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(54) **LIQUID SUPPLY SYSTEM, LIQUID EJECTING APPARATUS, AND LIQUID SUPPLY METHOD**

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CPC ***B41J 2/17566*** (2013.01)

(57) **ABSTRACT**

A liquid supply system includes a common mounting portion into which a first liquid storage body capable of storing a liquid and a substitute mounting body which is connected to a second liquid storage body capable of storing a liquid can be exchangeably mounted, a mounting target detection unit capable of detecting whether or not the first liquid storage body and the substitute mounting body are mounted to the common mounting portion, a pressurization supply unit which supplies the liquid which is stored in the second liquid storage body to the substitute mounting body under pressure, and a control unit which drives the pressure supply unit when a plurality of control conditions are satisfied.

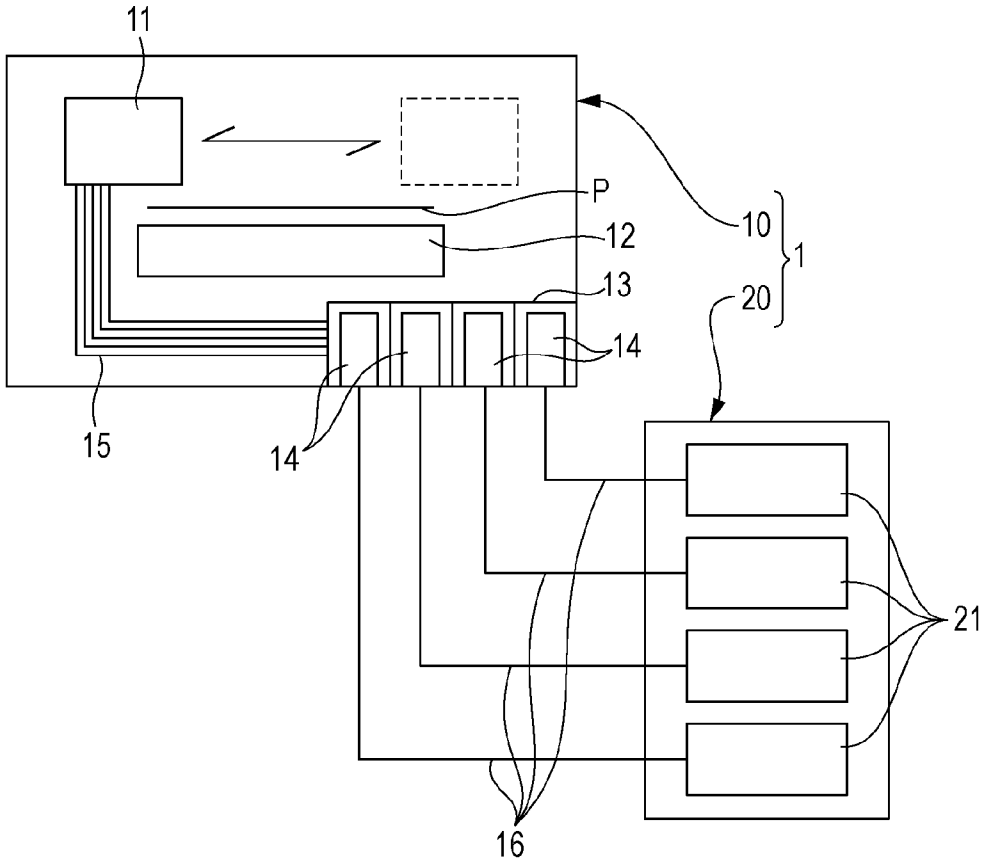


FIG. 1A

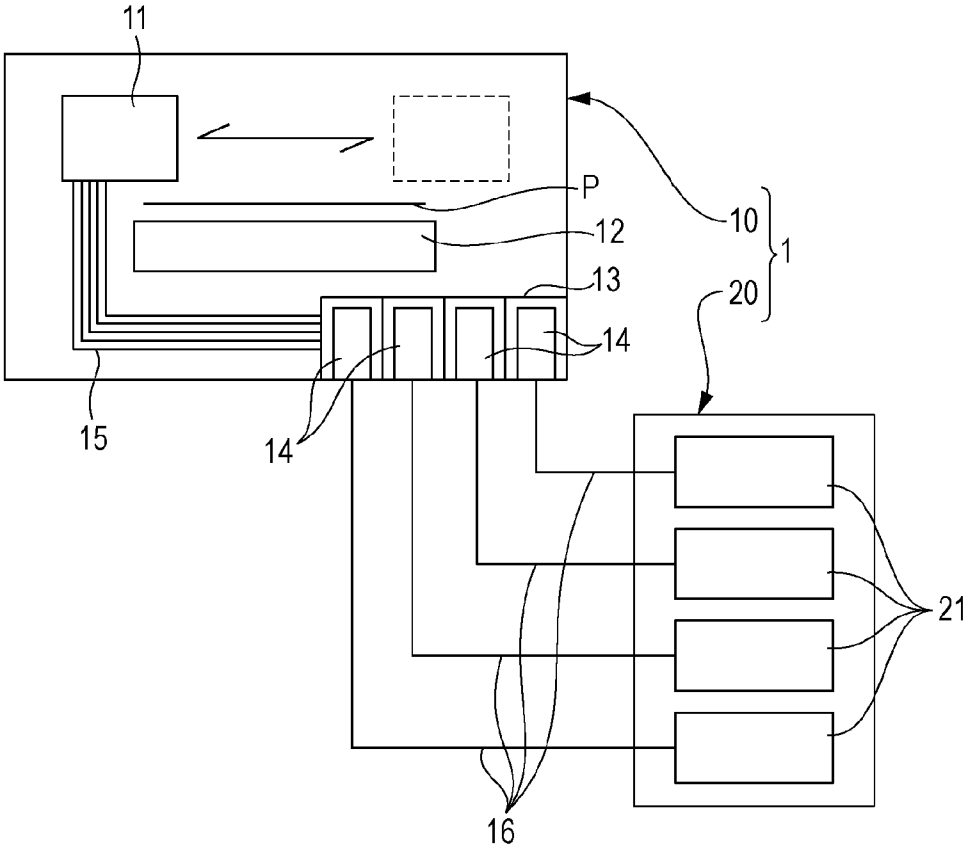


FIG. 1B

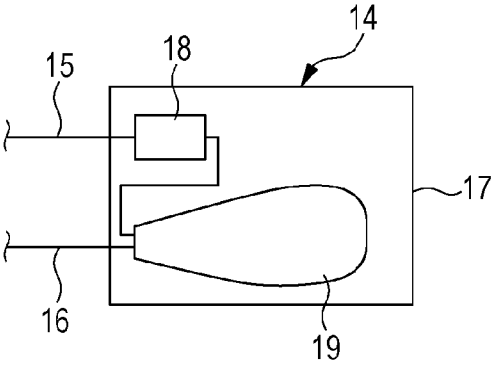


FIG. 2

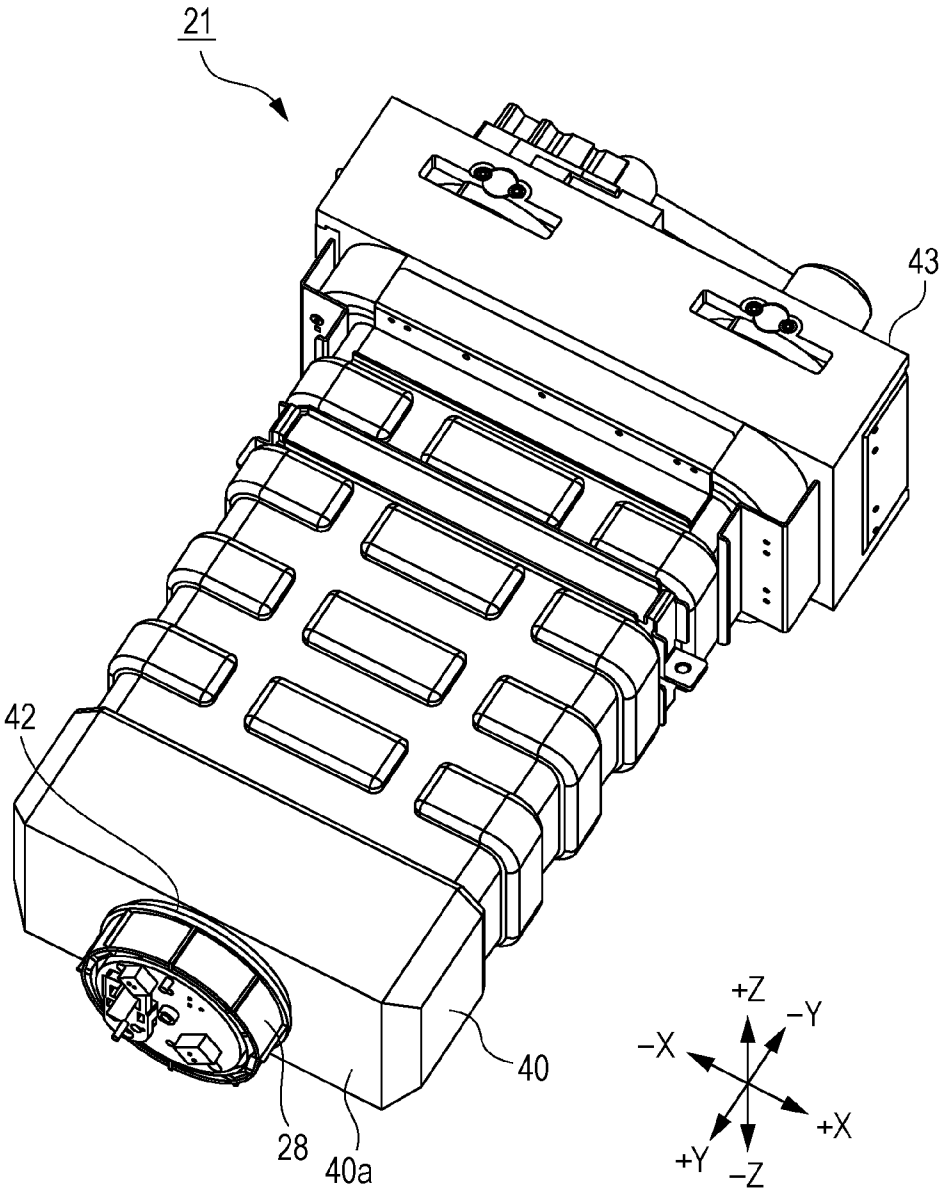


FIG. 3

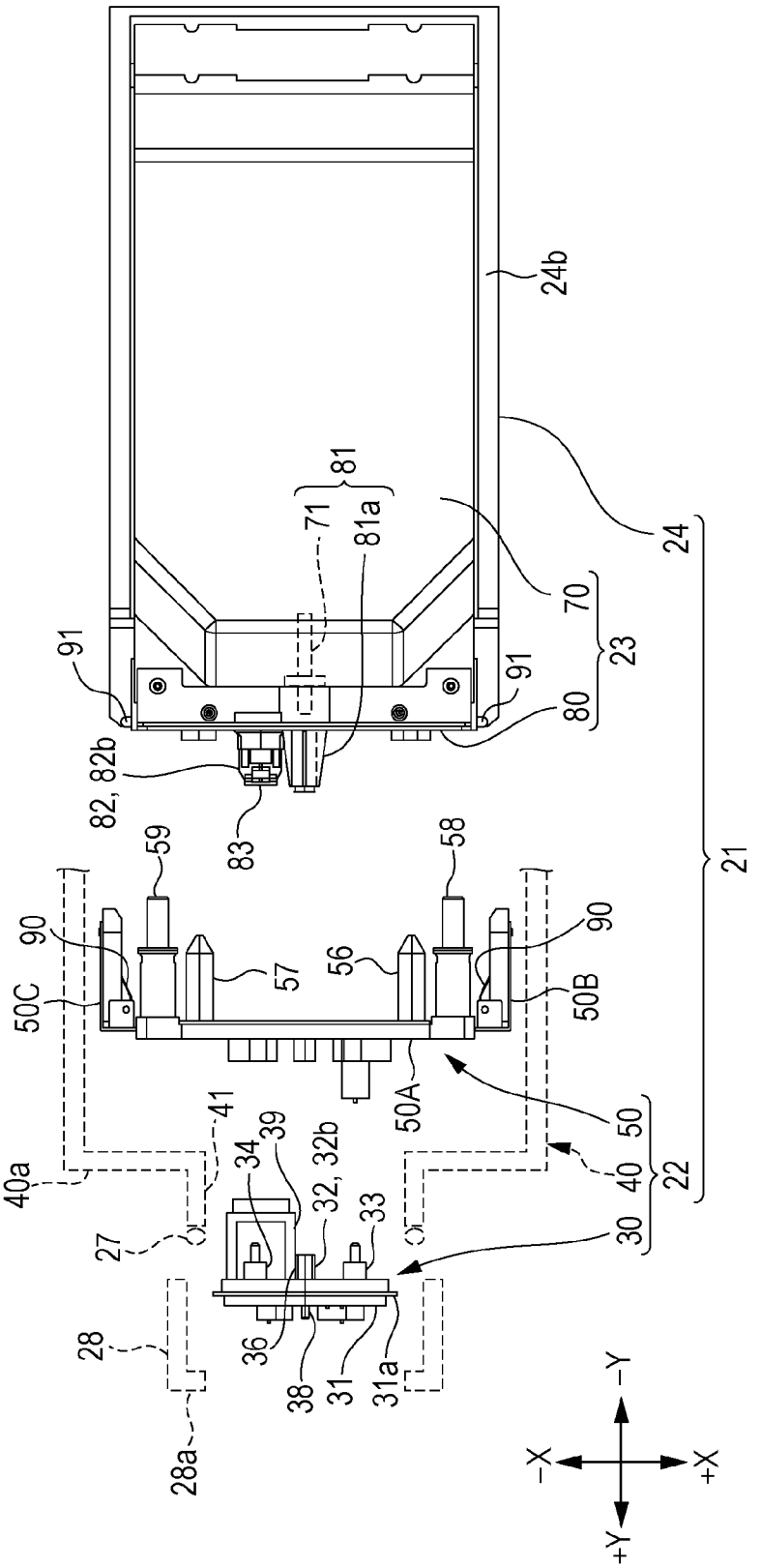
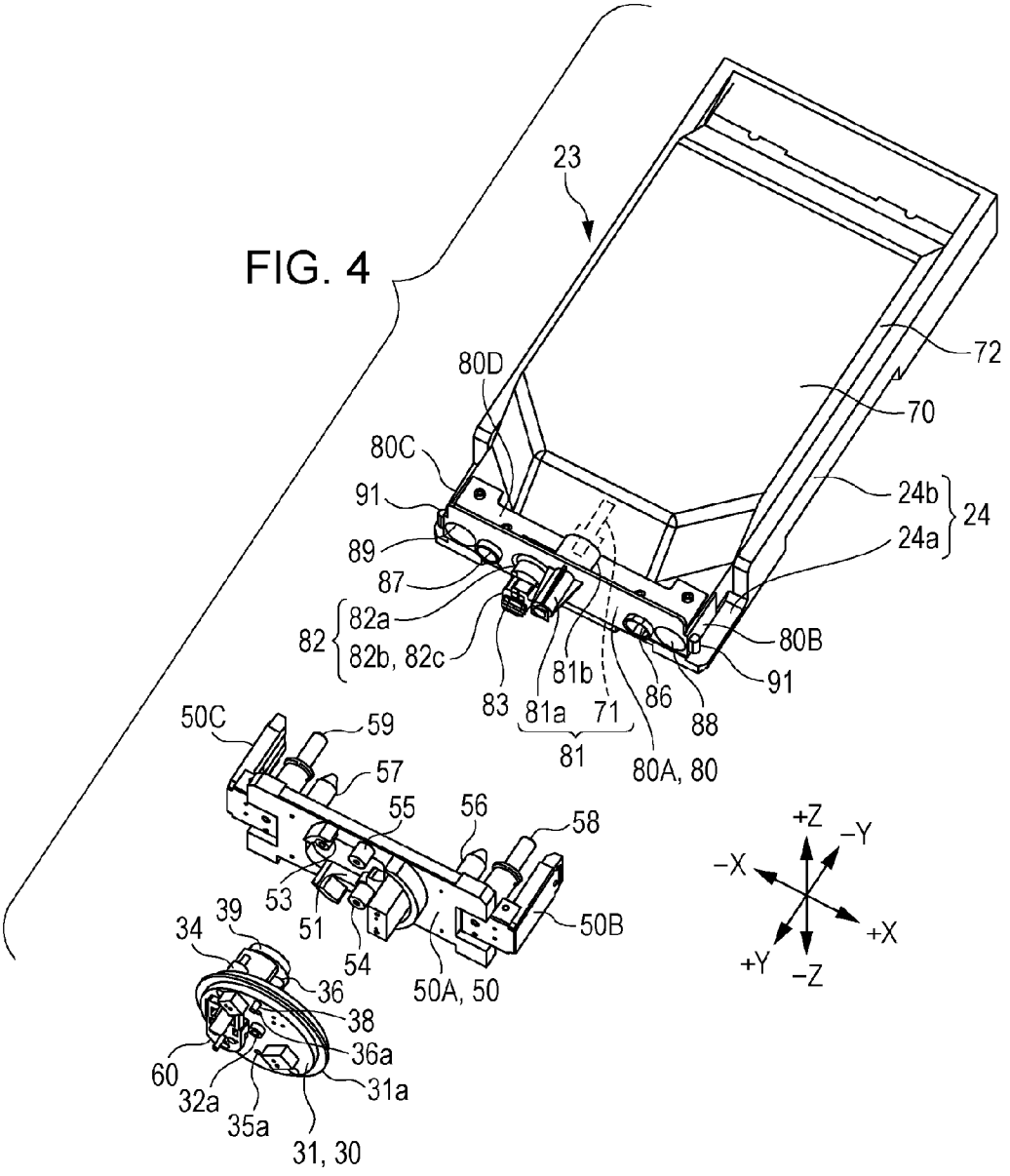

