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(54) **Carbonated water supplying apparatus**

(57) Provided is a water supplying apparatus (10) that supplies at least one of cold water, hot water and soda water. The water supplying apparatus includes a cold water tank (13), a soda water manufacturing unit, a gas tank (18) and a soda water valve. A soda water tank (14) stores soda water. A cold water inlet (142) is disposed at a portion of the soda water tank and cold water flows into the soda water tank through the cold water inlet. A carbon dioxide gas inlet (143) is disposed at an-

other portion of the soda water tank and a carbon dioxide gas flows into the soda water tank through the carbon dioxide gas inlet. A mixing floater (145) mixes the carbon dioxide gas and the cold water flowing into the soda water tank. A soda water draw off hole (144) draws off soda water. A water level sensor (147) senses water level inside the soda water tank.

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Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to a water supplying apparatus, and more particularly, to a hot and cold water purifier having an apparatus for manufacturing soda water.

Description of the Related Art

[0002] In general, a hot and cold water purifier is an apparatus for supplying drinking water, which purifies water supplied from a separate water tank or a tap and heats or cools the purified water to a predetermined temperature in order to provide a user with drinking water at a desired temperature.

[0003] Recently, more hot and cold water purifiers are installed in homes, companies and public places in fear of tap water pollution.

[0004] Also, a hot and cold water purifier providing both hot and cold water and soda water has appeared recently.

[0005] Meanwhile, in America and Europe, one has many years of experience drinking soda water, and soda water is sold in a separate container on the market. However, because the soda water currently sold on the market has a low level of carbonation, it does not suit consumer's taste.

[0006] Particularly, Europeans prefer soda water having a high level of carbonation.

[0007] A related art water purifier capable of manufacturing both hot and cold water and soda water requires a separate cooling device such as an evaporator surrounding an outer periphery of a soda water container in order to cool the soda water to an appropriate temperature. That is, the related art water purifier requires a separate cooling device for cooling a soda water container aside from an evaporator installed on an outer periphery of a cold water container. Accordingly, the related art water purifier has problems of high manufacturing costs, a complex manufacturing process and a large volume thereof.

SUMMARY OF THE INVENTION

[0008] Accordingly, the present invention is directed to a water supplying apparatus that substantially obviates one or more problems due to limitations and disadvantages of the related art.

[0009] An object of the present invention is to provide a water supplying apparatus including a cooling device that cools a cold water container together with a soda water container in order to effectively maintain temperature balance between cold water and soda water.

[0010] Another object of the present invention is to pro-

vide a water supplying apparatus having an improved carbonation structure for sufficiently dissolving carbon dioxide gas in water contained in a soda water container so that the taste of the soda water may be optimized.

5 [0011] A further another object of the present invention is to provide a water supplying apparatus flowing water through a separate mixing device after mixing the water with carbon dioxide gas in a soda water container, so as to mix them further, and thus to increase concentration of carbonic acid.

10 [0012] Additional advantages, objects, and features of the invention will be set forth in part in the description which follows and in part will become apparent to those having ordinary skill in the art upon examination of the following or may be learned from practice of the invention. The objectives and other advantages of the invention may be realized and attained by the structure particularly pointed out in the written description and claims hereof as well as the appended drawings.

15 [0013] To achieve these objects and other advantages and in accordance with the purpose of the invention, as embodied and broadly described herein, there is provided a water supplying apparatus that supplies at least one of cold water, hot water and soda water, including: a cold water tank for storing cold water, an evaporator being attached to an outer periphery of the cold water tank; a soda water manufacturing unit for mixing a carbon dioxide gas and cold water supplied from the cold water tank; a gas tank for supplying carbon dioxide gas to the soda water manufacturing unit; and a soda water valve for discharging soda water manufactured by the soda water manufacturing unit. Also, the soda water manufacturing unit includes: a soda water tank for storing soda water; a cold water inlet through which cold water flows into the soda water tank, the cold water inlet being disposed at a portion of the soda water tank; a carbon dioxide gas inlet through which a carbon dioxide gas flows into the soda water tank, the carbon dioxide gas inlet being disposed at another portion of the soda water tank; a mixing floater for mixing the carbon dioxide gas and the cold water flowing into the soda water tank; a soda water draw off hole for drawing off soda water; and a water level sensor for sensing water level inside the soda water tank.

20 [0014] In a water supplying apparatus according to the present invention, an evaporator installed on a cold water container cools a soda water container together with the cold water container, which makes it possible to effectively maintain temperature balance between cold water and soda water.

25 [0015] Further, a conductive plate is attached on an outer periphery of the soda water container so that cold may be transferred indirectly from the evaporator, which makes it possible to prevent soda water stored in the soda water container from freezing.

30 [0016] It is also possible to prevent supercooling of the soda water container which may delay a soda water manufacturing process.

35 [0017] In addition, after water and carbon dioxide gas

are mixed in the soda water container, they are mixed again while passing through a pre-mixer. Accordingly, concentration of carbonic acid in soda water is uniformed, and thus taste of the soda water is optimized.

