DESCRIPTION

LIQUID CONTAINER

Technical Field

[0001]

The present invention relates to a liquid container that is detachably mounted to a container mounting portion of a liquid consuming apparatus and supplies a liquid stored in a liquid containing portion to the liquid consuming apparatus.

Background Art

[0002]

As a liquid container for containing a liquid used for a liquid consuming apparatus, for example, an ink cartridge used for an ink jet printer has been known. In the ink cartridge for the ink jet printer, an ink containing chamber having ink to be supplied to a printing head (a liquid containing portion) is provided in a container body, and the ink cartridge is detachably mounted to a cartridge mounting portion (a container mounting portion) provided at a predetermined position when it is used. The ink contained in the ink containing chamber is supplied to a printing head that is driven according to printing data transmitted from a host computer, and is then discharged at target positions onto a printing medium, such as a sheet, from nozzles provided in the printing head.

[0003]

In general, the ink jet printer includes a carriage that has a printing head for discharging ink droplets and reciprocates in a direction orthogonal to the direction in which a printing medium is transported. In addition, ink can be supplied from the ink cartridge to the printing

head by the following methods. First, an ink cartridge is detachably mounted to a cartridge mounting portion provided in the carriage, and ink is supplied to the printing head from the ink cartridge that is reciprocated together with the printing head (a so-called on-carriage type). Second, an ink cartridge is detachably mounted to a cartridge mounting portion that is separately provided from a carriage of the ink jet printer, and ink is supplied from the ink cartridge to the printing head through an ink passage formed of, for example, a flexible tube (a so-called off-carriage type).

[0004]

Various types of ink cartridges including an ink cartridge disclosed in Patent Document 1 have been proposed as the ink cartridge mounted to an off-carriage type of ink jet printer.

An ink cartridge 201 shown in Figs. 15 and 16 is disclosed in Patent Document 1. In the ink cartridge 201, an ink pack 209 whose volume can be reduced by pressure caused by pressurized air, which is supplied from a pressure chamber 207 of a container body 205, is accommodated in the container body 205 that is mounted to a cartridge mounting portion 203 of the ink jet printer, and the ink pack 209 contains ink used for the ink jet printer.

[0005]

As shown in Fig. 16, one surface of the container body 205 (a leading end surface of the container body in a direction in which the container body is mounted) is provided with two positioning engaging portions (positioning means) 213 into which two positioning members 211 provided on the cartridge mounting portion 203 are fitted, thereby positioning the container body 205; an ink delivery port (a liquid delivery portion) 217 that connects an ink supply passage (a liquid supply portion)

215 of the cartridge mounting portion 203 to the ink pack 209; and a pressurized air inlet 221 that connects a pressurized air supply passage 219 of the cartridge mounting portion 203 to a pressure chamber 207. In the ink cartridge 201, the ink delivery port 217 is provided substantially at the center of one surface of the container body 205.

[0006]

As shown in Fig. 17, in the ink pack 209, the ink delivery port 217 for delivering the ink contained in the ink pack 209 to the outside is provided in a flexible pouch 216. For example, the flexible pouch 216 is formed by overlapping two laminated films and bonding the edges of the laminated films by fusing.

[0007]

Patent Document 1: JP-A-2002-19135

Disclosure of the Invention

Subjects to be Accomplished by the Invention

[0008]

However, in recent years, with an increase in the size of a liquid container, errors in the formation or assembly of the container body 205 have increased, and the tolerance between the positioning engaging portion 213 and the ink delivery port 217 has increased.

When the ink cartridge 201 is mounted to the cartridge mounting portion 203, the positional accuracy between the ink supply passage 215 and the ink delivery port 217 is lowered. As a result, the ink supply passage 215 is not smoothly connected to the ink delivery port 217, and the mountability of the ink cartridge is likely to be lowered.

[0009]

In addition, in recent years, the number of liquid containers mounted to the ink jet printer has increased in

order to improve a printing quality. Therefore, it is assumed that the liquid container is vertically arranged in order to accommodate the liquid container at a high density.

In the structure in which the ink cartridge 201 is vertically arranged, when the amount of ink filled into the ink pack 209 increases due to an increase in the size of the liquid container, the internal pressure of the ink pack increases even when no pressure is applied. As a result, the leakage of ink from the ink delivery port 217 is likely to increase.

[0010]

Accordingly, the invention is designed to solve the above problems, and an object of the present invention is to provide a liquid container capable of preventing the deterioration of connection between a liquid delivery portion and a liquid supply portion due to an increase in the size of the liquid container and preventing the leakage of a liquid from the liquid delivery portion.

Means to Accomplish the Subjects

[0011]

The object of the present invention is achieved by a liquid container including: a container body that is detachably mounted to a container mounting portion of a liquid consuming apparatus and includes a liquid containing portion storing a liquid; a connection port that is provided in the liquid containing portion and delivers the liquid; a liquid delivery portion that is provided in one surface of the container body to supply the liquid to the liquid consuming apparatus; and a plurality of positioning means into which, when the container body is mounted to the liquid consuming apparatus, a plurality of positioning members that are provided on the container mounting portion at positions

facing the one surface are fitted, thereby positioning the container body. The liquid container is characterized in that the liquid delivery portion is provided close to any one of the plurality of positioning means.

[0012]

According to the liquid container having the above-mentioned structure, since the liquid delivery portion is provided close to the positioning means that is formed in one surface, it is possible to reduce the influence of an increase in the tolerance between the positioning member of the container mounting portion and the positioning means of the container body, which is more likely to occur due to an increase in the size of the ink cartridge. Therefore, it is possible to improve the positional accuracy between the liquid supply portion of the container mounting portion and the liquid delivery portion of the container body, and smoothly connect the liquid supply portion and the liquid delivery portion. As a result, it is possible to prevent the deterioration of the mountability of a liquid container.

[0013]

In the liquid container having the above-mentioned structure, preferably, the liquid delivery portion is provided at a position that deviates from a center line of an opening of the connection port.