24b
81
71
81a
24
70
23
91
91
80
82b
82, 83
59
58
21
90
90
50C
57
56
50B
50A
50
41
39
34
32b
32, 33
40a
40
22
27
30
28
36
38
31
31a
28a
-Y
-X
+X
+Y

FIG. 4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72
80D
70
80C
24b
24
91
24a
89
87
82
82a
82b, 82c
80B
91
83
81a
71
81b
86
88
81
80A, 80
50C
59
57
55
56
58
53
51
54
50A, 50
50B
39
34
36
38
36a
31a
60
32a
35a
31, 30
+Z
−Y
−X
+X
+Y
−Z

FIG. 5B

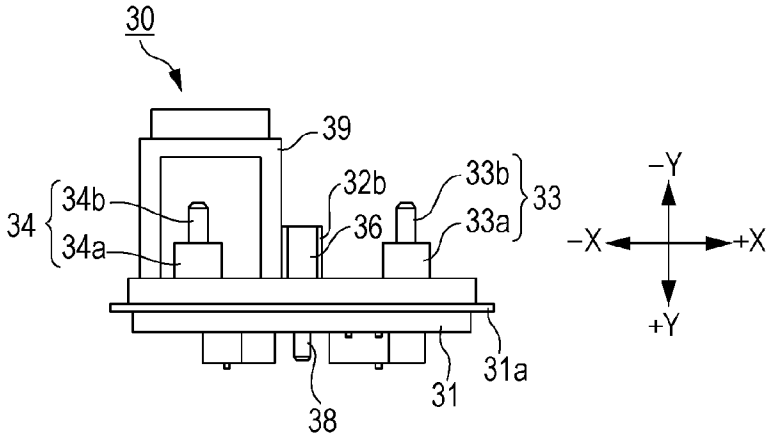


FIG. 5A

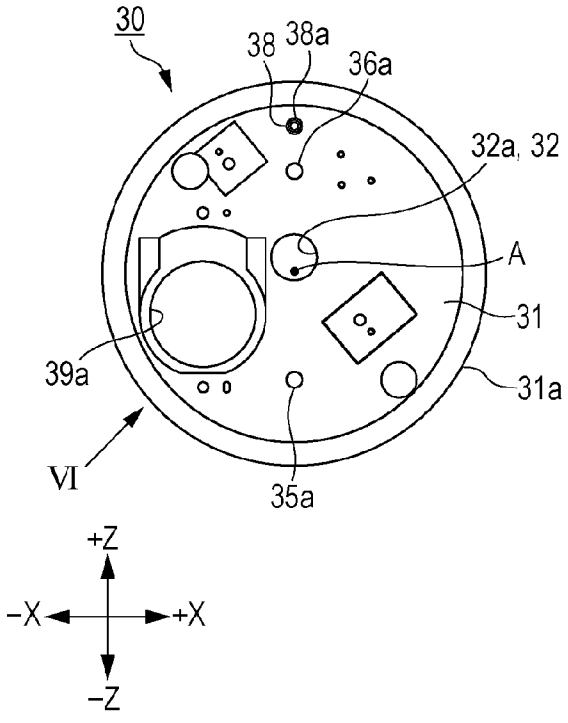


FIG. 5C

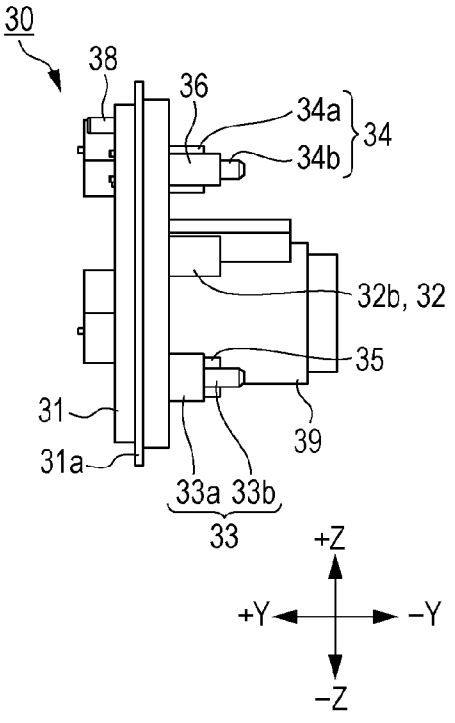


FIG. 6

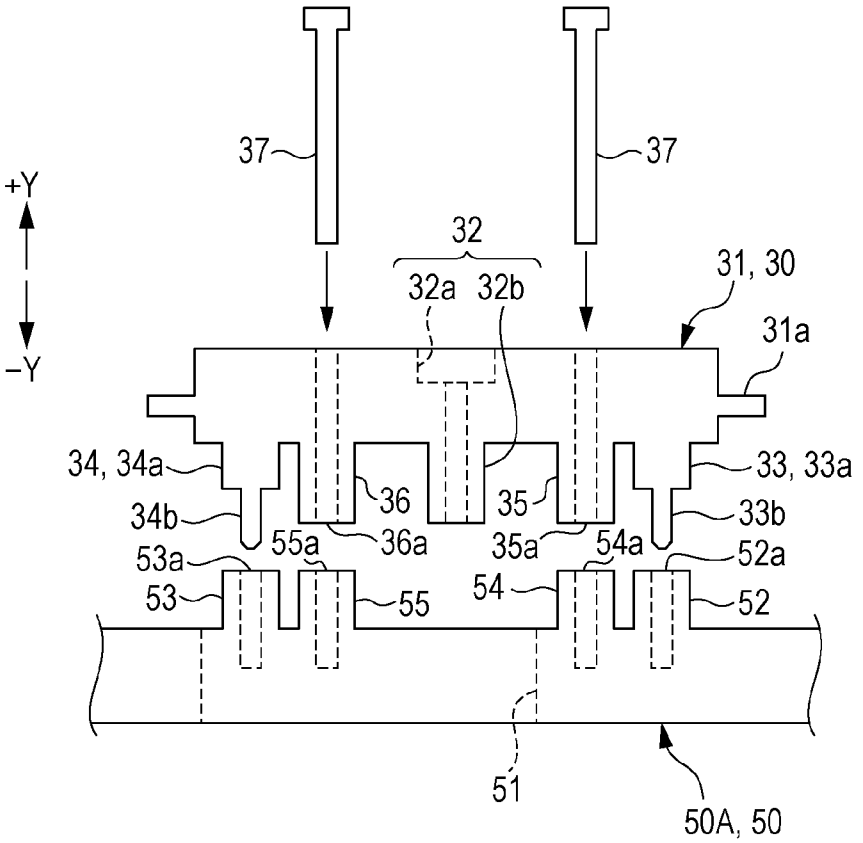
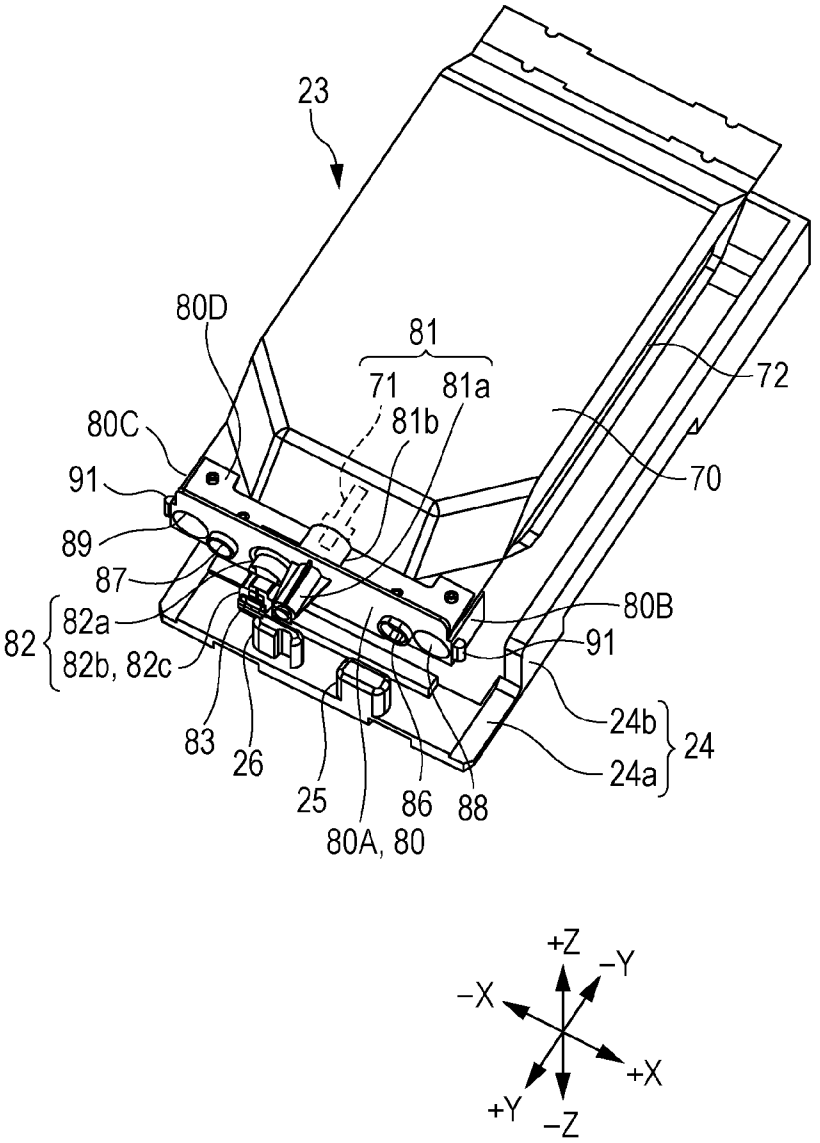