[0018] It is to be understood that both the foregoing general description and the following detailed description of the present invention are exemplary and explanatory and are intended to provide further explanation of the invention as claimed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this application, illustrate embodiment(s) of the invention and together with the description serve to explain the principle of the invention. In the drawings:

[0020] FIG. 1 is an exploded perspective view illustrating a water supplying apparatus according to the present invention;

[0021] FIG. 2 is an exploded perspective view illustrating a soda water manufacturing system according to the present invention;

[0022] FIG. 3 is a longitudinal sectional view illustrating a soda water tank according to the present invention;

[0023] FIG. 4 is a perspective view illustrating a soda water tank according to the present invention;

[0024] FIG. 5 is an exploded perspective view illustrating a pre-mixer according to the present invention; and

[0025] FIG. 6 is a sectional view illustrating a pre-mixer according to the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0026] Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings. Wherever possible, the same reference numbers will be used throughout the drawings to refer to the same or like parts.

[0027] FIG. 1 is an exploded perspective view illustrating a water supplying apparatus according to the present invention.

[0028] Referring to FIG. 1, the water supplying apparatus 10 according to the present invention includes a main frame 11, a tank receiving unit 12 disposed in an upper portion of the main frame 11, a cold water tank 13 mounted on the tank receiving unit 12, a hot water tank 16 mounted on bottom of the tank receiving unit 12, a soda water tank 14 attached to an outer periphery of the cold water tank 13, and a protector 111 for surrounding and protecting the soda water tank 14.

[0029] More particularly, a hot water valve 122 for discharging hot water, a cold water valve 123 for discharging cold water and a soda water valve 121 for discharging soda water are disposed on one side of an outer periphery of the tank receiving unit 12. An evaporator 131 is

mounted on an outer periphery of the cold water tank 13 to cool cold water stored in the cold water tank 13 to a set temperature. The soda water tank 14 adheres closely to an outer periphery of the evaporator 131 so that soda water stored in the soda water tank 14 is also cooled to the set temperature together with the cold water stored in the cold water tank 13.

[0030] In addition, the water supplying apparatus 10 further includes a control panel 190 mounted on a front surface of the main frame 11, a carbon dioxide gas tank 18 fixed to a portion of the main frame 11 to supply carbon dioxide gas, and a pump 15 receiving cold water from the cold water tank 13 to pump it into the soda water tank 14. In particular, a PCB substrate controlling operations of the water supplying apparatus 10 is mounted on the control panel 190, and a display window for displaying water temperature may be disposed on a front surface of the control panel 190.

[0031] Also, the water supplying apparatus 10 further includes a compressor 17 for compressing a refrigerant, which has passed through the evaporator 131, to a high temperature and high pressure state and a condenser 20 for exchanging heat between room air and the refrigerant that has passed through the compressor 17.

[0032] In particular, the refrigerant, which has been condensed into a liquid phase while passing through the condenser 20, passes through an expansion valve (not shown) to be changed into a low temperature and low pressure state. The refrigerant, which has passed through the expansion valve, further proceeds into the evaporator 131 to exchange heat with cold water stored in the cold water tank 13.

[0033] Hereinafter, functions of the water supplying apparatus 10 having above described configurations will be described briefly. To begin with, an indoor water feeder such as a tap is connected to the cold water tank 13 by a hose and the like. Thus, the drinking water supplied from the tap is stored in the cold water tank 13 at room temperature.

[0034] A portion of the cold water stored in the cold water tank 13 is discharged through the cold water valve 123. Another portion of the cold water stored in the cold water tank 13 is stored in the hot water tank 16. The water stored in the hot water tank 16 is heated to a set temperature by a heater disposed inside the hot water tank 16. The hot water valve 122 is connected to the hot water tank 16 so as to discharge hot water when a user presses or lifts a lever. A process for storing water in the hot and cold water tanks 13 and 14 and configurations for discharging water stored in the respective tanks through the valves are not described specifically herein because they are well known in the art.

[0035] Also, the other portion of the cold water stored in the cold water tank 13 is supplied to the pump 15 and pumped into the soda water tank 14 by the pump 15.

[0036] At the same time, carbon dioxide gas is supplied from the carbon dioxide gas tank 18 to the soda water tank 14. The cold water and the carbon dioxide gas thus

supplied are mixed to form soda water. The soda water thus formed is discharged through the soda water valve 121.

[0037] Hereinafter, an apparatus for manufacturing soda water is described more specifically with reference to the accompanying drawings.

[0038] FIG. 2 is an exploded perspective view illustrating a soda water manufacturing system according to the present invention.

[0039] Referring to FIG. 2, the soda water manufacturing system according to the present invention includes a cold water tank 13 for supplying cold water, a pump 15 for receiving the cold water from the cold water tank 13 and pumping the cold water into a soda water tank 14, and a carbon dioxide gas tank 18 for supplying carbon dioxide gas to the soda water tank 14.

[0040] In addition, the soda water manufacturing system further includes a pressure sensor 23 fixed to an outlet of the carbon dioxide gas tank 18 to sense pressure inside the carbon dioxide gas tank 18 and give information about an amount of a residual gas, and a pre-mixer 24 for mixing again the soda water drawn off from the soda water tank 14.

[0041] In particular, a soda water valve 121 is connected to an end of the pre-mixer 24 and a solenoid valve 25 is fixed on the carbon dioxide gas valve 121. A soda water button switch (not shown) is connected to the solenoid valve 25 to apply power to and open the solenoid valve 25 when a user presses a soda water button. When the solenoid valve 25 is opened, soda water is disposed through the soda water valve 121. A regulator 181 is fixed to an outlet of the carbon dioxide gas tank 18 to allow a gas to be supplied at a predetermined pressure.