[0014]

According to the liquid container having the above-mentioned structure, a passage extending in the width direction of the container body is formed between the connection port and the liquid delivery portion. Therefore, it is possible to provide an additional function unit in a portion of the passage while minimizing the length of the container body in the longitudinal direction (lengthwise direction) thereof. As a result, it is possible to form a small liquid container provided with

an additional function unit, such as a residual amount detecting unit or an air bubble trap chamber.

[0015]

Preferably, the liquid container having the above-mentioned structure further includes: an offset passage member that has a passage through which the connection port communicates with the liquid delivery portion; and an engaging means that is provided in a connecting portion between the container body and the offset passage member and enables the offset passage member to be detachably engaged with the container body by rotation.

[0016]

According to the liquid container having the above-mentioned structure, the use of the offset passage member makes it easy to provide the liquid delivery portion at a position that deviates from the center line of an opening of the connection port. As a result, the flexibility of the position where the liquid delivery portion is formed is improved.

In addition, the offset passage member is attached to the container body by a simple operation of engaging the engaging portions that are provided in a connecting portion between the offset passage member and the container body using an engaging means and rotating the offset passage member.

[0017]

The object of the invention is also achieved by a liquid container including: a container body that is detachably mounted to a container mounting portion of a liquid consuming apparatus and supplies a liquid stored in a liquid containing portion to the liquid consuming apparatus; a connection port that is provided in the liquid containing portion and delivers the liquid; and a liquid delivery portion which is provided in a leading end surface of the container body in a direction in which the

container body is mounted and through which the connection port communicates with a liquid supply portion that is provided in the container mounting portion. The liquid container is characterized in that the liquid delivery portion is provided above the center of the leading end surface of the container body in the direction in which the container body is mounted in the height direction when the container body is mounted to the liquid consuming apparatus.

[0018]

According to the liquid container having the above-mentioned structure, in general, the liquid delivery portion of the container body is positioned above the connection port of the liquid containing portion that is disposed at a height substantially equal to the center of the leading end surface of the container body in the direction in which the container body is mounted, when the container body is mounted to the liquid consuming apparatus. Therefore, it is possible to reduce the static pressure of the liquid delivery portion by a value corresponding to the water head difference thereof, and thus reduce the leakage of a liquid from the liquid delivery portion.

[0019]

In the liquid container having the above-mentioned structure, preferably, the liquid delivery portion is provided at a position that deviates from a center line of an opening of the connection port.

[0020]

According to the liquid container having the above-mentioned structure, a passage extending in the width direction of the container body is formed between the connection port and the liquid delivery portion. Therefore, it is possible to provide an additional function unit in a portion of the passage while minimizing

the length of the container body in the longitudinal direction (lengthwise direction) thereof. As a result, it is possible to form a small liquid container provided with an additional function unit, such as a residual amount detecting unit or an air bubble trap chamber.

[0021]

Preferably, the liquid container having the above-mentioned structure further includes: an offset passage member that has a passage through which the connection port communicates with the liquid delivery portion; and an engaging means that is provided in a connecting portion between the container body and the offset passage member and enables the offset passage member to be detachably engaged with the container body by rotation.

[0022]

According to the liquid container having the above-mentioned structure, the use of the offset passage member makes it easy to provide the liquid delivery portion at a position that deviates from the center line of an opening of the connection port. As a result, the flexibility of the position where the liquid delivery portion is formed is improved.

In addition, the offset passage member is attached to the container body by a simple operation of engaging the engaging portions that are provided in a connecting portion between the offset passage member and the container body using an engaging means and rotating the offset passage member.

[0023]

The object of the invention is also achieved by a liquid container including: a container body that is detachably mounted to a container mounting portion of a liquid consuming apparatus and supplies a liquid stored in a liquid containing portion to the liquid consuming apparatus; a connection port that is provided in the

liquid containing portion and delivers the liquid; a liquid delivery portion which is provided in a leading end surface of the container body in a direction in which the container body is mounted and through which the connection port communicates with a liquid supply portion that is provided in the container mounting portion; and two concave portions into which two convex portions that are provided on the container mounting portion at positions facing the leading end surface of the container body in the direction in which the container body is mounted are fitted. The liquid container is characterized in that the liquid delivery portion is provided close to one of the two concave portions provided at both sides of the leading end surface of the container body in the direction in which the container body is mounted in the width direction thereof.

Further, the object of the invention is also achieved by a liquid container that is detachably mounted to a container mounting portion of a liquid consuming apparatus. The liquid container is characterized by including: a liquid containing portion that stores a liquid; a connection port that is provided in the liquid containing portion and delivers the liquid; a liquid delivery portion which is provided in a front wall of the liquid container and supplies the liquid to the liquid consuming apparatus; and first and second positioning holes which are provided at both sides of the front wall and into which first and second positioning members that are provided on the container mounting portion at positions facing the front wall are fitted when the liquid container is mounted to the liquid consuming apparatus, thereby positioning a container body. In the liquid container, the liquid delivery portion is provided closer to the first positioning hole than to the second positioning hole.

In the liquid container having the above-mentioned

structure, preferably, the first positioning hole is positioned at above the second positioning hole when the liquid container is mounted to the liquid consuming apparatus.

Preferably, the liquid container having the above-mentioned structure further includes a side wall that is orthogonal to the front wall and is positioned at an upper side when the liquid container is mounted to the liquid consuming apparatus. In the liquid container, preferably the side wall is provided with a circuit board that can be connected to connection terminals of the liquid consuming apparatus.

Preferably, the liquid container having the above-mentioned structure further includes a side wall that is orthogonal to the front wall and is positioned at a lower side when the liquid container is mounted to the liquid consuming apparatus. In the liquid container, preferably, the side wall is provided with an engaging portion that can be engaged with an engaging means provided in the liquid consuming apparatus.

Brief Description of the Drawings

[0024]

Fig. 1 is an exploded perspective view illustrating a liquid container according to a first embodiment of the invention.

Fig. 2 is a perspective view illustrating the liquid container shown in Fig. 1 that is assembled.

Fig. 3(a) is a perspective view illustrating the liquid container, which is shown in Fig. 1, having an ink pack, which is a liquid containing portion, and a spacer for filling up a peripheral gap of the ink pack provided in a pouch accommodating portion of a container body.

Fig. 3(b) is an enlarged view illustrating a portion A of the liquid container shown in Fig. 3(a).

