressure in the process of controlled portion supply of liquid, and is equipped with a control unit and includes a sensor functionally connected to the control unit that registers liquid flowing from the capsule, compressed due to gas pressure, when in this case, the sensor can be made in the form of an optical

sensor, or in the form of an acoustic sensor, or in the form of an electromagnetic wave sensor, or a timer, or a conductive sensor, or in the form of a microwave sensor, or in the form of a combination of at least two of indicated sensors. In addition, the liquid dispensing unit is additionally equipped with at least one means for blocking the flow of liquid. Or at least two capsules filled with liquid are installed in the housing, and the liquid dispensing unit is configured to dispense liquid simultaneously from only one capsule or from two, at the user's choice, and is additionally equipped with at least two, according to the number of capsules, by means of blocking the leakage of liquid. In addition, the capsule is additionally equipped with an outlet fitting for liquid to flow out, while the outlet fitting can be made integral with the capsule shell, or in the form of a removable dispensing nozzle, or the body is additionally equipped with an outlet fitting for liquid to flow out, and the capsule is additionally equipped with - specifically equipped with a means of fastening to the outlet fitting.

[0009] The figures show examples of the design of a liquid dispensing unit.

Figure 1 shows an example of a liquid dispensing unit with one capsule, where the outlet fitting is made integral with the capsule shell, and there is no means for blocking the flow of liquid.

Figure 2 shows an example of a liquid dispensing unit with one capsule, where the outlet fitting is made as part of the housing, and there is a means for blocking the flow of liquid.

Figure 3 shows an example of a liquid dispensing unit with two capsules, where both outlet fittings are made as part of the housing, and there are two means for blocking the flow of liquid.

Figure 4 shows an example of a liquid dispensing unit with two capsules, where both outlet fittings are made in the form of a removable dispensing nozzle, and there are two means for blocking the flow of liquid.

Figure 5 shows an example of a removable dispensing nozzle.

[0010] The liquid dispensing unit consists of a housing 2, a gas supply means 7, at least one capsule 3 installed inside the housing 2, a sensor 4 and a control unit (not shown in the figures). Additionally, the liquid dispensing unit may include other elements that complement the basic design and allow the unit to be adapted for different tasks.

[0011] The housing 2 may be made of, for example, but not limited to, metal, such as stainless steel, or a polymeric material, such as plastic or a mixture of plastics, or impact-resistant glass. The housing 2 can be detachable into at least two parts, or the housing 2 can be provided with a cover 1. The cover 1 can be made, for example, of metal, plastic or impact-resistant glass. Additionally, the connection between body 2 and cover 1

can be equipped with sealing gaskets made, for example, of rubber or silicone (not shown in the figures).

[0012] Inside the housing 2 there is at least one capsule 3 with a liquid for dispensing, for example syrup, concentrate and/or other liquid. Capsule 3 is at least partially a thin-walled shell. The shell is at least partially made of a polymeric elastic material, such as rubber or silicone, of a thickness that allows the shell to bend under pressure and not retain its shape in the absence of external influence. The shell may be uniformly elastic, that is, made entirely of elastic material, and preferably be of uniform thickness. Or the thickness of the shell may be uneven, that is, the shell may have areas of different hardness. Alternatively, the shell may be made partly of a hard polymeric material, such as polyolefin, and partly of an elastic material.

[0013] An embodiment of the dispensing unit is possible, where the capsule 3 is installed in the housing 2, while the capsule 3 can be equipped with an outlet fitting 5, which is part of the capsule 3. In this case, the outlet fitting 5 is a capillary made, for example, of a polymer material, preferably silicone, polyolefin, or glass. Additionally, the outlet fitting 5 may have a protective cap (not shown in the figures) or a sealed end, which is broken off before starting the dispensing process or before installing the capsule 3 into the housing 2.

[0014] An embodiment of the dispensing unit is possible, where the capsule 3 is installed in the housing 2, while the housing 2 can be equipped with an outlet fitting 5, made in the form of a channel in the housing 2 or a capillary installed in the housing 2. In this case, the capsule 3 has an outlet for liquid (not indicated in the figures), which, when installing the capsule 3 into the housing 2, is combined with the outlet fitting 5. In this case, the capsule 3 is equipped with a means of fastening 8 to the outlet fitting 5, designed to ensure that during operation there is no displacement of the capsule outlet opening relative to the outlet fitting 5. The fastening means 8 can be made, for example, but not limited to the listed options, in the form of at least one hook that clings to the outlet fitting 5. Or the fastening means 8 can be made in the form of a cylindrical threaded fitting, with the body 2 and /or the outlet fitting 5 is equipped with a mating part to the thread of the fastening means 8.