37
37
+Y
−Y
32
32a
32b
31, 30
31a
34, 34a
33, 33a
34b
36
35
33b
55a
36a
35a
54a
53a
52a
53
55
54
52
51
50A, 50

FIG. 7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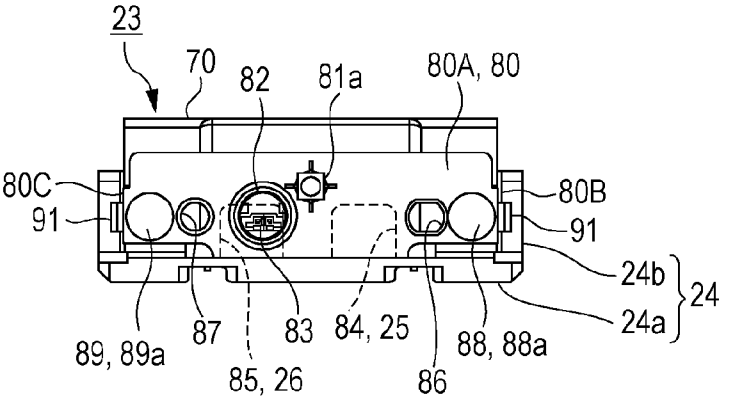
71
81a
72
80C
81b
91
70
89
87
80B
82
82a
82b, 82c
91
24b
24
24a
83
26
25
86
88
80A, 80
+Z
−Y
−X
+X
+Y
−Z

FIG. 8A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81a
80A, 80
80C
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80B
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24b
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24a
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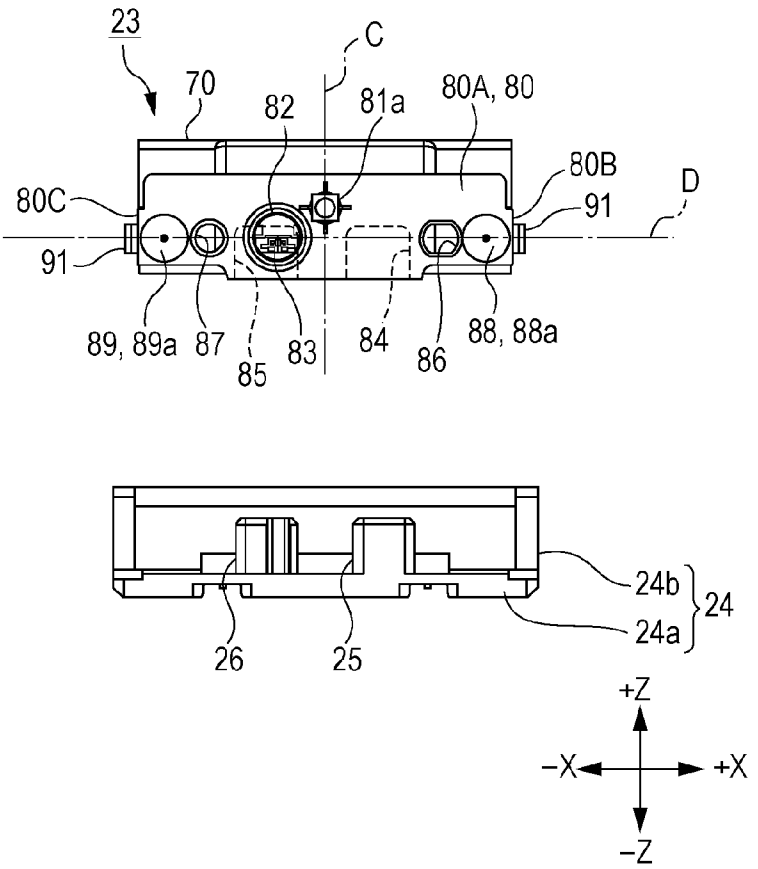
84, 25
88, 88a
85, 26
86

FIG. 8B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80B
D
80C
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89, 89a
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24b
24
24a
26
25
+Z
−X
+X
−Z