Fig. 4 is a perspective view of a residual amount detecting unit shown in Fig. 1, as viewed from the rear side.

Fig. 5 is a perspective view illustrating the residual amount detecting unit engaged with a detecting unit engaging portion.

Fig. 6 is a cross-sectional view taken along the line VI-VI of Fig. 5.

Fig. 7 is a perspective view illustrating a process of assembling the liquid container.

Fig. 8 is a cross-sectional view taken along the line VIII-VIII of Fig. 7.

Fig. 9 is a perspective view illustrating the liquid container shown in Fig. 7 that is completely assembled.

Fig. 10(a) is a front view illustrating a container mounting portion of a liquid consuming apparatus.

Fig. 10(b) is a cross-sectional view taken along the line C-C of Fig. 10(a).

Fig. 11 is an enlarged cross-sectional view illustrating main parts of a liquid container according to a second embodiment of the invention.

Fig. 12(a) is a front view illustrating a liquid container according to a third embodiment of the invention.

Fig. 12(b) is a cross-sectional view taken along the line D-D of Fig. 12(a).

Fig. 13 is an enlarged view illustrating a portion E of Fig. 12(b).

Fig. 14 is an enlarged cross-sectional view illustrating main parts of a liquid container according to a fourth embodiment of the invention.

Fig. 15 is a perspective view illustrating a liquid container according to the related art.

Fig. 16 is a cross-sectional view illustrating main parts of a liquid mounting portion and the liquid container shown in Fig. 15.

Fig. 17 is a perspective view illustrating an ink pack accommodated in the liquid container shown in Fig. 15.

Explanation of Reference Numerals

[0025]

1: INK CARTRIDGE (LIQUID CONTAINER)

3: POUCH ACCOMMODATING PORTION

5: CONTAINER BODY

5c: FRONT WALL (LEADING END SURFACE OF CONTAINER BODY IN DIRECTION IN WHICH CONTAINER BODY IS MOUNTED)

7: INK PACK (LIQUID CONTAINING PORTION)

7a: CONNECTION PORT

7b: FLEXIBLE POUCH

9: LIQUID DELIVERY PORTION

11: RESIDUAL AMOUNT DETECTING UNIT (OFFSET PASSAGE MEMBER)

11a: CONNECTION NEEDLE

23: DETECTING UNIT ENGAGING PORTION (ENGAGING MEANS)

23a, 23b: CONVEX WALL

24: LOCKING GROOVE

27, 28: POSITIONING HOLE (POSITIONING MEANS)

35: CONTAINER ENGAGING PORTION (ENGAGING MEANS)

35a, 35b: CONVEX WALL

38: LOCKING PIECE

100: CARTRIDGE MOUNTING PORTION (CONTAINER MOUNTING PORTION)

102: LIQUID SUPPLY PORTION

106, 107: POSITIONING PIN (POSITIONING MEMBER)

O1: ROTATION CENTER OF CONTAINER ENGAGING PORTION

O2: CENTER OF CONNECTION NEEDLE

Best Mode for Carrying Out the Invention

[0026]

Hereinafter, a liquid container according to an embodiment of the invention will be described in detail

with reference to the accompanying drawings. Fig. 1 is an exploded perspective view illustrating a liquid container according to a first embodiment of the invention, and Fig. 2 is a perspective view illustrating the liquid container shown in Fig. 1 that is assembled. Fig. 3(a) is a perspective view illustrating the liquid container, which is shown in Fig. 1, having an ink pack, which is a liquid containing portion, and a spacer for filling up a peripheral gap of the ink pack provided in a pouch accommodating portion of a container body, and Fig. 3(b) is an enlarged view illustrating a portion A of the liquid container shown in Fig. 3(a). Fig. 4 is a perspective view of a residual amount detecting unit shown in Fig. 1, as viewed from the rear side.

[0027]

An ink cartridge (liquid container) 1 shown in Figs. 1 and 2 is detachably mounted to a cartridge mounting portion (container mounting portion) 100 of a commercial ink jet printing apparatus (liquid consuming apparatus) and supplies ink to a printing head (ink ejecting head) provided in the printing apparatus (see Figs. 10(a) and 10(b)).

[0028]

The ink cartridge 1 according to this embodiment includes: a container body 5 that is detachably mounted to the cartridge mounting portion 100 of an ink jet printing apparatus and supplies ink (liquid) stored in an ink pack 7, serving as a liquid containing portion, to a printing head provided in a printing apparatus; a connection port 7a that delivers ink contained in the ink pack 7; a liquid delivery portion 9 which is provided in a front wall 5c, which is a lead end surface of the liquid container 5 in the direction in which the container body 5 is mounted, and through which a liquid supply portion 102 provided in the cartridge mounting portion 100 communicates with the

connection port 7a; and two positioning holes (positioning means) 27 and 28 into which two positioning pins (positioning members) 106 and 107 provided on the container mounting portion 100 at positions facing the front wall 5c are fitted, thereby regulating the movement of the container body along the front wall 5c.

[0029]

The ink pack 7 of the ink cartridge 1 is accommodated in a pouch accommodating portion 3 that is pressed by a pressure unit, and when the pouch accommodating portion 3 is pressed, ink contained in the ink pack 7 is discharged through the connection port 7a.

The ink delivery portion 9 for supplying ink to an external printing head is provided in a residual amount detecting unit 11, serving as an additional function unit that is detachably mounted to the container body 5. The residual amount detecting unit 11 is an offset passage member having a passage that communicates between the connection port 7a of the ink pack 7 and the liquid delivery portion 9, and has a detecting unit engaging portion (engaging means) in a connection portion between the container body 5 and the residual amount detecting unit 11. The residual mount detecting unit 11 rotates with respect to the container body 5 to be attached to or detached from the container body 5 by the detecting unit engaging portion 23.

[0030]

The container body 5 is a case formed by resin molding, and includes the substantially box-shaped pouch accommodating portion 3 with an open upper surface, and a detecting unit accommodating portion 13 that is disposed in front of the pouch accommodating portion 3 and accommodates the residual amount detecting unit 11. The pouch accommodating portion 3 is partitioned from the detecting unit accommodating portion 13.