[0015] An embodiment of the dispensing unit is possible, where the capsule 3 is installed in the housing 2, while the housing 2 has an outlet fitting 5, made, for example, in the form of a hole in the housing 2 or a capillary installed in the housing 2. The capsule 3 is equipped with a fastening means 8, made, for example, in the form of a plastic sleeve or a plastic fitting with a snap or threaded connection. Additionally, the liquid dispensing unit contains a removable dispensing nozzle 10, which is made of a polymer material and represents a capillary and a fastening element, which is a counterpart to the fastening means 8. The removable dispensing nozzle 10 is attached to the capsule 3 before installing the capsule 3 into the housing 2. When installing the capsule 3 together

with the removable dispensing nozzle 10 attached to it into the body 2, the removable dispensing nozzle 10 is aligned with the outlet fitting 5. Additionally, the removable dispensing nozzle 10 may have a protective a cap (not shown in the figures) or a sealed end, which breaks off before starting the dispensing process or before installing the capsule 3 with a removable dispensing nozzle 10 into the housing 2. The removable dispensing nozzle 10 can be single-use or reusable with the ability to detach it from the capsule 3 and attach it back to the same or another similar capsule 3 without loss of properties.

[0016] Additionally, the liquid dispensing unit may contain a means for blocking the outflow of liquid 9, pinching the outlet fitting 5 of the capsule 3 or a removable dispensing nozzle 10, blocking the outflow of liquid, including in the case when the housing 2 is filled with gas, exerting pressure on the walls of the capsule 3.

[0017] An embodiment is possible where at least two capsules 3 of a similar design are located inside the housing 2, with each of the capsules 3 connected to the output fitting 5, where the design of the output fitting 5 and the connection of the output fitting 5 with the capsule 3 and housing 2 can be any of described above, while the liquid dispensing unit additionally contains means for blocking the flow of liquid 9 in the same quantity as capsules 3.

[0018] The gas supply means 7 can be made in the form of a compressor or pump, or a cylinder with compressed gas, and the compressor or pump can either be connected to an external power source, or have an independent power source, for example a battery or battery. The gas can be used, for example, but not limited to the listed options, atmospheric air, compressed air, compressed carbon dioxide, compressed inert gases. The gas supply means 7 can, for example, be built into the housing 2, while the gas supply means 7 can have an independent power source or be connected to an external power source with a thin wire. The gas supply means 7 can be connected to the housing 2 by a flexible tube, while the housing 2 can be additionally equipped with a fitting 6 to improve the accuracy and reliability of the fastening. The gas supply means 8 is functionally connected to the control unit (not shown in the figures). Additionally, the liquid dispensing unit can be equipped with a pressure relief valve (not shown in the figures), built, for example, into the housing 2, or into the gas supply means 7, or into the fitting 6.

[0019] The control unit (not shown in the figures) is made in the form of a controller, functionally connected to the gas supply means 8 and the sensor 4. Additionally, the control unit can be functionally connected to at least one means for blocking the outflow of liquid. The controller can be stand-alone, connected only to the liquid dispensing unit, or be part of a beverage preparation apparatus.

[0020] The sensor 4 can be made, but not limited to the above options, in the form of an acoustic, optical or electromagnetic wave sensor, or in the form of a timer, or in the form of a conductive or microwave sensor, or in

the form of a combination of at least two of these sensors.

[0021] The claimed dispensing device unit can be used in various beverage preparation apparatuses, and the design of the apparatus itself may include a separate channel for dispensing liquid and a separate channel for supplying water, or a single channel, which is simultaneously a channel for supplying water and a channel for dispensing liquid. Liquid dispensing can be carried out, for example, but not limited to the above options, into a stream of water or into an external container, for example, a cup or cup installed in the beverage preparation apparatus.