[0042] A check valve 151 is disposed between the pump 15 and the soda water tank 14 to prevent cold water, which is pumped into the soda water tank 14 by the pump 15, from flowing back to the pump 15. Also, check valves 21 and 22 are coupled to both ends of the pressure switch 26 to prevent carbon dioxide gas, which is supplied from the carbon dioxide gas tank 18, from flowing back.

[0043] Meanwhile, a collector 23 may be coupled to an end of the soda water valve 121. The collector 23 allows cold water, hot water and soda water to be discharged through the same dispenser. A hot water port 231 connecting to an end of a hot water valve 122 and a cold water port 232 connecting to an end of a cold water valve 123 are formed on a top surface of the collector 23 as shown in FIG. 2. Also, an end of a soda water valve 121 connects to a central portion of the collector 23. A dispenser 233 for discharging hot water, cold water and soda water is formed at a bottom center of the collector 23.

[0044] Hereinafter, functions and operations of the soda water manufacturing system having above described configurations will be described briefly.

[0045] To begin with, cold water is supplied from the cold water tank 13 to the pump 15, and then is pumped

into the soda water tank 14 by the pump 15. When water inside the soda water tank 14 increases above a predetermined water level, carbon dioxide gas is supplied from the carbon dioxide gas tank 18 to the soda water tank 14. Then, water and carbon dioxide gas are mixed in the soda water tank 14 to form soda water. When a user presses the soda water button, the solenoid valve 25 opens and the soda water flows from the soda water tank 14 to the pre-mixer 24. The soda water is mixed in the pre-mixer 24, and then is discharged through the soda water valve 121 and the dispenser 233 of the collector.

[0046] FIG. 3 is a longitudinal sectional view illustrating a soda water tank according to the present invention.

[0047] Referring to FIG. 3, the soda water tank according to the present invention includes a case 141, a cold water inlet 142 disposed at a portion of a top surface of the case 141, a safety valve 149 disposed at another portion of the top surface of the case 141, a carbon dioxide gas inlet 143 disposed at a portion of a bottom surface of the case 141 and a soda water draw off hole 144 disposed at another portion of the bottom surface of the case 141.

[0048] In particular, a nozzle 142a is installed to connect to the cold water inlet 142 in order to inject cold water, which has flowed into the cold water inlet 142, at high pressure. A pipe holder 146 is formed on the carbon dioxide gas inlet 143 to extend inside the case 141 to a predetermined length. A mixing floater 145 is movably fitted on an outer periphery of the pipe holder 146.

[0049] More particularly, the mixing floater 145 controls properly an amount of a carbon dioxide gas flowing into the case 141 so as to increase mixing efficiency of the carbon dioxide gas. That is, when cold water inside the case 141 increases above predetermined volume, the mixing floater 145 floats so that a carbon dioxide gas may be injected into the case 141.

[0050] A scattering recess 145a is formed to a predetermined depth from a top surface of the mixing floater 145, so that cold water injected at high pressure through the nozzle 142a hits the scattering recess 145a. The cold water hitting the scattering recess 145a scatters and spreads in the case 141. Then, a contact area between cold water and carbon dioxide gas supplied into the case 141 increases, so that the carbon dioxide gas could dissolve in the cold water rapidly and completely. A long channel into which a pipe holder 146 is inserted is formed vertically along an axial center of the mixing floater 145 to have a predetermined length. Also, a gas vent 145b is formed to horizontally pass through about a middle portion of the mixing floater. A gas open pin 145c extends inside the mixing floater 145 to a predetermined length and is inserted into the pipe holder 146.

[0051] In addition, a circular protrusion 146b is formed at a predetermined height of the pipe holder 146 along an inner periphery of the pipe holder 146 to form a closable hole 146a inside the pipe holder 146. The closable hole 146a is closed by an end of the gas open pin 145c and it is opened as the mixing floater 145 floats.

[0052] A water level sensor 147 is installed at about a center portion of a bottom surface inside the case 141. In particular, the water level sensor 147 includes a shaft 147a extending to a predetermined length in the case 141 and a sensing floater 147c is movably fitted on an outer periphery of the shaft 147a to ascend and descend according to a water level. A hole sensor 147b is installed inside the shaft 147a and a magnet 147d is installed in the sensing floater 147c. The hole sensor 147b is electrically connected to a controller of the control panel 19. The hole sensor 147b senses a magnetic field generated from the magnet 147d with the ascending and descending of the sensing floater 147a to transmit it to the controller. That is, the hole sensor 147b senses a weak magnetic field when the water level inside the case 141 is low, and senses a stronger magnetic field as the water level rises. If the soda water stored in the case 141 reaches a predetermined level, the hole sensor 147b detects it and transmits the detection result to the controller. Then, the controller stops the pump 15. The water level sensor 147 may also be any kinds of sensor performing above described functions as well as the hole sensor.

[0053] In addition, a temperature sensor 148 is installed inside the case 141 to sense a temperature of the soda water stored in the case 141. The temperature sensor 148 is also connected to the controller to sense the temperature of the soda water at every instant and transmit it to the controller. The controller determines whether the temperature of the soda water is above a predetermined temperature to control whether or not the compressor 17 operates. That is, if the controller determines that the temperature of the soda water is above a predetermined temperature, the controller operates the compressor 17 so that a refrigerant cycle may operate. Then, temperature of a refrigerant falls, the refrigerant flowing through the evaporator surrounding the outer periphery of the cold water tank 13. Accordingly, the case 141 closely adhering to the evaporator 131 is cooled, and then temperature of the soda water stored in the case 141 falls. A conductive plate 500 (FIG. 4) is attached to an outer periphery of the case 141 in order to rapidly exchange heat between the soda water and the refrigerant and in order to minimize a heat loss. The conductive plate 500 will be described specifically later.