That is, the container body 5 of the ink cartridge 1 includes the front wall 5c, a rear wall 5f, a first side wall 5d that is disposed at an upper part when the ink cartridge 1 is mounted to the cartridge mounting portion 100 of the ink jet printing apparatus (hereinafter, referred to as a mounted state of the ink cartridge), a second side wall 5e that is disposed at a lower part in the mounted state of the ink cartridge 1, a third side wall 5g that serves as a vertical surface in the mounted state of the ink cartridge 1, and a partition wall 5a that partitions the pouch accommodating portion 3 from the detecting unit accommodating portion 13.

An open upper surface of the pouch accommodating portion 3 is sealed by a sealing film 15 after the ink pack 7 is put inside the pouch accommodating portion 3. In this way, the pouch accommodating portion 3 serves as a sealed chamber, and is pressed by a pressure unit.

[0031]

The partition wall 5a partitioning the pouch accommodating portion 3 from the detecting unit accommodating portion 13 is provided with a pressure hole 17, which is a passage for supplying pressurized air to the sealed pouch accommodating portion 3. When the ink cartridge 1 is mounted to the cartridge mounting portion 100 of the ink jet printing apparatus, a pressurized air supply unit 104 of the cartridge mounting portion shown in Figs. 10(a) and 10(b) is connected to the pressure hole 17, and the ink pack 7 is pressed by the pressurized air supplied into the pouch accommodating portion 3.

[0032]

The ink pack 7 is formed by bonding a cylindrical connection port 7a into which a connection needle 11a (see Fig. 4) of the residual amount detecting unit 11 is inserted to one end of a flexible pouch 7b that is formed of an aluminum-laminated multilayer film having a resin

film and an aluminum layer formed thereon. In addition, the aluminum-laminated multilayer film can ensure high gas barrier properties.

[0033]

The detailed structure of the liquid containing portion is not limited to the ink pack 7. For example, a structure that fills up a container with ink and covers the ink with a film may be used well as the ink pack using the flexible pouch.

[0034]

The connection port 7a of the ink pack 7 airtightly passes through a connection port insertion opening 18 formed in the partition wall 5a such that a leading end thereof protrudes from the detecting unit accommodating portion 13, as shown in Figs. 3(a) and 3(b). Before the residual amount detecting unit 11 is connected to the ink pack 7, the ink pack 7 is filled with deaerated ink.

[0035]

When the ink pack 7 is mounted to the pouch accommodating portion 3, spacers 19 formed of resin are mounted to front and rear inclined portions 7c and 7d of the flexible pouch 7b. When the upper surface of the pouch accommodating portion 3 is covered with the sealing film 15 to be sealed, the spacers 19 formed of resin prevent the ink pack 7 from rattling in the sealed pouch accommodating portion 3, and prevent pressure caused by the movement of ink when the ink cartridge 1 drops from being concentrated on a fused portion of the ink pack 7.

[0036]

A cover 21 formed of resin is mounted onto the sealing film 15 covering the open surfaces of the pouching accommodating portion 3 and the detecting unit accommodating portion 13. When the cover 21 formed of resin covers the upper surface of the container body 5, an engaging means (not shown) is engaged with an engaging

portion provided on the second side wall 5e of the container body 5 to fix the case 21 to the container body 5.

[0037]

As shown in Fig. 3(b), the detecting unit engaging portion 23, which is a connecting portion with which the residual amount detecting unit 11 is rotatably engaged, is provided around the opening 18 formed in the partition wall 5a. In this embodiment, the detecting unit engaging portion 23 includes two curved convex walls 23a and 23b, and the convex walls 23a and 23b form a ring structure for regulating the rotation center of the residual amount detecting unit 11.

As shown in Fig. 3(b), a locking groove 24 for preventing the residual detecting unit 11 engaged with the detecting unit engaging portion 23 from being detached therefrom is provided in a partition wall 5b that is provided on the detecting unit accommodating portion 13 so as to be orthogonal to the partition wall 5a at a position close to the detecting unit engaging portion 23.

[0038]

An opening 26, which is a cutout, is formed in the front wall (the leading end of the container body in the direction in which the container body is mounted) 5c of the container body 5, which is a partition wall covering the front surface of the detecting unit accommodating portion 13, at a position facing the detecting unit engaging portion 23, in order to attach the residual amount detecting unit 11.

As shown in Fig. 2, positioning holes 27 and 28 into which positioning pins 106 and 107 provided on the cartridge mounting portion 100 when the ink cartridge 1 is mounted to the cartridge mounting portion 100 are provided at both sides of the front wall 5c (see Figs. 10(a) and 10(b)). The positioning hole 27 is formed in a circular

shape, and the positioning hole 28 is formed in a shape that is elongated in the width direction (in the direction of an arrow X in Fig. 2) of the container body 5. The elongated positioning hole 28 makes it possible to improve positioning accuracy and easily allow a tolerance.

[0039]

As shown in Fig. 7, the liquid delivery portion 9 formed in the front wall 5c is provided between the positioning hole 27 (first positioning hole) and the positioning hole 28 (second positioning hole) that are formed at both sides of the front wall 5c in the width direction thereof so as to be closer to the positioning hole 27 than to the positioning hole 28. In addition, the liquid delivery portion 9 is arranged above a virtual line linking the two positioning holes 27 and 28 in the vertical direction of Fig. 7. Therefore, the position of the connection port 7a of the ink pack 7 deviates from the position of the liquid delivery portion 9 in the horizontal direction of Fig. 7. That is, the liquid delivery portion 9 is disposed at an offset position that deviates from a center line S of the connection port 7a.

[0040]

Actually, when the ink cartridge 1 is inserted into the ink jet printing apparatus, the ink cartridge shown in Fig. 7 is rotated 90 degrees in the clockwise direction. Therefore, the liquid delivery portion 9 is provided above the center of the front wall 5c (on the center line S of an opening of the connection port 7a) in the height direction when the container is used.

[0041]

A circuit board 31 that is electrically connected to connection terminals 109 of the cartridge mounting portion 100 when the ink cartridge 1 is mounted to the cartridge mounting portion 100 is provided on the first side wall 5d of the liquid container 5 close to the circular

positioning hole 27 at a position leaning toward the front surface (see Figs. 10(a) and 10(b)).