[0022] As part of its distinctive features, the liquid dispensing unit operates as follows. The user installs a capsule 3 filled with liquid inside the housing 2, the assembly being preferably sealed. When starting the dispensing process, the user turns on the controller and/or starts the gas supply means 7. The gas supply means 7 injects gas into the housing 2 into the space between the inner wall of the housing 2 and the outer wall of the capsule 3. In this case, the shell of the capsule 3 eliminates contact of gas with liquid, that is, the risk of contamination of the liquid with impurities in the gas and/or crystallization or sugaring of the liquid under exposure to gas. The shell of the capsule 3 is at least partially elastic, as a result, when gas enters the space between the wall of the housing 2 and the capsule 3, the liquid is squeezed out of the capsule 3, that is, dosing. Sensor 4 registers the presence of liquid in the outlet fitting 5, or, if the sensor is designed as a timer, the start time of dosing. If the sensor 4 is made in the form of an acoustic, optical or electromagnetic wave sensor, the flow of liquid entering through the outlet fitting is recorded and, thus, the amount of a portion of the dosed liquid is recorded. When the specified portion volume is reached, the controller, based on the readings of sensor 4, turns off the gas supply 7. If sensor 4 is designed as a timer, sensor 4 measures the time interval sufficient to dispense the specified portion of liquid, after which, based on the signal from sensor 4, the controller turns off the gas supply 7. If the sensor 4 is made in the form of a conductive or microwave sensor, the presence of liquid in the outlet fitting 5 is detected, while the gas supply means 7 supplies gas to the housing 2 in portions, where the portion of gas is designed to dispense a given portion of liquid, while the sensor 4 detects the presence of liquid in the outlet fitting, if during operation of the gas supply means 7, the sensor 4 detects that there is no liquid in the outlet fitting 5, the controller restarts the gas supply means 7, or detects the end of the liquid in the capsule 3 and informs the user. If the sensor 4 is made in the form of a combination of at least two of these sensors, for example, in the form of a timer and a conductive or microwave sensor, then as soon as the liquid enters the outlet fitting 5 and its presence is recorded, at this moment it turns on timer. The time that the timer runs is calculated for the required portion of liquid. After a portion of liquid is received, based on a timer signal, the controller turns off the gas supply 7 and

its absence in the outlet fitting 5 is recorded. In the case when the control unit is additionally functionally connected to the means for blocking the outflow of liquid 9, according to a signal from the controller, simultaneously or immediately after turning on the gas supply means 7, the means for blocking the outflow of liquid 9 opens, and simultaneously with turning off the gas supply means 7 or immediately after, the means closes blocking fluid leakage 9. If two or more capsules 3 are installed in the housing 2, when the liquid dispensing unit is turned on for dosing, a signal from the control unit opens a means for blocking the outflow of liquid 9 for one or more capsules 3 selected by the user, while for capsules 3 that were not selected by the user, the means for blocking the flow of liquid 9 remains closed. After this, the gas supply means 7 is turned on, while the gas is supplied to the housing 2, compressing the walls of all capsules 3, but the liquid flows out only from the selected capsules 3. Then, after dispensing of a given portion of liquid is completed, according to the signal from the sensor 4, the controller turns off the gas supply means 7, stopping dispensing process.

[0023] Moreover, unlike the closest analogue, to complete the dispensing process it is not necessary to completely squeeze out all the liquid from capsule 3. That is, more than a single dosage from one capsule 3 is possible, that is, replacing capsule 3 is required less frequently, which makes it possible to reduce the amount of recyclable polymer shell, that is, the environmental friendliness of the system increases and reduces the impact on the environment. The size of the dosed liquid portion can be set by the user and adjusted using the control unit as a function of the volume of liquid passing through the outlet fitting 5, or as a function of the volume of supplied gas, or as a coefficient of extrusion time, or a combination of these methods. Thus, the user can control the process of preparing the drink by adjusting the portion size of the dosed liquid, thus, compared to the closest analogue, the liquid dispensing unit has improved ergonomic characteristics.

[0024] Thus, the assigned task and technical result were achieved.

[0025] The present description of the invention presents a preferred embodiment of the invention. Changes can be made to it, within the limits of the claimed formula, which makes it possible for it to be widely used.

Claims

1. A liquid dispensing unit consisting of a housing, a gas supply means and at least one at least partially thin-walled capsule filled with liquid installed inside the housing, **characterized in that** said unit is made with the ability to compress walls of the capsule by gas pressure during a process of controlled delivery of a portion of liquid, and is equipped with a control unit.