[0054] The safety valve 149 keeps the case 141 at an even internal pressure. For example, if the internal pressure of the case 141 increases too much, the safety valve 149 opens to let out a portion of a carbon dioxide gas in the case 141. On the contrary, if the internal pressure of the case 141 decreases below a predetermined pressure, the safety valve 149 closes. A configuration of the safety valve 149 is not described specifically herein because it may be a well-known pressure control valve.

[0055] A carbon dioxide gas, which has passed through the closable hole 146a, flows up through a gap between an inner periphery of the pipe holder 146 and an outer periphery of the gas open pin 145c. Then, the carbon dioxide gas is vented to the inside of the case

141 through the gas vent 145b. The carbon dioxide gas vented through the gas vent 145b and the cold water scattered by the scattering recess 145a are mixed to form soda water.

[0056] Hereinafter, a process for manufacturing soda water will be described more specifically.

[0057] To begin with, soda water is stored in the soda water tank 14 to occupy about 70 % of a soda water tank. In the above state, when a user presses a soda water button to discharge soda water, the soda water is drawn off through the soda water draw off hole 144. Then, a water level inside the case 141 decreases, and correspondingly the mixing floater 145 and the sensing floater 147c descends. As the sensing floater 147c descends, the hole sensor 147b senses the decrease of the water level and transmits a signal indicative of the decrease of the water level to the controller so that a pump 15 may operate.

[0058] As the pump 15 operates, cold water stored in the cold water tank flows into the soda water tank 14 through the cold water inlet 142 of the soda water tank 14. The cold water flowing in through the cold water inlet 142 is injected by the nozzle 142a. Accordingly, the injected cold water hits the scattering recess 145a of the mixing floater 145, and then stored in the case 141. As a level of cold water stored in the case 141 increases, the mixing floater 145 ascends.

[0059] As the mixing floater ascends, the gas open pin 145c integrally formed inside the mixing floater 145 also ascends.

Thereby, the closable hole 146a inside the pipe holder 146a opens, so that a carbon dioxide gas flows from the carbon dioxide gas tank 18 into the case 141. As described above, the carbon dioxide gas flows up through a gap between the gas open pin 145c and the pipe holder 146, and then flows into case 141 through the gas vent 145b of the mixing floater 145.

[0060] Meanwhile, cold water flowing in while the mixing floater 145 ascends is mixed with carbon dioxide gas to form soda water. If a water level of the soda water thus formed reaches a predetermined level, the hole sensor senses the water level so that the pump 15 is stopped. Carbon dioxide gas continues to flow into the case 141 after the water level of the soda water reaches a predetermined water level. As carbon dioxide gas flows into a region above the surface of the soda water, internal pressure of the case 141 increases. The inflow of the carbon dioxide gas is stopped when the internal pressure of the case 141 becomes equal to the pressure of the gas flowing into the case 141.

[0061] The case 141 is designed such that the internal pressure thereof is higher than a pressure of the carbon dioxide gas tank 18. That is, a safety valve 149 installed on the case 141 is designed to open when the internal pressure of the case 141 is higher than the internal pressure of the carbon dioxide gas tank 18. Thus an amount of the carbon dioxide gas in the case 141 does not exceed a predetermined value even if the closable hole 146a

opens with an ascent of the mixing floater 145.

[0062] When a user presses a soda water button, a process for discharging soda water and a process for manufacturing soda water are performed nearly simultaneously. That is, when a water level inside the case 141 decreases with the discharge of the soda water, the pump 15 operates immediately with the aid of the water level sensor 147. Accordingly, cold water flows into the case 141 and soda water is manufactured. Therefore, a volume of water inside the case 141 is kept to be about 60 ~ 70 % of a case volume while soda water is not discharged.

[0063] FIG. 4 is a perspective view illustrating a soda water tank according to the present invention.

[0064] Referring to FIG. 4, a soda water tank 14 according to the present invention adheres closely to an outer periphery of the cold water tank 13.

[0065] In particular, the soda water tank 14 is curved to have a curvature of the cold water tank 13 in order to closely adhere to the outer periphery of the cold water tank 13. In addition, a conductive plate 500 of a predetermined size is attached on a portion of a surface that adheres closely to the outer periphery of the cold water tank 13.

[0066] As described above, the conductive plate 500 is attached on the outer periphery of the soda water tank 14 so that heat exchange is performed effectively between an evaporator 131 surrounding the outer periphery of the cold water tank 13 and soda water stored in the soda water tank 14.

[0067] The soda water tank 14 has a volume smaller than that of the cold water tank 13. Accordingly, if an entire surface of one side of the soda water tank 14 adheres closely to the evaporator 131, soda water stored in the soda water tank 14 is frozen, and thus a soda water manufacturing process is delayed. That is, if the cold water tank 14 is supercooled, a nozzle 142a installed at cold water inlet 142 is frozen and clogs. In addition, if the soda water is frozen, it is difficult for the mixing floater 145 to float, and it is also difficult for the soda water to be drawn off smoothly through the soda water draw off hole 144.