The circuit board 31 electrically connects a memory device provided on the rear surface thereof or a piezoelectric device provided on the residual amount detecting unit 11 to a control circuit of the ink jet printing apparatus such that the control circuit of the ink jet printing apparatus can control the memory device or the piezoelectric device.

[0042]

As shown in Figs. 1 and 4, the residual amount detecting unit 11 according to the first embodiment, serving as the offset passage member, includes: a container engaging portion 35, which is a connecting portion that is rotatably engaged with the detecting unit engaging portion 23 (see Fig. 3(b)) of the container body 5; a fixing means 37 that fixes the residual amount detecting unit 11 to the container body 5 when the residual amount detecting unit 11 rotates with the container engaging portion 35 being engaged with the detecting unit engaging portion 23; an internal passage (not shown) that guides the ink contained in the flexible pouch 7b to the liquid delivery portion 9 through the connection needle 11a connected to the connection port 7a; and a sensor (not shown) that detects the residual amount of ink from the state of ink in the internal passage (a variation in pressure).

[0043]

In this embodiment, the container engaging unit 35 includes two curved convex walls 35a and 35b that are formed so as to be detachable from the convex walls 23a and 23b of the detecting unit engaging portion 23 and to rotate to be engaged with the convex walls 23a and 23b, respectively. The convex walls 35a and 35b form a ring structure for regulating the rotation center of the

residual amount detecting unit 11.

[0044]

In the above-mentioned structure, the detecting unit engaging portion 23 formed on the partition wall 5a and the container engaging portion 35 provided on the residual amount detecting unit 11 form an engaging means for rotatably connecting the container body 5 and the residual amount detecting unit 11.

[0045]

The fixing means 37 includes a locking piece 38 that protrudes from the outer circumferential surface of the container engaging portion 35 and an engaging portion 39 that is provided on a leading end thereof that rotates.

As shown in Fig. 5, the locking piece 38 is fitted to the locking groove 24 (see Fig. 3(b)) of the container body 5 when the residual amount detecting unit 11 is rotated in the direction of an arrow (B) with the container engaging portion 35 being engaged with the detecting unit engaging portion 23, thereby retaining the connection between the engaging portion and the cartridge mounting portion, as shown in Figs. 7 and 8. Meanwhile, as shown in Fig. 5, the engaging portion 39 is engaged with an engaging portion of the container body 5 when the residual amount detecting unit 11 is rotated in the direction of the arrow (B) with the container engaging portion 35 being engaged with the detecting unit engaging portion 23, thereby regulating the rotation of the residual amount detecting unit 11.

[0046]

In this embodiment, as shown in Fig. 6, a rotation center O1 of the container engaging portion 35 deviates from the center O2 of the connection needle 1a toward the open surface of the container body 5 by a distance L.

In addition, the eccentricity between the rotation center O1 and the center O2 is set such that, as shown in

Figs. 7 and 8, when the container engaging portion 35 of the residual amount detecting unit 11 is engaged with the detecting unit engaging portion 23 of the container body 5 and the residual amount detecting unit 11 is rotated to engage the locking piece 38 with the locking groove 24, the connection needle 11a is positioned substantially at the center of the connection port 7a of the ink pack 7 accommodated in the pouch accommodating portion 3 of the container body 5.

[0047]

That is, when the residual amount detecting unit 11 is engaged with the container body 5, the connection needle 11a is disposed at an eccentric position that deviates from the center of the opening 18 formed in the partition wall 5a. When the residual amount detecting unit 11 is coupled to the container body 5, the connection needle 11a is disposed at the center of the opening 18. Therefore, the residual amount detecting unit 11 is formed so as to move between the eccentric position and the central position when the residual amount detecting unit 11 is rotated. As a result, the residual amount detecting unit 11 rotates in a narrow rotation range.

[0048]

According to the ink cartridge 1 of the first embodiment, since the liquid delivery portion 9 is provided at a position close to the positioning hole 27 that is formed in the front wall 5c, it is possible to reduce the influence of an increase in the tolerances between the positioning pins 106 and 107 of the cartridge mounting portion 100 and the positioning holes 27 and 28 of the container body 5, which are more likely to occur due to an increase in the size of the ink cartridge. Therefore, it is possible to improve the positional accuracy between the liquid supply portion 102 of the cartridge mounting portion 100 and the liquid delivery

portion 9 of the container body 5, and smoothly connect the liquid supply portion 102 and the liquid delivery portion 9. As a result, it is possible to prevent the deterioration of the mountability of the ink cartridge 1.

[0049]

Further, in the ink cartridge 1 according to this embodiment, the liquid delivery portion 9 is provided at a position that deviates from the center line S of the connection port 7a of the ink pack 7. A passage extending in the width direction of the container body 5 is formed between the connection port 7a and the liquid delivery portion 9. Therefore, it is possible to provide the residual amount detecting unit 11, serving as an additional function unit, in a portion of the passage while minimizing the length of the container body 5 in the longitudinal direction (lengthwise direction) thereof. As a result, it is possible to form a small ink cartridge 1 provided with the residual amount detecting unit 11.

[0050]

Furthermore, the ink cartridge 1 according to this embodiment includes the residual amount detecting unit 11, serving as an offset passage member having a passage that communicates between the connection port 7a of the ink pack 7 and the liquid delivery portion 9, and the detecting unit engaging portion 23 that is provided in a connecting portion between the container body 5 and the residual amount detecting unit 11 to enable the residual amount detecting unit 11 to be rotatably engaged with or disengaged from the container body 5. The use of the residual amount detecting unit 11, serving as the offset passage member, makes it easy to provide the liquid delivery portion 9 at a position that deviates from the center line S of the connection port 7a, which results in an increase in the flexibility of the position where the liquid delivery portion 9 is formed.

Further, in the ink cartridge 1 according to this embodiment, the liquid delivery portion 9 is provided at a position close to the positioning hole 27 that is formed in the front wall 5c, and the circuit board 31 is provided on the upper wall 5d of the container body so as to be close to the positioning hole 27 that is formed in the front wall 5c. Therefore, it is possible to ensure good electrical connection between the circuit board 31 and the connection terminals 109 formed on the cartridge mounting portion 100 when the ink cartridge 1 is mounted to the cartridge mounting portion 100.