FIG. 9A

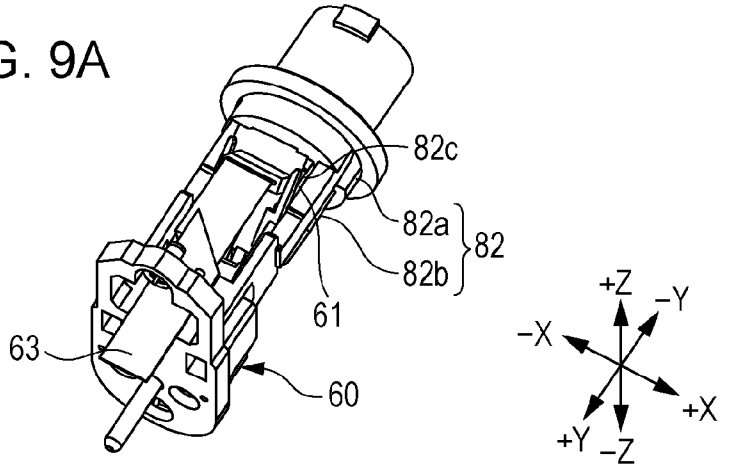


FIG. 9B

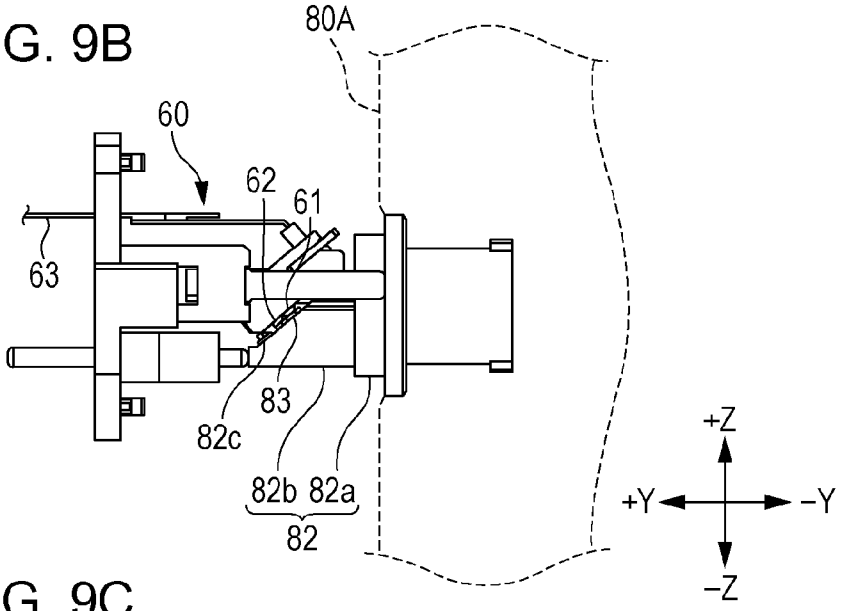


FIG. 9C

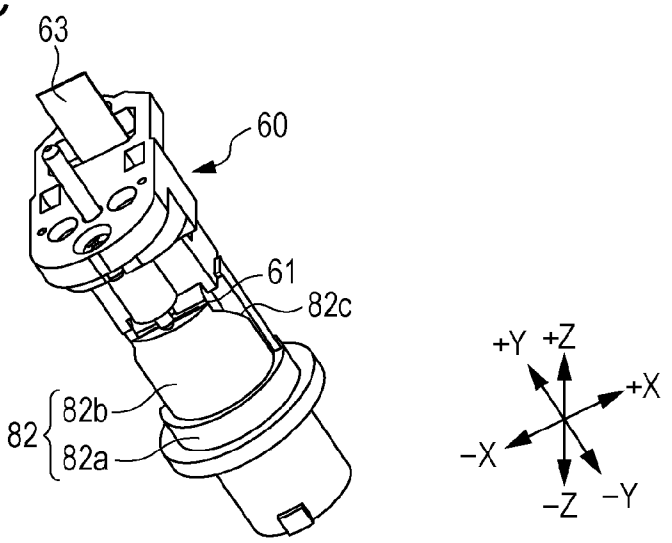
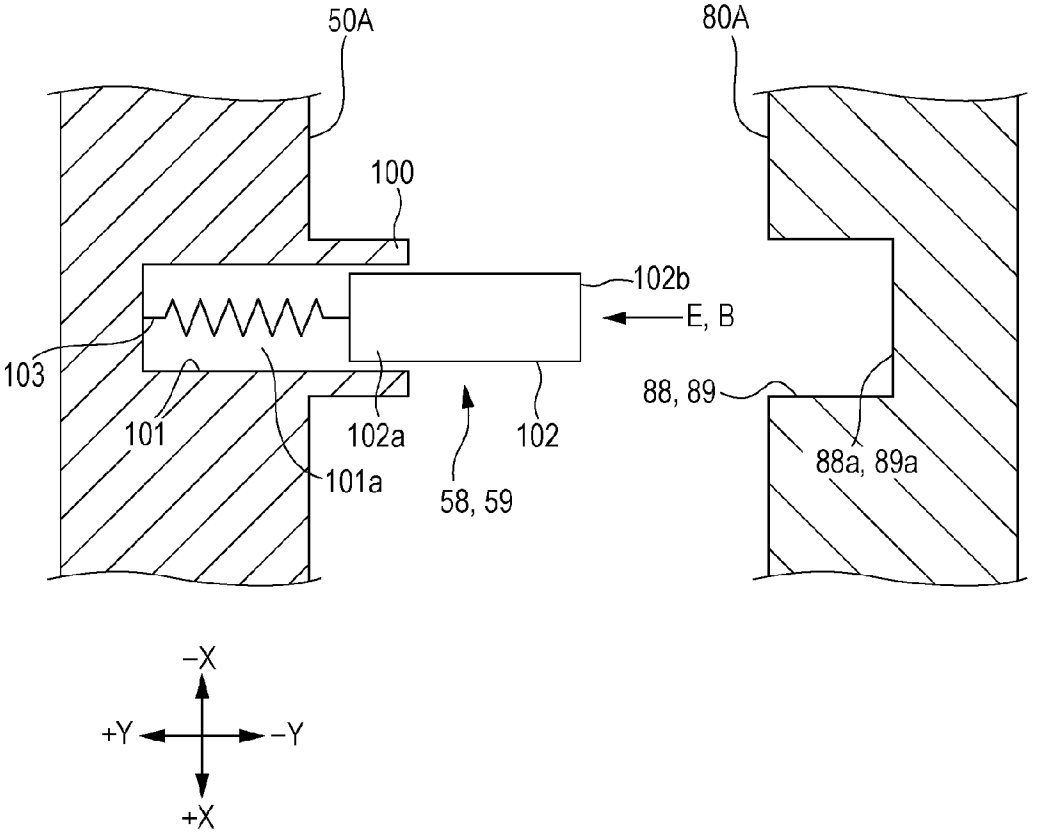


FIG. 10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102a
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101a
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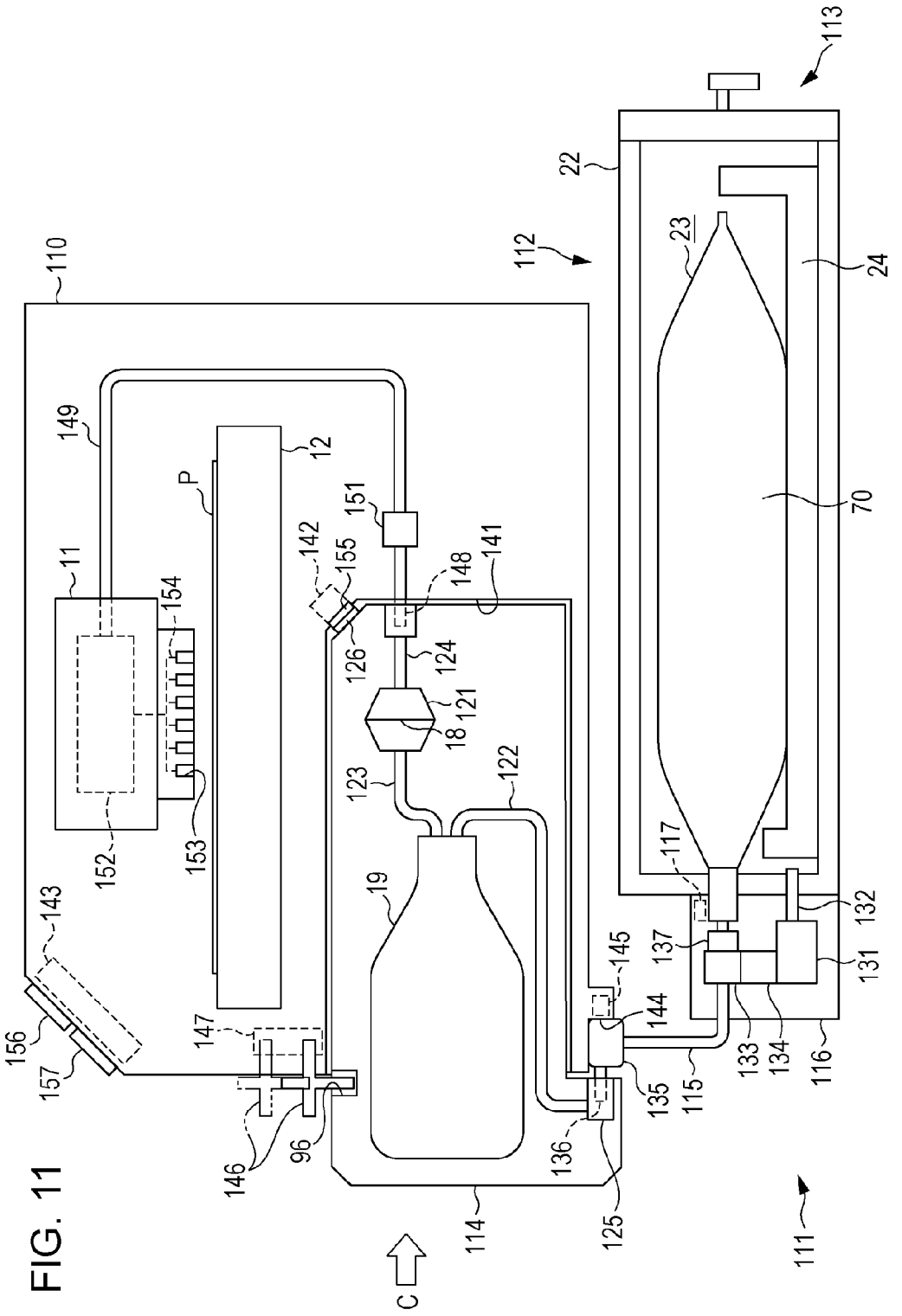
−X
+Y
−Y
+X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153
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116
125
C