[0068] In addition, the soda water tank 14 is in line contact with the evaporator 131 because the evaporator 131 has a shape of a repeatedly winding pipe of a small diameter. Accordingly, cold in the evaporator 131 can not be transferred rapidly to the soda water tank 14. Furthermore, if the soda water tank 14 is made of a metal having a good thermal conductivity in order to improve heat exchange efficiency, the above described supercooling phenomenon occurs.

[0069] According to the present invention, which is suggested to obviate the above described problems, a conductive plate 500 is attached between the evaporator 131 and the soda water tank 14 to intermediate heat conduction therebetween. The conductive plate 500 is preferably made of a copper sheet having an excellent thermal conductivity.

[0070] In particular, the soda water tank 14 does not

directly contact with the evaporator 131, but instead a conductive plate 500 having a good thermal conductivity is in surface contact with a portion of the evaporator 13. Then, an appropriate amount of cold is transferred to the conductive plate 500 to cool soda water stored in the soda water tank 14. Accordingly, the soda water stored in the soda water tank 14 is maintained in a cooled state at a predetermined temperature without freezing. The temperature sensor 148 installed inside the soda water tank 14 senses a temperature of the soda water. The controller receives the temperature data from the temperature sensor 148 to determine whether or not the compressor 17 needs to operate.

[0071] FIG. 5 is an exploded perspective view illustrating a pre-mixer according to the present invention and FIG. 6 is a sectional view illustrating the pre-mixer.

[0072] Referring to FIGs. 5 and 6, the pre-mixer 24 according to the present invention includes a housing 241 and a mixing rod 242 inserted into the housing 241.

[0073] An inflow hole 241a is formed at a portion of the housing 241. Soda water drawn off through a soda water draw off hole 144 of the soda water tank 14 flows into the housing through the inflow hole 241a. An insert hole 241b through which the mixing rod 242 is inserted is formed at front side of the housing 241. A space that connects the inflow hole 241a to the insert hole 241b is formed inside the housing 241. The mixing rod 242 is fitted into the space. A diverging portion 241c a diameter of which increases outwardly is formed at an end of the inflow hole 241a.

[0074] The mixing rod 242 includes a conic portion 242a a diameter of which decreases toward an end of the mixing rod. The mixing rod 242 also includes a groove 242b formed in front of the conic portion 242a to have a band-like shape caved in to a predetermined depth.

[0075] A connecting hole 242d is formed on the groove 242b. Soda water that has flowed in through the inflow hole 241a flows further into the connecting hole 242d. An outflow hole 242c is formed at an opposite end to the conic portion 242a. A passage connecting the outflow hole 242c and the connecting hole 242d is formed in the mixing rod 242.

[0076] The mixing rod 242 is inserted into the housing 241 through the insert hole 241b with the conic portion 242a at the lead. The conic portion 242a is fitted into the converging portion 241c of the housing 241. The conic portion 242a is somewhat smaller than, but has the same converging angle as the converging portion 241c. Accordingly, soda water that has flowed in through the inflow hole 241a spreads out radially to the groove through a gap between the diverging portion 241c and the conic portion 242a. Thereafter, the soda water flows through the connecting hole 242d and internal passage, and then flows out through the outflow hole 242c. Afterwards, the soda water further flows to the soda water valve 121.

[0077] The soda water that has flowed in through the inflow hole 241a is mixed again while flowing through the converging portion 241c and the groove 242b. Accord-

ingly, concentration of carbonic acid in the soda water is uniformed, and thus the soda water tastes better.

[0078] It will be apparent to those skilled in the art that various modifications and variations can be made in the present invention. Thus, it is intended that the present invention covers the modifications and variations of this invention provided they come within the scope of the appended claims and their equivalents.

Claims

1. A water supplying apparatus that supplies at least one of cold water, hot water and soda water, the apparatus comprising:

a cold water tank for storing cold water, an evaporator being attached to an outer periphery of the cold water tank;
 a soda water manufacturing unit for mixing a carbon dioxide gas and cold water supplied from the cold water tank;
 a gas tank for supplying carbon dioxide gas to the soda water manufacturing unit; and
 a soda water valve for discharging soda water manufactured by the soda water manufacturing unit,

wherein the soda water manufacturing unit comprises:

a soda water tank for storing soda water;
 a cold water inlet through which cold water flows into the soda water tank, the cold water inlet being disposed at a portion of the soda water tank;
 a carbon dioxide gas inlet through which a carbon dioxide gas flows into the soda water tank, the carbon dioxide gas inlet being disposed at another portion of the soda water tank;
 a mixing floater for mixing the carbon dioxide gas and the cold water flowing into the soda water tank;
 a soda water draw off hole for drawing off soda water; and
 a water level sensor for sensing a water level inside the soda water tank.

2. The water supplying apparatus according to claim 1, further comprising a conductive plate attached to an outer periphery of the soda water tank to exchange heat between the evaporator and the soda water tank.
3. The water supplying apparatus according to claim 2, wherein the conductive plate comprises a copper sheet.
4. The water supplying apparatus according to any of

claims 1 to 3, further comprising a pre-mixer disposed between the soda water draw off hole and the soda water valve to uniform concentration of carbonic acid.

5. The water supplying apparatus according to claim 4, wherein the pre-mixer comprises:

a housing at a portion of which a soda water inflow hole is formed, and
 a mixing rod inserted into the housing.