[0051]

As shown in Figs. 5 and 6, when the container engaging portion 35 of the residual amount detecting unit 11 is engaged with the detecting unit engaging portion 23 of the container body 5 and then the residual amount detecting unit 11 is rotated in the direction of the arrow (B) shown in Fig. 5 in the vicinity of the engaging portion, the locking piece 38 that protrudes from the outer circumferential surface of the container engaging portion 35 is engaged with the locking groove 24 of the container body 5, and the engaging portion 39 is engaged with the engaging portion of the container body 5, thereby fixing the residual amount detecting unit 11 to the container body 5.

[0052]

That is, the residual amount detecting unit 11 is attached to the container body 5 having the ink pack 7 accommodated therein by a simple operation of engaging the engaging portions 35 and 23 that are provided in a connecting portion between the residual amount detecting unit 11 and the container body 5 and rotating the residual amount detecting unit 11. Therefore, it is possible to easily assemble the ink cartridge 1 and thus improve the productivity of the ink cartridge 1.

[0053]

Further, since the rotation center O1 of the container engaging portion 35 deviates from the center O2 of the connection needle 11a, it is possible to reduce the rotation locus of the locking piece 38 of the residual amount detecting unit 11 that is engaged with the container body 5 by rotation. Therefore, it is possible to form the locking groove 24 of the container body 5 at a position close to the rotation center of the residual amount detecting unit 11, or reduce the depth of the locking groove 24. As a result, it is possible to reduce the size of the container body 5 and thus prevent an increase in the size of the ink cartridge 1.

[0054]

Furthermore, in the ink cartridge 1 according to this embodiment, the container engaging portion 35 of the residual amount detecting unit 11 is engaged with the detecting unit engaging portion 23 of the container body 5 and then the residual mount detecting unit 11 is rotated to fit the locking piece 38 into the locking groove 24. In this case, as shown in Fig. 8, the connection needle 11a is positioned substantially at the center of the connection port 7a of the ink pack 7 that is accommodated in the pouch accommodating portion 3 of the container body 5.

[0055]

Therefore, as shown in Fig. 7, when a manufacturing method of rotating the residual amount detecting unit 11 to be fixed to the container body 5 and setting the ink pack 7 in the pouch accommodating portion 3 of the container body 5 is adopted, it is possible to simply align the connection port 7a of the ink pack 7 with the connection needle 11a of the residual amount detecting unit 11. As a result, it is possible to easily connect the residual amount detecting unit 11 and the ink pack 7,

and thus improve the assembly of an ink cartridge.

[0056]

Furthermore, in the ink cartridge 1 according to this embodiment, both the detecting unit engaging portion 23 of the container body 5 and the container engaging portion 35 of the residual amount detecting unit 11 include one or more convex walls, and they are rotatably engaged with each other by the ring structures of the convex walls. Since the convex walls are intermittently provided, it is possible to improve die cutting during molding and thus easily manufacture the detecting unit engaging portion 23 and the container engaging portion 35, as compared to a cylindrical structure in which the detecting unit engaging portion 23 and the container engaging portion 35 are engaged with each other.

[0057]

The detailed structure of the detecting unit engaging portion 23 or the container engaging portion 35 is not limited to the above-described embodiment. In this embodiment, the detecting unit engaging portion 23 or the container engaging portion 35 includes two convex walls, but the invention is not limited thereto. The detecting unit engaging portion 23 or the container engaging portion 35 may include one convex wall or three or more convex walls forming a ring structure for regulating the rotation center. In addition, instead of the convex walls, one or more concave grooves may be used to form a ring structure for regulating the rotation center.

[0058]

Moreover, in the ink cartridge 1 according to the first embodiment, when the container mounted to the cartridge mounting portion 100 of the ink jet printing apparatus is used, the liquid delivery portion 9 is positioned above the center of the front wall 5c (the center line S of the connection port 7a) in the height

direction during the use of the container.

[0059]

Therefore, in general, during the use of the container, the liquid delivery portion 9 of the container body 5 is positioned above the connection port 7a of the ink pack 7 that is disposed at a height substantially equal to the center of the front wall 5c of the container body 5. Therefore, it is possible to reduce the static pressure of the liquid delivery portion 9 by a value corresponding to the water head difference thereof, and thus reduce the leakage of ink from the liquid delivery portion 9. That is, an ink passage from the connection port 7a rises from the connection port 7a to the liquid delivery portion 9 in the vertical direction. In the ink passage, since the weight of ink is subtracted from the pressure of ink, the pressure of ink applied to the liquid delivery portion 9 is reduced.

[0060]

In the ink cartridge 1 according to the first embodiment, the internal passage of the residual amount detecting unit 11 extends in the width direction (in the direction of an arrow X in Fig. 2) of the container body 5 between the connection port 7a and the liquid delivery port 9, and the residual amount detecting unit 11, serving as an additional function unit, is provided in a portion of the passage. However, the additional function unit according to the invention is not limited thereto.

[0061]

For example, an ink cartridge 110 shown in Fig. 11 according to a second embodiment is a liquid container having an air bubble trap unit 111, serving as an additional function unit, provided between the connection port 7a and the liquid delivery portion 9, instead of the residual amount detecting unit 11 of the ink cartridge 1 according to the first embodiment. In the second

embodiment, components having the same structures as those of the ink cartridge 1 according to the first embodiment are denoted by the same reference numerals, and a detailed description thereof will be omitted.

[0062]

As shown in Fig. 11, in the ink cartridge 110, internal passages 112a and 112b and a trap chamber 113 extend in the width direction (in the vertical direction of Fig. 11) of the container body 5 between the connection port 7a and the liquid delivery port 9, and the air bubble trap unit 111, serving as an additional function unit, is provided in a portion of the passage.