FIG. 11

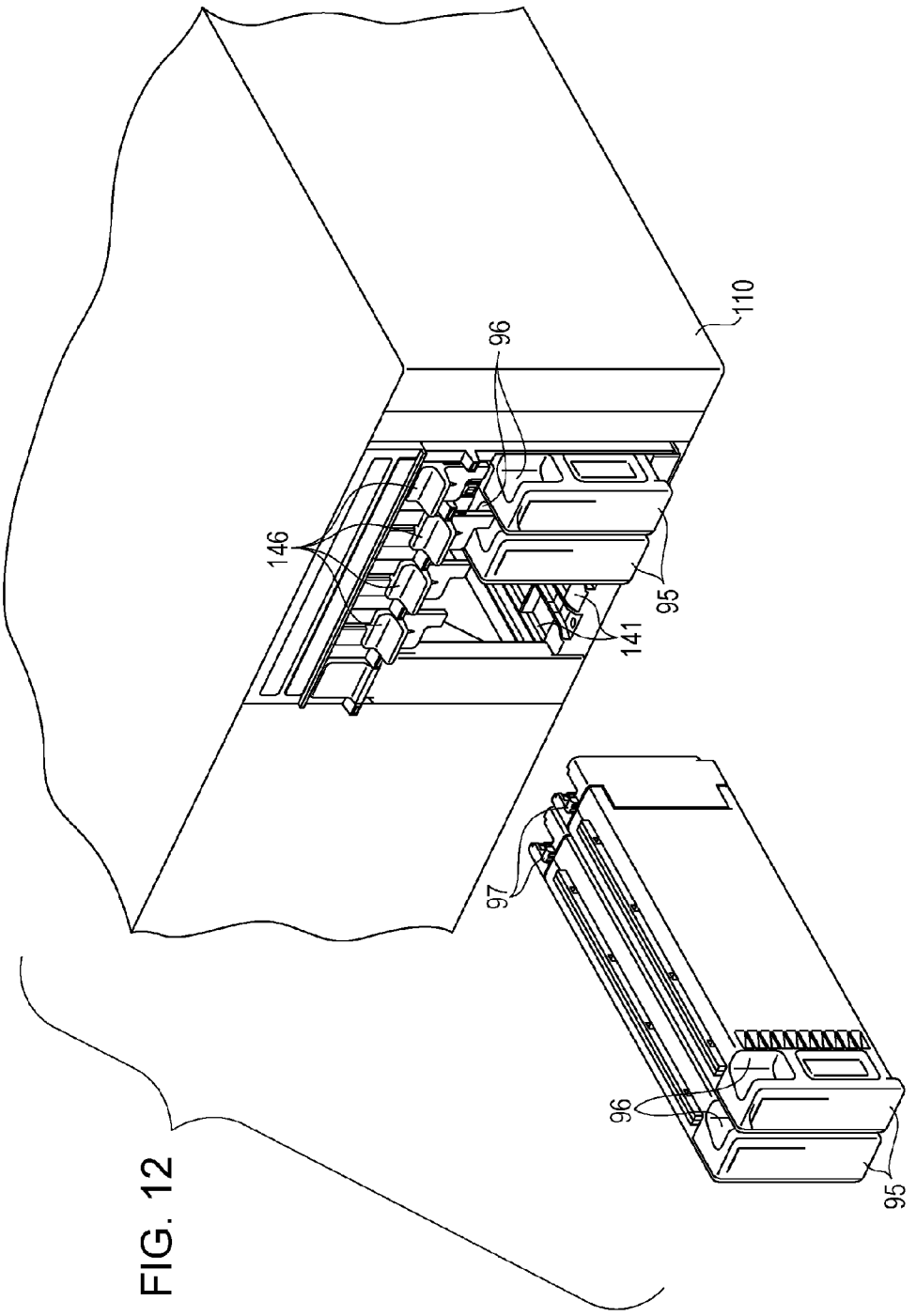
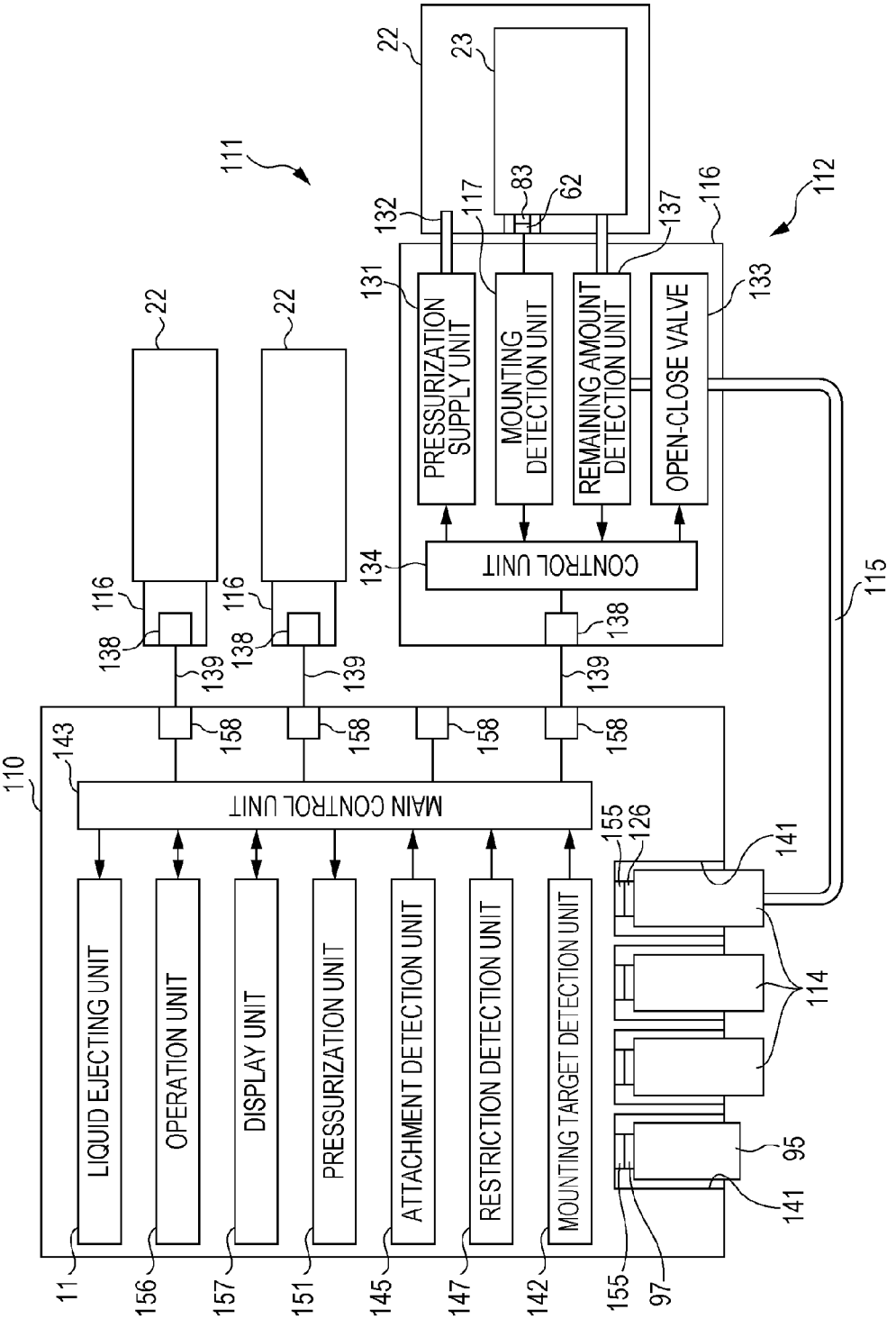


FIG. 12

FIG. 13


MAIN CONTROL UNIT
LIQUID EJECTING UNIT
OPERATION UNIT
DISPLAY UNIT
PRESSURIZATION UNIT
ATTACHMENT DETECTION UNIT
RESTRICTION DETECTION UNIT
MOUNTING TARGET DETECTION UNIT
CONTROL UNIT
PRESSURIZATION SUPPLY UNIT
MOUNTING DETECTION UNIT
REMAINING AMOUNT DETECTION UNIT
OPEN-CLOSE VALVE
110
111
112
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97
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LIQUID SUPPLY SYSTEM, LIQUID EJECTING APPARATUS, AND LIQUID SUPPLY METHOD

BACKGROUND

[0001] 1. Technical Field

[0002] The present invention relates to a liquid supply system, a liquid supply apparatus, a liquid ejecting apparatus, and a liquid supply method.

[0003] 2. Related Art

[0004] An ink jet printer which performs printing by ejecting an ink from nozzles which are provided in a print head is an example of the liquid ejecting apparatus. Among such printers, there are printers in which the ink is supplied to the print head by driving a supply pump from a compact ink cartridge, and from an additional ink tank which has a greater ink storage capacity than the ink cartridge (for example, JP-A-2011-42127).

[0005] Incidentally, in a printer such as the one described above, there is a problem in that when the additional ink tank is configured to be attachable and detachable, depending on the mounting state of the additional ink tank, it may not be possible to supply the ink to the print head even if the supply pump is driven.

[0006] Note that, this problem is not limited to a printer which performs printing by ejecting an ink, and is generally common to cases in which a liquid storage body which stores a liquid for supplying is provided with a configuration which can be attached thereto and detached therefrom.