6. The water supplying apparatus according to claim 5, wherein the mixing rod comprises:

a conic portion a diameter of which decreases from about a center of the mixing rod toward an end of the mixing rod;
 a groove formed in front of the conic portion to have a predetermined depth;
 a connecting hole formed on the groove; and
 an outflow hole for flowing out soda water that has flowed into the mixing rod through the connecting hole, and
 the housing comprises a diverging portion connecting to the soda water inflow hole such that soda water flows from the inflow hole to the diverging portion, the conic portion being fitted into the diverging portion.

7. The water supplying apparatus according to any of claims 1 to 6, wherein carbon dioxide gas flows into the soda water tank when mixing floater floats as cold water flows into the soda water tank.

8. The water supplying apparatus according to any of claims 1 to 7, further comprising a safety valve disposed on a portion of an outer surface of the soda water tank to keep the soda water tank at an even internal pressure.

9. The water supplying apparatus according to any of claims 1 to 8, wherein the water level sensor comprises a magnet and a hole sensor for sensing strength of a magnetic field generated by the magnet.

10. The water supplying apparatus according to any of claims 1 to 9, further comprising a pump connected to the cold water tank to pump cold water, an operation of the pump being controlled depending on the water level sensed by the water level sensor.

11. The water supplying apparatus according to any of claims 1 to 10, further comprising a temperature sensor disposed inside the soda water tank to sense temperature of soda water contained in the soda water tank.

12. The water supplying apparatus according to any of claims 1 to 11, further comprising a pipe holder including a gas passage formed therein, the mixing floater being movably fitted around the pipe holder to ascend and descend. 5
13. The water supplying apparatus according to claim 12, wherein the mixing floater comprises: 10
- a scattering recess formed to a predetermined depth from a top surface of the mixing floater, a gas vent transversely passing through the mixing floater, and
 - a gas open pin extending inside the mixing floater to a predetermined length, the gas open pin is inserted into the pipe holder. 15
14. The water supplying apparatus according to any of claim 1 to 13, wherein a surface of the soda water tank that closely adheres to the cold water tank is curved to have a predetermined curvature. 20