2. The liquid dispensing unit according to claim 1, **characterized in that** the unit includes a sensor that registers liquid flowing from the capsule compressed due to gas pressure, functionally connected to the control unit.
3. The liquid dispensing unit according to claim 2, **characterized in that** the sensor can be made in the form of an optical sensor, or in the form of an acoustic sensor, or in the form of an electromagnetic wave sensor, or a timer, or a conductive sensor, or in the form of a microwave sensor, or in as a combination of at least two of those indicated by the sensor.
4. The liquid dispensing unit according to claim 1, **characterized in that** the unit is additionally equipped with at least one means of blocking the flow of the liquid.
5. The liquid dispensing unit according to claim 1, **characterized in that** at least two capsules filled with liquid are installed in the housing, wherein the liquid dispensing unit is configured to dispense liquid simultaneously, at the user's choice, from only one capsule or from two capsules, and is additionally equipped with at least two, equal to the number of capsules, means for blocking the leakage of the liquid.
6. The liquid dispensing unit according to claim 1, **characterized in that** the capsule is additionally equipped with an outlet fitting for the liquid to flow out, while the outlet fitting can be made integral with the capsule shell, or in the form of a removable dispensing nozzle.
7. The liquid dispensing unit according to claim 1, **characterized in that** the housing is additionally equipped with an outlet fitting for the liquid to flow out, and the capsule is additionally equipped with a means of fastening to the outlet fitting.