SUMMARY

[0007] An advantage of some aspects of the invention is to provide a liquid supply system, a liquid supply apparatus, a liquid ejecting apparatus, and a liquid supply method, each of which is capable of supplying a liquid, as appropriate, according to the mounting state of a liquid storage body.

[0008] Hereinafter, means of the invention and operation effects thereof will be described.

[0009] According to an aspect of the invention, there is provided a liquid supply system which includes a common mounting portion into which a first liquid storage body capable of storing a liquid and a substitute mounting body which is connected to a second liquid storage body capable of storing a liquid via a relay flow path can be exchangeably mounted, a mounting target detection unit capable of detecting whether or not the first liquid storage body and the substitute mounting body are mounted to the common mounting portion, a pressurization supply unit which supplies the liquid which is stored in the second liquid storage body to the substitute mounting body under pressure, and a control unit which drives the pressure supply unit when a plurality of control conditions are satisfied, in which the control conditions include the liquid which is stored in the second liquid storage body entering a pressurizable state and the mounting target detection unit detecting mounting of the substitute mounting body to the common mounting portion.

[0010] In this case, when the liquid which is stored in the second liquid storage body enters a pressurizable state and the mounting target detection unit detects the mounting of the substitute mounting body to the common mounting portion, since the pressurization supply unit is driven, it is possible to appropriately supply the liquid which is stored in the second liquid storage body through the relay flow path due to the pressurization supply unit being driven. Meanwhile, when the liquid which is stored in the second liquid storage body is not in the pressurizable state, or when the substitute mounting body is not mounted to the common mounting portion, since the pressurization supply unit is not driven, the wasteful driving of the pressurization supply unit does not occur. Therefore, it is possible to appropriately supply the liquid according to the mounting state of the liquid storage body.

[0011] The liquid supply system may further include a second liquid storage body mounting portion to and from which the second liquid storage body can be attached and detached, and a mounting detection unit capable of detecting whether or not the second liquid storage body is mounted to the second liquid storage body mounting portion. When the mounting detection unit detects that the second liquid storage body is mounted to the second liquid storage body mounting portion, the control unit may determine that the liquid which is stored in the second liquid storage body is in a pressurizable state.

[0012] In this case, when the second liquid storage body is mounted to the second liquid storage body mounting portion, since the liquid which is stored in the second liquid storage body is determined to be in the pressurizable state, it is possible to appropriately supply the liquid according to the mounting state of the second liquid storage body to the second liquid storage body mounting portion. Meanwhile, when the second liquid storage body is not mounted to the second liquid storage body mounting portion, since the pressurization supply unit is not driven, the wasteful driving of the pressurization supply unit does not occur.

[0013] In the liquid supply system, the substitute mounting body is detachably connected to the relay flow path via a first connection portion which may be provided on a downstream end of the relay flow path and a second connection portion which may be provided on the substitute mounting body, the common mounting portion may include an attachment portion to which the first connection portion is attached in a removable state, and an attachment detection unit capable of detecting whether or not the first connection portion is in a state of being attached to the attachment portion, and the control conditions may include the attachment detection unit detecting the first attachment unit being attached to the attachment portion.

[0014] In this case, since the driving of the pressurization supply unit is started after the attachment detection unit detects the fact that the first connection portion which is provided on the downstream end of the relay flow path is attached to the attachment portion of the common mounting portion, when the liquid is supplied, it is possible to reliably hold the relay flow path in the common mounting portion.

[0015] In the liquid supply system, in a state in which the first connection portion is attached to the attachment portion, the first connection portion may be connected to the second connection portion in a process of the substitute mounting body being mounted to the common mounting portion.

[0016] In this case, in the state in which the first connection portion is attached to the attachment portion, since the first connection portion is connected to the second connection portion in the process of the substitute mounting body being mounted to the common mounting portion, it is possible to confirm the connection between the substitute mounting body and the relay flow path due to the mounting target detection unit detecting the mounting of the substitute mounting body to the common mounting portion. In addition to this detection, since the fact that the common mounting portion, the

substitute mounting body, and the relay flow path are connected to each other is confirmed by detecting the attachment of the first connection portion to the attachment portion, it is possible to appropriately supply the liquid which is stored in the second liquid storage body to the common mounting portion due to the pressurization supply unit being driven after the confirmation.

[0017] The liquid supply system may further include a restriction portion which is capable of restricting the substitute mounting body which is mounted to the common mounting portion from being detached and is capable of moving between a restriction position which restricts the substitute mounting body which is mounted to the common mounting portion from being detached and a restriction released position which allows the substitute mounting body which is mounted to the common mounting portion to be detached, and a restriction detection unit capable of detecting whether or not the restriction portion is in the restriction position. The control conditions may include the restriction detection unit detecting that the restriction portion is in the restriction position.

[0018] In this case, when the restriction detection unit detects that the restriction portion is in the restriction position, since it is conceivable that the substitute mounting body which is mounted to the common mounting portion is restricted from being detached, it is possible to appropriately supply the liquid in a state in which the substitute mounting body is reliably mounted to the common mounting portion.

[0019] The liquid supply system may further include a plurality of the common mounting portions. The control conditions may include the mounting target detection unit detecting that the first liquid storage body or the substitute mounting body is mounted to the common mounting portion.

[0020] In this case, since the driving of the pressurization supply unit is started when one or more of the first liquid storage bodies or the substitute mounting bodies are mounted to a plurality of the common mounting portions, it is possible to appropriately supply the liquid of the first liquid storage bodies or the second liquid storage bodies which are mounted to the plurality of common mounting portions.

[0021] According to an aspect of the invention, there is provided a liquid supply apparatus which includes a substitute mounting body which can be mounted, so as to be exchangeable with a first liquid storage body, to a common mounting portion to and from which the first liquid storage body capable of storing a liquid can be attached and detached, a relay flow path which communicates a second liquid storage body capable of storing a liquid with the substitute mounting body, a pressurization supply unit which supplies the liquid which is stored in the second liquid storage body to the substitute mounting body through the relay flow path under pressure, and a control unit which drives the pressure supply unit when a plurality of control conditions are satisfied, in which the control conditions include the liquid which is stored in the second liquid storage body entering a pressurizable state and the substitute mounting body being mounted to the common mounting portion.

[0022] In this configuration, it is possible to obtain the same effect as the liquid supply system.

[0023] According to still another aspect of the invention, there is provided a liquid ejecting apparatus which includes a liquid ejecting unit capable of ejecting a liquid, a common mounting portion into which a first liquid storage body capable of storing a liquid and a substitute mounting body which is connected to a second liquid storage body capable of storing a liquid via a relay flow path can be exchangeably mounted, a mounting target detection unit capable of detecting whether or not the first liquid storage body and the substitute mounting body are mounted to the common mounting portion, a pressurization supply unit which supplies the liquid which is stored in the second liquid storage body to the substitute mounting body under pressure, and a control unit which drives the pressure supply unit when a plurality of control conditions are satisfied, in which the control conditions include the liquid which is stored in the second liquid storage body entering a pressurizable state and the mounting target detection unit detecting mounting of the substitute mounting body to the common mounting portion.

[0024] In this configuration, it is possible to obtain the same effect as the liquid supply system.

[0025] According to still another aspect of the invention, there is provided a liquid supply method which is carried out by a liquid supply apparatus which includes a substitute mounting body which can be mounted, so as to be exchangeable with a first liquid storage body, to a common mounting portion to and from which the first liquid storage body capable of storing a liquid can be attached and detached, a relay flow path which communicates a second liquid storage body capable of storing a liquid with the substitute mounting body, and a pressurization supply unit which supplies the liquid which is stored in the second liquid storage body to the substitute mounting body through the relay flow path under pressure. The liquid supply method may cause the pressurization supply unit to start being driven when the liquid which is stored in the second liquid storage body enters a pressurizable state and the substitute mounting body is mounted to the common mounting portion.

[0026] In this configuration, it is possible to obtain the same effect as the liquid supply system.

BRIEF DESCRIPTION OF THE DRAWINGS

[0027] The invention will be described with reference to the accompanying drawings, wherein like numbers reference like elements.

[0028] FIG. **1**A is a diagram schematically illustrating a first embodiment of a liquid ejecting apparatus, and FIG. **1**B is a diagram schematically illustrating the configuration of a relay apparatus.

[0029] FIG. **2** is a perspective view of the exterior of a main tank.

[0030] FIG. **3** is an exploded plan view of the main tank.

[0031] FIG. **4** is an exploded perspective view of the main tank.