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FIG. 1

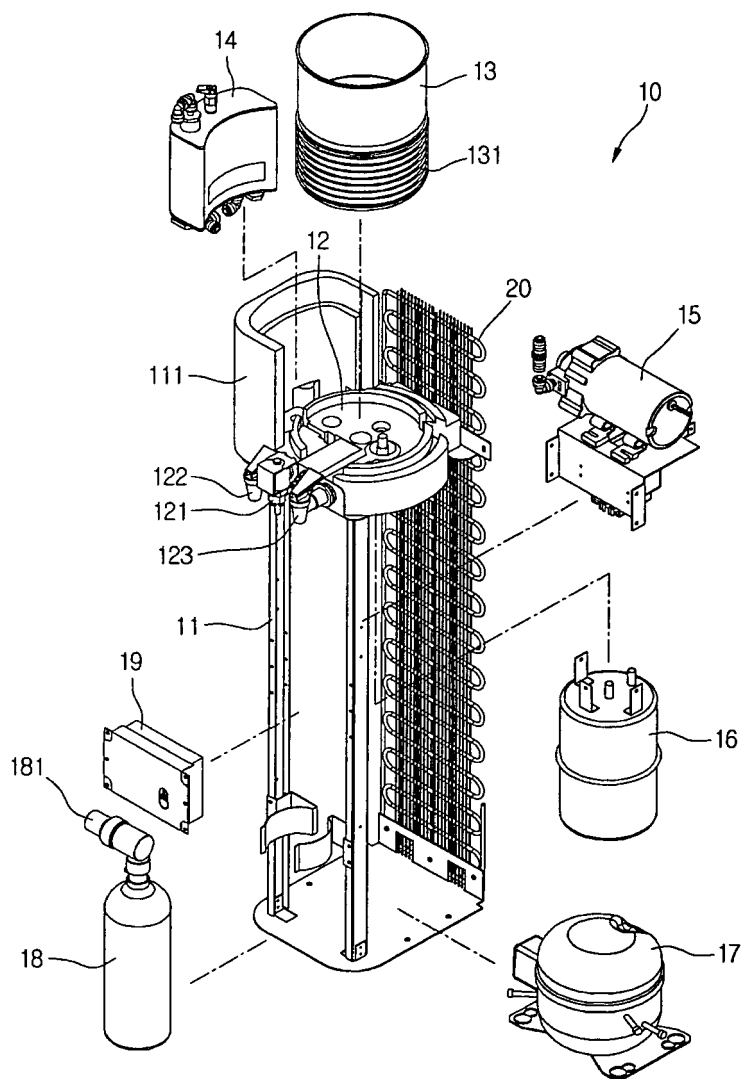


FIG.2

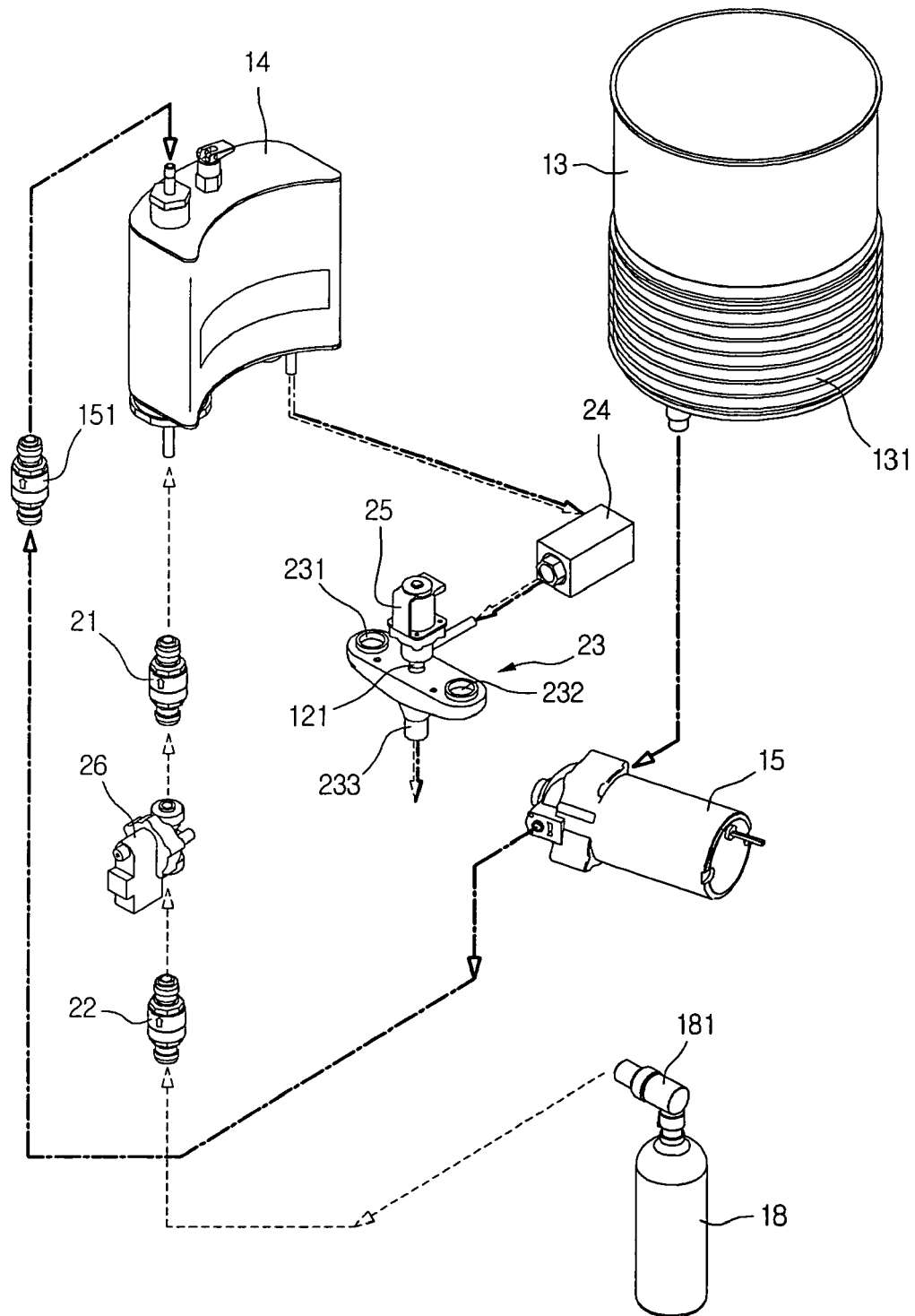