[0063]

In this way, air bubbles in the ink contained in the ink pack 7 and the internal passage 112a are prevented from being supplied from the liquid delivery portion 9 to the printing head together with the ink, which makes it possible to maintain a high printing quality of the printing head. That is, even when air bubbles are generated from the ink contained in the ink pack 7 and the internal passage 112a due to the outside air infiltrated into the flexible pouch 7b of the ink pack 7 or deaerated ink flowing back from the liquid delivery portion 9, the air bubbles in the passage are captured in the trap chamber 113 and no air bubble flows from the internal passage 112 to the liquid delivery portion 9.

[0064]

Therefore, in the ink cartridges 1 and 110 according to the first and second embodiments, the liquid delivery portion 9 is provided at a position that deviates from the center line S of the connection port 7a, and a passage extends in the width direction of the container body 5 between the connection port 7a and the liquid delivery portion 9. Therefore, it is possible to provide the residual amount detecting unit 11 or the air bubble trap

unit 111 having a small size, serving as an additional function unit, in a portion of the passage while minimizing the length of the container body 5 in the longitudinal direction thereof.

[0065]

In an ink cartridge 120 according to a third embodiment shown in Figs. 12(a) to 13, instead of the residual amount detecting unit 11 of the ink cartridge 1 according to the first embodiment, an offset passage member 121 is detachably mounted to the container body 5. In the third embodiment, components having the same structures as those of the ink cartridge 1 according to the first embodiment are denoted by the same reference numerals, and a detailed description thereof will be omitted.

[0066]

As shown in Fig. 13, in the ink cartridge 120, a passage 122 of the offset passage member 121 extends in the width direction (in the vertical direction of Fig. 13) of the container body 5 between the connection port 7a of the ink pack 7 and the liquid delivery portion 9.

The offset passage member 121 has an engaging means that enables the offset passage member 121 to be attached to or detached from the container body 5 by rotation in a connecting portion with the container body 5, similar to the detecting unit engaging portion 23 of the first embodiment.

[0067]

That is, in the ink cartridge 120 according to the third embodiment, the use of the offset passage member 121 makes it easy to provide the liquid delivery portion 9 at a position that deviates from the center line S of the connection port 7a. As a result, the flexibility of the position where the liquid delivery portion 9 is formed is improved.

Similar to the ink cartridge 1 according to the first embodiment, in the ink cartridge 120 according to the third embodiment, the liquid delivery portion 9 is provided at a position close to the positioning hole 27 that is formed in the front wall 5c. Therefore, it is possible to reduce the influence of an increase in the tolerances between the positioning pins 106 and 107 of the cartridge mounting portion 100 and the positioning holes 27 and 28 of the container body 5, which are more likely to occur due to an increase in the size of the ink cartridge. Thus, it is possible to improve the positional accuracy between the liquid supply portion 102 of the cartridge mounting portion 100 and the liquid delivery portion 9 of the container body 5, and smoothly connect the liquid supply portion 102 and the liquid delivery portion 9. As a result, it is possible to prevent the deterioration of the mountability of the ink cartridge 120.

[0068]

In the ink cartridge 120 according to the third embodiment, when the container mounted to the cartridge mounting portion 100 of the ink jet printing apparatus is used, the liquid delivery portion 9 is positioned above the center of the front wall 5c (the center line S of the connection port 7a) in the height direction during the use of the container. Therefore, in general, during the use of the container, the liquid delivery portion 9 of the container body 5 is positioned above the connection port 7a of the ink pack 7 that is disposed substantially at the center of the front wall 5c of the container body 5. Therefore, it is possible to reduce the static pressure of the liquid delivery portion 9 by a value corresponding to the water head difference thereof, and thus reduce the leakage of ink from the liquid delivery portion 9.

[0069]

Fig. 14 is a cross-sectional view illustrating main

parts of a liquid container according to a fourth embodiment of the invention. In the fourth embodiment, components having the same structures as those of the ink cartridge 1 according to the first embodiment are denoted by the same reference numerals, and a detailed description thereof will be omitted.

[0070]

An ink cartridge 130 according to the fourth embodiment includes: a container body 5 that is detachably mounted to a cartridge mounting portion 100 and supplies ink (liquid) stored in an ink pack 137, serving as a liquid containing portion, to a printing head provided in a printing apparatus; a connection port 7a which delivers ink contained in the ink pack 137; a liquid delivery portion 9 which is provided in a front wall 5c, which is a lead end surface of the container body 5 in the direction in which the container body 5 is mounted, and through which a liquid supply portion 102 provided in the cartridge mounting portion 100 communicates with the connection port 7a; and two positioning holes 27 and 28 into which two positioning pins 106 and 107 provided on the container mounting portion 100 at positions facing the front wall 5c are fitted, thereby regulating movement along the front wall 5c.

[0071]

In the ink pack 137 of the ink cartridge 130, the connection port 7a that discharges ink stored in the ink pack by pressure applied to the pouch accommodating portion 3 is provided in one side of a flexible pouch 7b so as to be offset to one corner (an upper corner in Fig. 14).

Meanwhile, the liquid delivery portion 9 through which the liquid supply portion 102 of the cartridge mounting portion 100 communicates with the connection port 7a is provided at a position close to the positioning hole

27 of the two positioning holes 27 and 28 that are formed at both sides of the front wall 5c in the width direction thereof.

[0072]

Therefore, the liquid delivery portion 9 and the connection port 7a of the ink pack 137 are provided at an offset position that deviates from the center of the front wall 5c in the upward direction of Fig. 14 such that the center lines thereof are substantially aligned with each other.

As shown in Fig. 14, when the ink cartridge 130 is actually inserted into an ink jet printing apparatus, the liquid delivery portion 9 is provided above the center of the front wall 5c in the height direction when the container is used.

[0073]

Therefore, according to the ink cartridge 130 of the fourth embodiment, the liquid delivery portion 9 is provided at a position close to the positioning hole 27 that is formed in the front wall 5c. Therefore, it is possible to reduce the influence of an increase in the tolerances between the positioning pins 106 and 107 of the cartridge mounting portion 100 and the positioning holes 27 and 28 of the container body 5, which are more likely to occur due to an increase in the size of the ink cartridge. Thus, it is possible to improve the positional accuracy between the liquid supply portion 102 of the cartridge mounting portion 100 and the liquid delivery portion 9 of the container body 5, and smoothly connect the liquid supply portion 102 and the liquid delivery portion 9. As a result, it is possible to prevent the deterioration of the mountability of the ink cartridge 130.