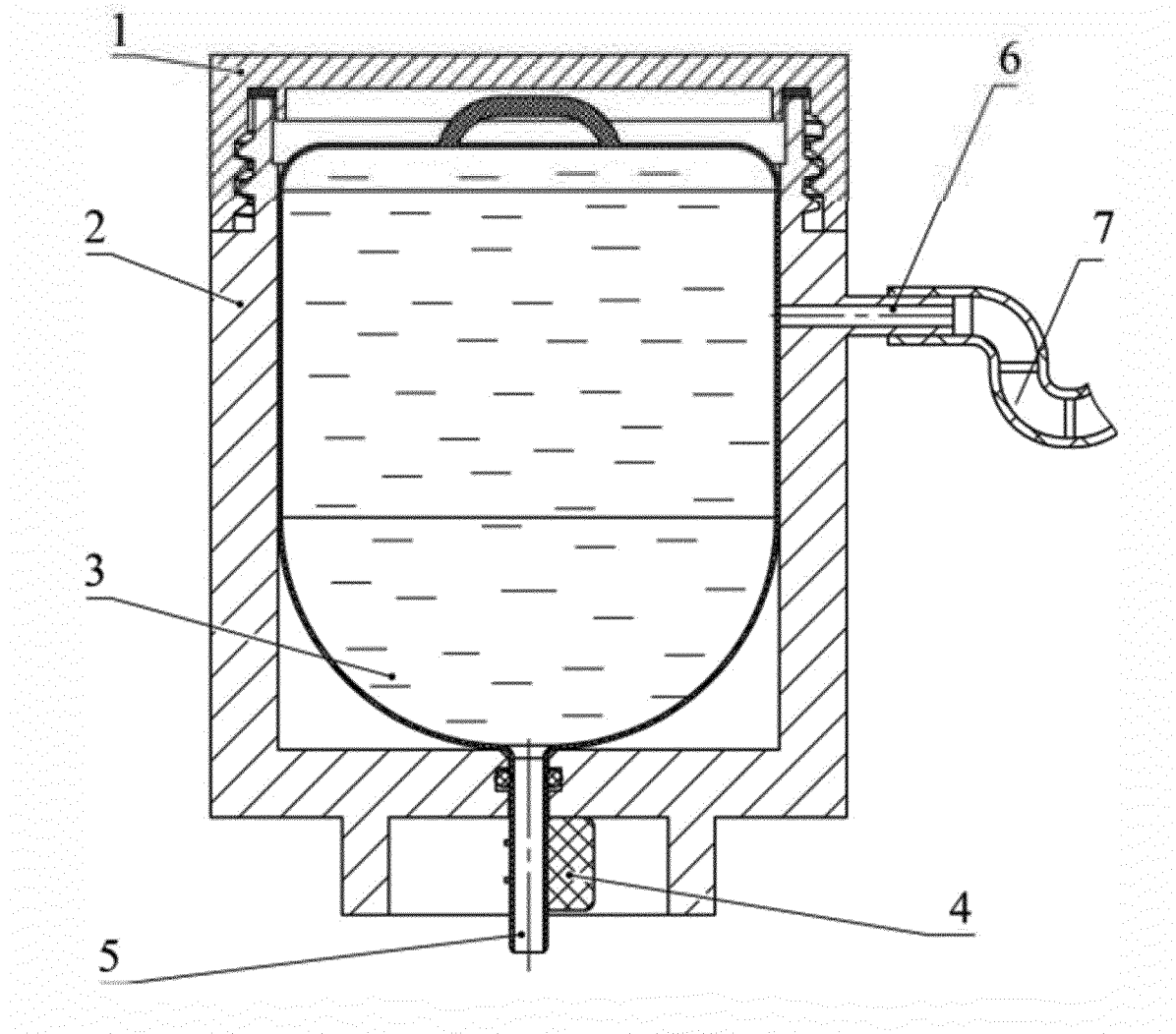


Figure 1

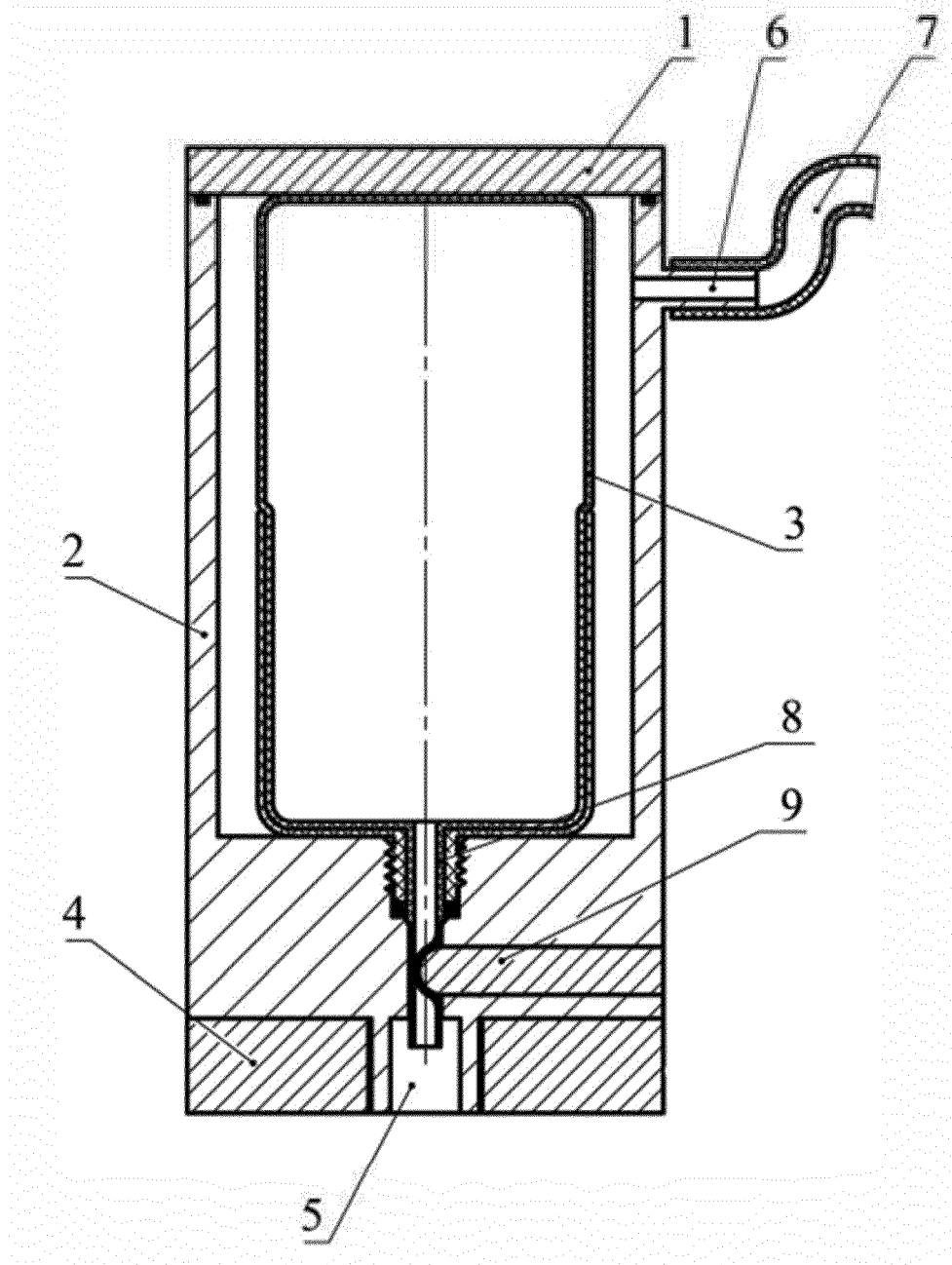


Figure 2

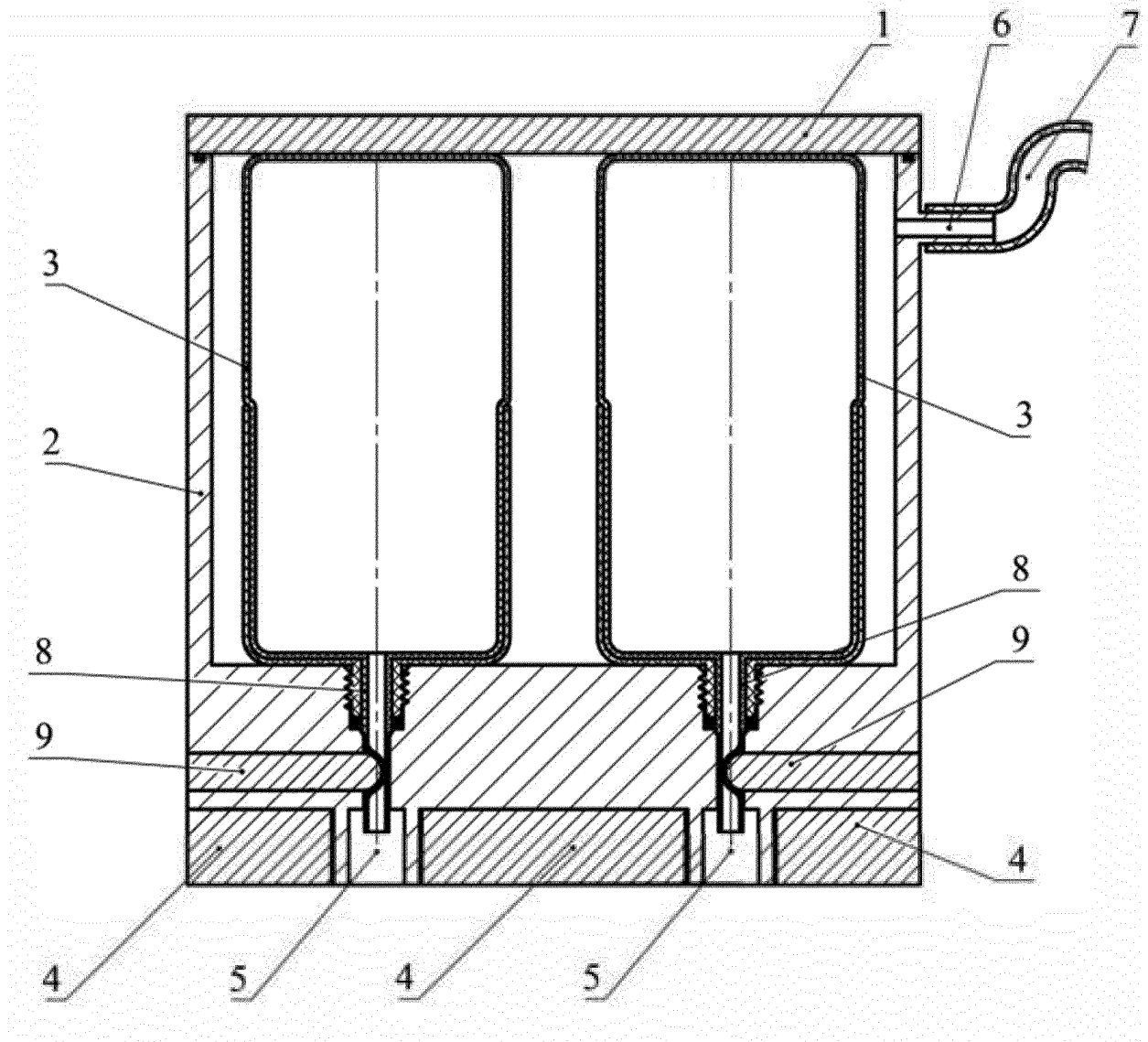


Figure 3

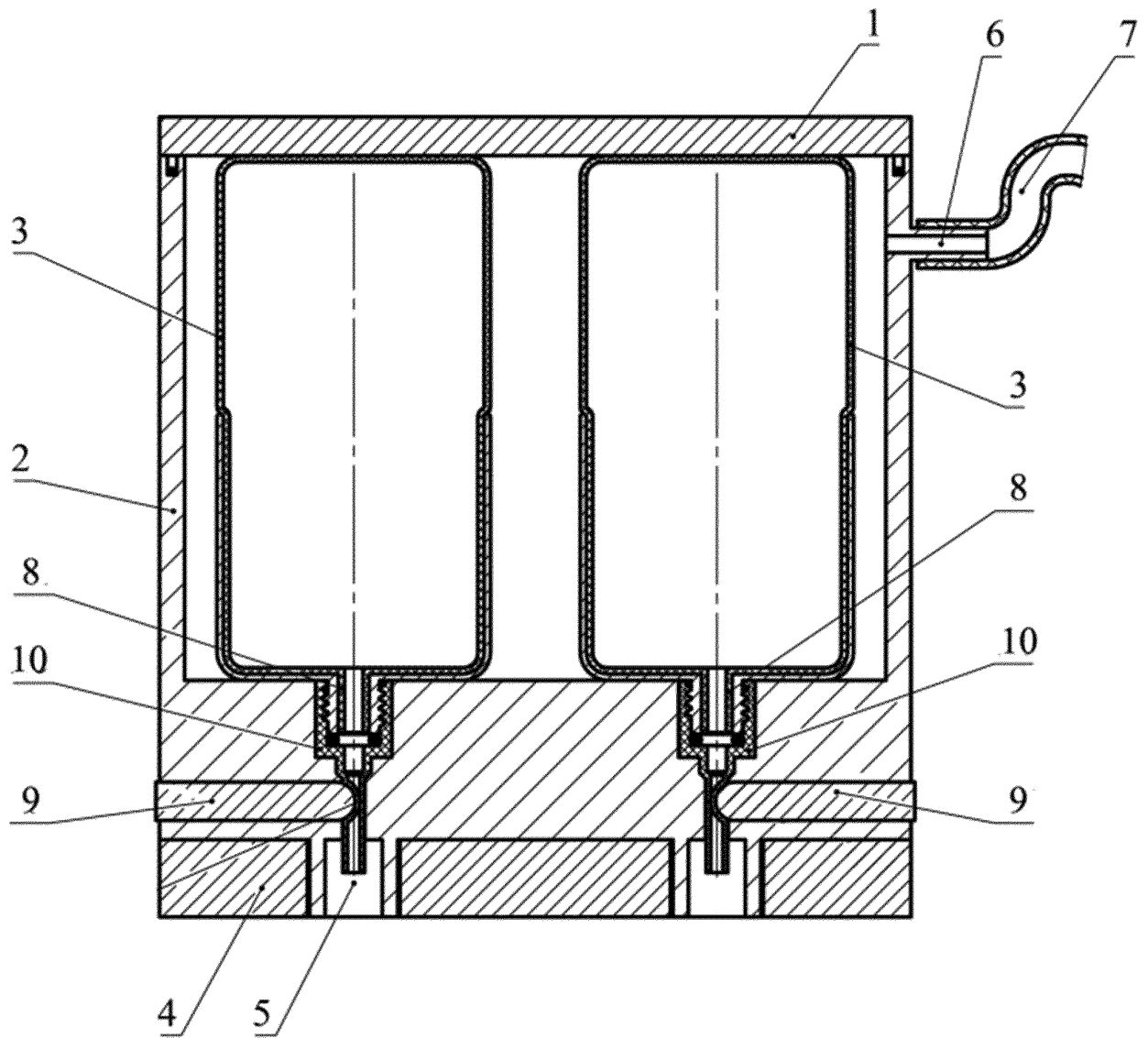


Figure 4

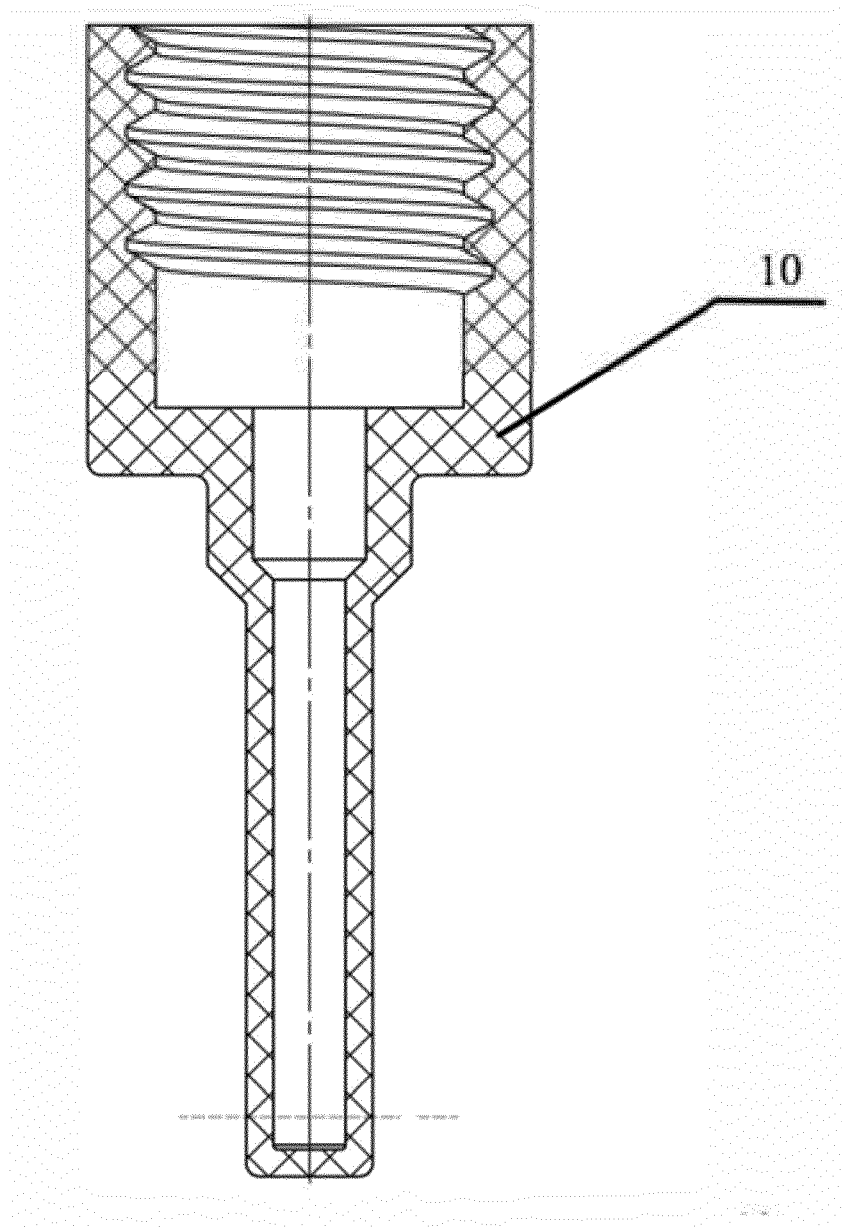


Figure 5

INTERNATIONAL SEARCH REPORT

International application No.
PCT/RU 2022/000129

5	A. CLASSIFICATION OF SUBJECT MATTER B65D 83/62 (2006.01)	
	According to International Patent Classification (IPC) or to both national classification and IPC	