FIG. 3

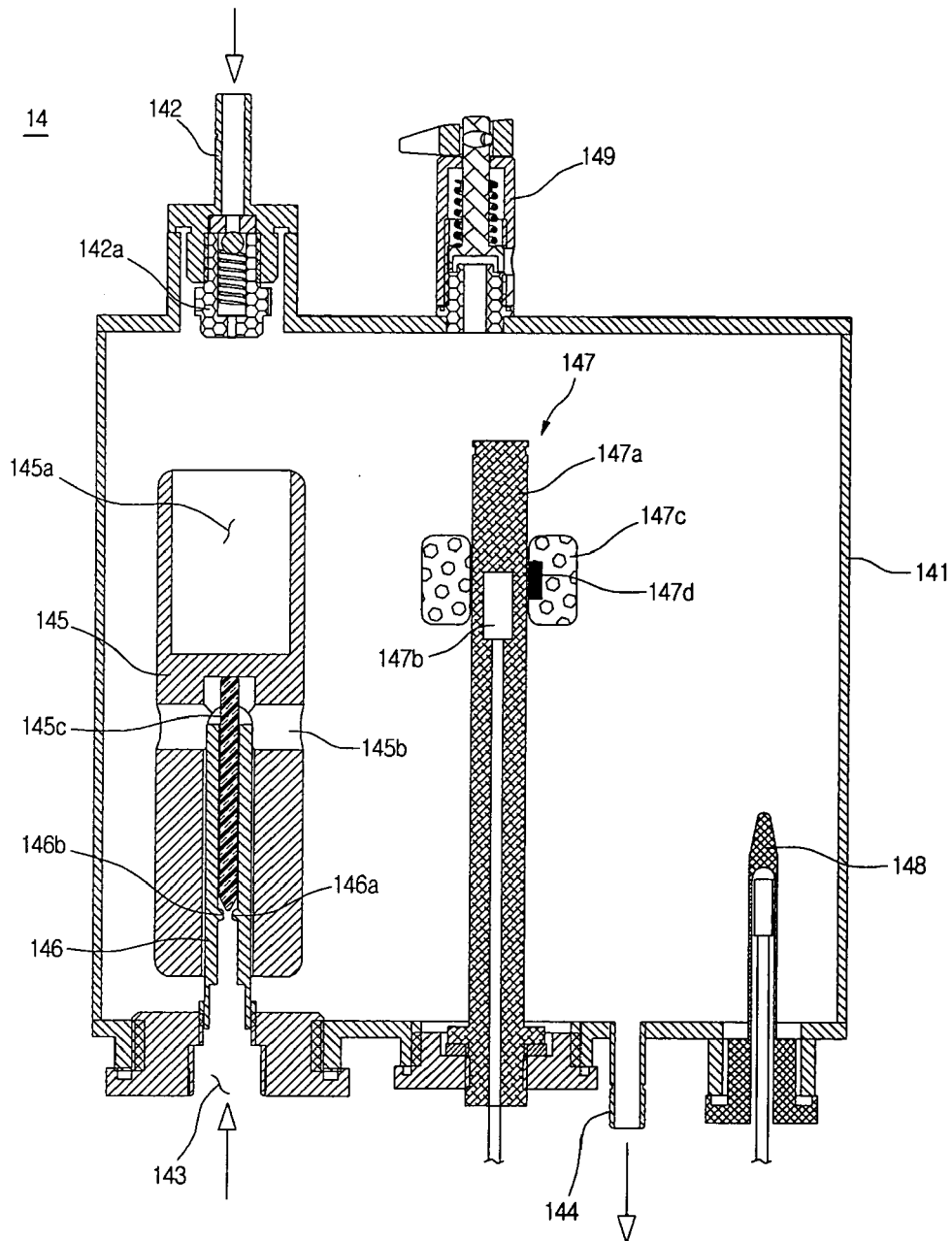


FIG. 4

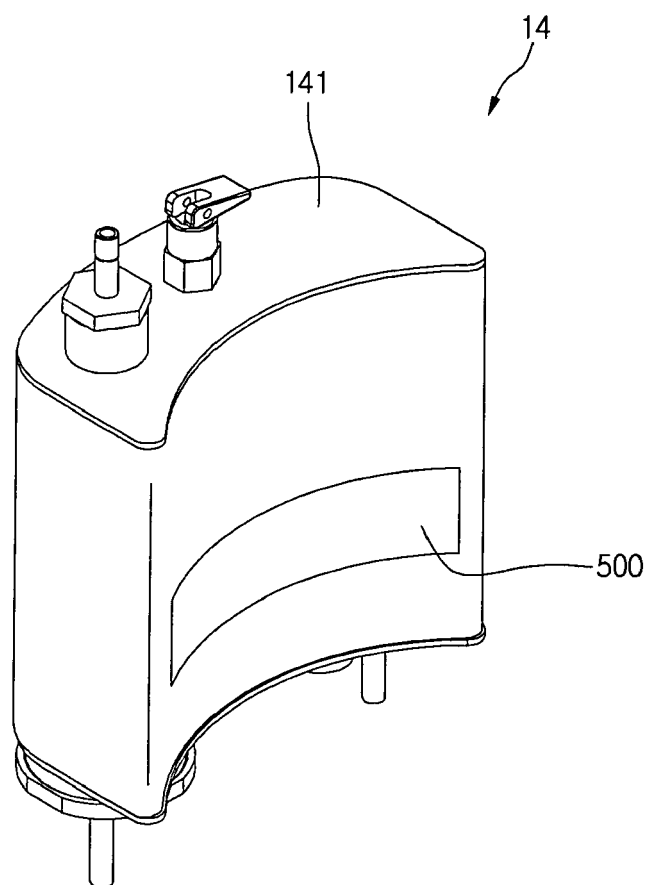


FIG. 5

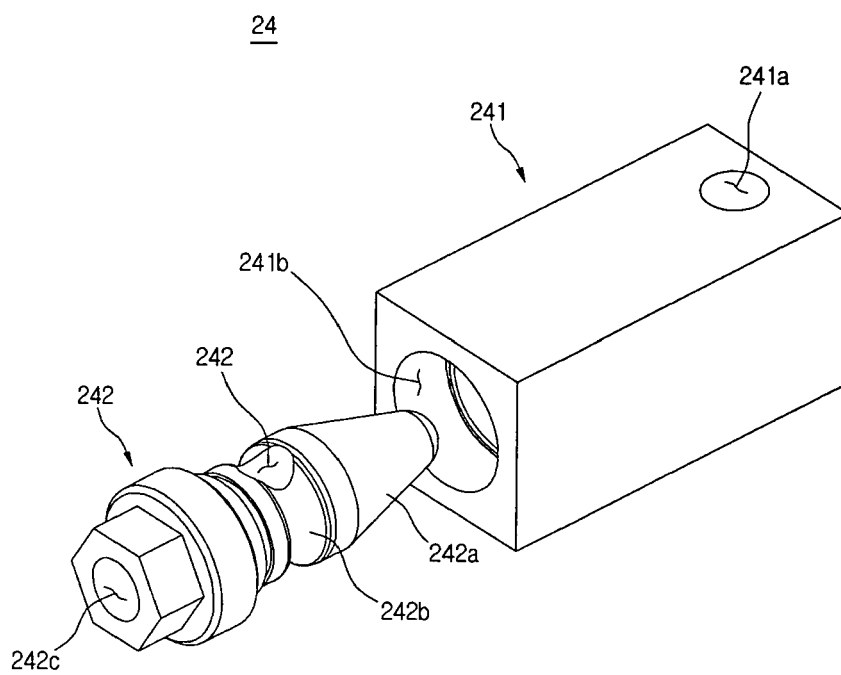


FIG. 6