[0074]

Further, in the ink cartridge 130 according to the fourth embodiment, when the container mounted to the

cartridge mounting portion 100 of the ink jet printing apparatus is used, the connection port 7a and the liquid delivery portion 9 are positioned above the center of the front wall 5c in the height direction during the use of the container. Therefore, it is possible to reduce the pressure of ink applied to the liquid delivery portion 9 through the connection port 7a due to the weight of ink contained in the ink pack 137, and thus reduce the leakage of ink from the liquid delivery portion 9.

[0075]

In this embodiment, the container body 5 includes two positioning holes 27 and 28 into which the two positioning pins 106 and 107 provided on the cartridge mounting portion 100 are fitted, thereby regulating the movement thereof along the front wall 5c, but the invention is not limited thereto. For example, the container body may include two concave portions into which two convex portions formed on the cartridge mounting portion are fitted, and the liquid delivery portion may be provided close to one of the two concave portions.

In addition, the number of positioning holes and the number of positioning holes are preferably two or more. When two or more positioning holes are provided, the liquid delivery portion may be provided close to any one of the plurality of positioning holes.

[0076]

Furthermore, the use of the liquid container according to the invention is not limited to an ink cartridge of an ink jet printing apparatus. The liquid container according to the invention may be used for various types of liquid consuming apparatuses provided with liquid ejecting heads.

The liquid consuming apparatuses provided with liquid ejecting heads include, for example, apparatuses provided with color material ejecting heads used to manufacture

color filters, such as liquid crystal displays, apparatuses provided with electrode material (conductive paste) ejecting heads used to manufacture electrodes of, for example, organic EL displays and surface-emitting displays (FEDs), apparatuses provided with bio-organic material ejecting heads used to manufacture bio chips, apparatuses provided with sample ejecting heads, such as accurate pipettes, and printing apparatuses or micro-dispensers.

CLAIMS

1. A liquid container comprising:

a container body that is detachably mounted to a container mounting portion of a liquid consuming apparatus and includes a liquid containing portion storing a liquid;

a connection port that is provided in the liquid containing portion and delivers the liquid;

a liquid delivery portion that is provided in one surface of the container body to supply the liquid to the liquid consuming apparatus; and

a plurality of positioning means into which, when the container body is mounted to the liquid consuming apparatus, a plurality of positioning members that are provided on the container mounting portion at positions facing the one surface are fitted, thereby positioning the container body,

the liquid container characterized in that the liquid delivery portion is provided close to any one of the plurality of positioning means.

2. The liquid container according to claim 1, characterized in that the liquid delivery portion is provided at a position that deviates from a center line of an opening of the connection port.

3. The liquid container according to claim 2, characterized by further comprising:

an offset passage member that has a passage through which the connection port communicates with the liquid delivery portion; and

an engaging means that is provided in a connecting portion between the container body and the offset passage member and enables the offset passage member to be detachably engaged with the container body by relative

rotation.

4. A liquid container comprising:

a container body that is detachably mounted to a container mounting portion of a liquid consuming apparatus and supplies a liquid stored in a liquid containing portion to the liquid consuming apparatus;

a connection port that is provided in the liquid containing portion and delivers the liquid; and

a liquid delivery portion which is provided in a leading end surface of the container body in a mounting direction in which the container body is mounted and through which the connection port communicates with a liquid supply portion that is provided in the container mounting portion,

the liquid container characterized in that the liquid delivery portion is provided above a center of the leading end surface of the container body in a height direction when the container body is mounted to the liquid consuming apparatus.

5. The liquid container according to claim 4,

characterized in that the liquid delivery portion is provided at a position that deviates from a center line of an opening of the connection port.

6. The liquid container according to claim 5, characterized by further comprising:

an offset passage member that has a passage through which the connection port communicates with the liquid delivery portion; and

an engaging means that is provided in a connecting portion between the container body and the offset passage member and enables the offset passage member to be detachably engaged with the container body by relative

rotation.

7. A liquid container comprising:

a container body that is detachably mounted to a container mounting portion of a liquid consuming apparatus and supplies a liquid stored in a liquid containing portion to the liquid consuming apparatus;

a connection port that is provided in the liquid containing portion and delivers the liquid;

a liquid delivery portion which is provided in a leading end surface of the container body in a mounting direction in which the container body is mounted and through which the connection port communicates with a liquid supply portion that is provided in the container mounting portion; and

two concave portions into which two convex portions that are provided on the container mounting portion at positions facing the leading end surface of the container body in the mounting direction are fitted,

characterized in that the liquid delivery portion is provided close to one of the two concave portions provided at both sides of the leading end surface of the container body in the mounting direction in a width direction thereof.

8. A liquid container that is detachably mounted to a container mounting portion of a liquid consuming apparatus, the liquid container characterized by comprising:

a liquid containing portion that stores a liquid;

a connection port that is provided in the liquid containing portion and delivers the liquid;

a liquid delivery portion which is provided in a front wall of the liquid container and supplies the liquid to the liquid consuming apparatus; and

first and second positioning holes which are provided

at both sides of the front wall and into which first and second positioning members that are provided on the container mounting portion at positions facing the front wall are fitted when the liquid container is mounted to the liquid consuming apparatus, thereby positioning a container body,

wherein the liquid delivery portion is provided closer to the first positioning hole than to the second positioning hole.

9. The liquid container according to claim 8, characterized in that the first positioning hole is positioned above the second positioning hole when the liquid container is mounted to the liquid consuming apparatus.

10. The liquid container according to claim 8 or 9, characterized by further comprising:

a side wall that is orthogonal to the front wall and is positioned at an upper side when the liquid container is mounted to the liquid consuming apparatus,

wherein the side wall is provided with a circuit board that can be connected to a connection terminal of the liquid consuming apparatus.

11. The liquid container according to any one of claims 8 to 10, characterized by further comprising:

a side wall that is orthogonal to the front wall and is positioned at a lower side when the liquid container is mounted to the liquid consuming apparatus,

wherein the side wall is provided with an engaging portion that can be engaged with an engaging means provided in the liquid consuming apparatus.