	B. FIELDS SEARCHED	
10	Minimum documentation searched (classification system followed by classification symbols) B65D 35/28-35/56, 83/00-83/62, A61M 15/00, B05B 17/00-17/06, B05C 17/015, B67D 1/00-1/12, 7/00-7/84	
	Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched	
15	Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) PatSearch (RUPTO Internal), USPTO, PAJ, Espacenet, Information Retrieval System of FIPS	
	C. DOCUMENTS CONSIDERED TO BE RELEVANT	
20	Category*	Citation of document, with indication, where appropriate, of the relevant passages
		Relevant to claim No.
	A	WO 2006/116389 A2 (ADVANCED TECHNOLOGY MATERIALS, INC, et al.) 02.11.2006, paragraphs [0169]-[0267], figures 1-24
25	A	US 5169037 A (CCL INDUSTRIES INC.) 08.12.1992, column 7, page 57-column 9, page 16, figures 1, 7-11
	A	US 2007/0235471 A1 (MARTY EDWARD REDERMACHER) 11.10.2007, paragraphs [0031] -[0061], figures 1-7
30	A	US 2007/0000488 A1 (JOACHIM KOERNER et al.) 04.01.2007, paragraphs [0011], [0026], figure 2
35		
40	☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.	
45	* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family	
50	Date of the actual completion of the international search 26 July 2022 (26.07.2022)	Date of mailing of the international search report 25 August 2022 (25.08.2022)
	Name and mailing address of the ISA/RU	Authorized officer
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