[0032] FIG. **5**A is a front surface diagram of a cap body, as viewed from a +Y direction side, FIG. **5**B is a side surface diagram of the cap body, as viewed from a +Z direction side, and FIG. **5**C is a side surface diagram of the cap body, as viewed from a +X direction side.

[0033] FIG. **6** is a diagram schematically illustrating a fixing structure between the cap body and a mounting member.

[0034] FIG. **7** is a perspective view illustrating a state in which a liquid container is lifted from a tray.

[0035] FIG. **8**A is a front view illustrating a state in which the liquid container is placed on the tray, and FIG. **8**B is a front view illustrating a state in which the liquid container is lifted from the tray.

[0036] FIGS. **9**A and **9**C are perspective views of a connector unit and a substrate holding portion, and FIG. **9**B is a side surface view of the connector unit and the substrate holding portion.

[0037] FIG. **10** is a diagram schematically illustrating the configuration of a damper.

[0038] FIG. **11** is a diagram schematically illustrating a second embodiment of the liquid ejecting apparatus and the liquid supply apparatus in addition to a liquid supply system.

[0039] FIG. **12** is a perspective view of common mounting portions and first liquid storage bodies which are provided in the liquid ejecting apparatus of FIG. **11**.

[0040] FIG. **13** is a block diagram illustrating the electrical configuration of the liquid supply system.

DESCRIPTION OF EXEMPLARY EMBODIMENTS

[0041] Hereinafter, description will be given of the liquid supply system, the liquid supply apparatus, the liquid ejecting apparatus, and the liquid supply method, with reference to the drawings. An example of the liquid ejecting apparatus is an ink jet printer which performs recording (printing) by ejecting an ink, which is an example of the liquid, onto a medium such as paper.

First Embodiment

Overall Configuration

[0042] As illustrated in FIG. **1**A, a liquid ejecting apparatus **1** is provided with a main body portion **10** and a storage unit **20**. The main body portion **10** is provided with a liquid ejecting unit **11**, a medium supporting portion **12**, a medium transport mechanism (not shown), a head movement mechanism (not shown), and the like. The liquid ejecting unit **11** is capable of ejecting a liquid, and the medium supporting portion **12** is capable of supporting a medium P. The medium P is transported along the medium supporting portion **12** by the medium transport mechanism which is provided with a feed roller, a feed motor, and the like.

[0043] The liquid ejecting unit **11** is moved reciprocally by the head movement mechanism in a direction crossing the medium supporting portion **12**. The head movement mechanism is provided with a carriage, a carriage guide shaft, a carriage movement mechanism, a carriage motor, and the like. The liquid ejecting unit **11** is mounted on the carriage, the carriage guide extends in the direction which crosses the medium supporting portion **12**, and the carriage movement mechanism reciprocally moves the carriage along the carriage guide shaft. When the medium P passes the medium supporting portion **12**, the printing is performed due to the liquid ejecting unit **11** ejecting the liquid onto the medium P.

[0044] The main body portion **10** is provided with a mounting portion **13**. A relay apparatus **14** is mounted in the mounting portion **13** for each color of ink of cyan, magenta, yellow, and black. The liquid ejecting unit **11** and the relay apparatuses **14** are connected by flexible supply tubes **15**. Note that, the relay apparatuses **14**, the supply tubes **15**, and the storage unit **20** form the liquid supply apparatus.

[0045] The storage unit **20** houses the same number (four, in the present embodiment) of main tanks **21** as relay apparatuses **14**. The four main tanks **21** are supported by the support frame of the storage unit **20**. The main tank **21** is pressurized by pressurized air which is pumped in from a pressurization unit (not shown) which is provided in the main body portion **10**. The relay apparatuses **14** and the main tanks **21** are connected by flexible supply tubes **16**. Note that, the number of relay apparatuses **14** and main tanks **21** may be a number other than four, and the types of liquid which are stored may differ from the four colors of ink described above.

[0046] As illustrated in FIG. **1**B, the relay apparatus **14** is provided with a cartridge-shaped case **17** in addition to a filter **18** and a storage container **19** which are disposed on an inner portion of the case **17**. The storage container **19** is a flexible tube container, and, for example, a blown bottle which has been created using blow-forming and is made of a resin is used as the storage container **19**.

[0047] When the relay apparatus **14** is mounted in the mounting portion **13**, a supply needle is inserted into a connection port which is provided in the case **17**. Accordingly, the storage container **19** and the supply tube **15** are connected via the filter **18**, and the storage container **19** and the supply tube **16** are connected to each other. When the main tank **21** is pressurized, the liquid which is stored in the main tank **21** is supplied to the relay apparatus **14**, is stored temporarily, and is subsequently supplied from the relay apparatus **14** to the liquid ejecting unit **11**.

Main Tank

[0048] As illustrated in FIG. **3**, the main tank **21** illustrated in FIG. **2** is provided with a container storage portion **22**, and a tray **24**. The container storage portion **22** is a sealed container, and the liquid container **23** is placed on the tray **24**. The container storage portion **22** is provided with a circular cap body **30**, a blown tank **40**, and a mounting member **50**. The blown tank **40** has been created using blow-forming and is made of a resin. The mounting member **50** is disposed on a reverse side of the cap body **30** in the inner portion of the blown tank **40**.

[0049] In the description hereinafter, three directions which orthogonally intersect each other are defined as a container width direction X, a container front-rear direction Y, and a container vertical direction Z. One side and the other side in the container width direction X are respectively defined as the +X direction and the −X direction, one side and the other side in the container front-rear direction Y are respectively defined as the +Y direction and the −Y direction, and one side and the other side in the container vertical direction Z are respectively defined as the +Z direction and the −Z direction.

Opening and Closing Structure of Container Storage Portion

[0050] As illustrated in FIG. **2**, the blown tank **40** is a container which is a substantially rectangular prism shape which is long in the container front-rear direction Y and is made of a resin. A circular opening **41** (refer to FIG. **3**) is formed in the blown tank **40** and penetrates a container front surface portion **40***a* which is positioned on the end portion of the +Y direction side.

[0051] A cylindrical portion **42** which protrudes to the +Y direction side is formed at the opening edge of the circular opening **41**. The cap body **30** is mounted to the distal end of the cylindrical portion **42** and seals the circular opening **41** in an airtight state. The cap body **30** is provided with a cap main body portion **31**, which is substantially circular plate shaped, and a flange portion **31***a* overhangs the cap main body portion **31** from the outer circumferential end surface in a ring shape.

An O-ring **27** (refer to FIG. **3**) is disposed between the flange portion **31***a* and the distal end surface of the cylindrical portion **42**.

[0052] An outside ring **28** (refer to FIGS. **2** and **3**) is mounted to the outside of the cylindrical portion **42** and the cap body **30**. The outer circumferential surface of the cylindrical portion **42** and the inner circumferential surface of the outside ring **28** oppose each other in the radial direction, and while a male screw portion is formed on one, a female screw portion is formed on the other. The outside ring **28** is mounted so as to cause the screw portions to engage with each other. An annular portion **28***a* which overhangs to the inner circumferential side is formed on the end portion of the +Y direction side of the outside ring **28**. When the outside ring **28** is fastened, the annular portion **28***a* retains the flange portion **31***a* from the +Y direction side. Accordingly, the gap between the flange portion **31***a* and the cylindrical portion **42** is sealed by the O-ring **27**.

[0053] Meanwhile, a rear side opening (not shown) which is open to the −Y direction is formed on the end portion of the opposite side from the circular opening **41** in the blown tank **40**, and an opening and closing door **43** which opens and closes the rear side opening is attached. The opening and closing door **43** rocks around one end side in the container width direction X to open and close. The opening and closing door **43** is opened, and the liquid container **23** and the tray **24** are removed from and inserted into the blown tank **40** from the rear side opening. When the opening and closing door **43** is closed, the rear side opening is sealed in an airtight state.

Liquid Supply Portion

[0054] FIG. **6** is a diagram schematically illustrating the fixing structure between the cap body **30** and the mounting member **50** (a diagram as viewed from an arrow VI direction in FIG. **5**A), and illustrates a state in which the mounting member **50** and the cap body **30** are separated from each other in the container front-rear direction Y.

[0055] As illustrated in FIGS. **5**A to **5**C, the cap body **30** is mounted to the circular opening **41** of the blown tank **40** in a state of being capable of rotating around a center axis line of the cylindrical portion **42**. The liquid supply portion **32** is provided in the cap body **30** in a position which is slightly shifted from the center of rotation A (refer to FIG. **5**A).

[0056] The liquid supply portion **32** is provided with a connection port **32***a* and a protruding portion **32***b*. The opening of the connection port **32***a* is formed in the surface of the +Y direction side of the cap main body portion **31**, and the protruding portion **32***b* protrudes in the −Y direction from a position of the reverse side of the connection port **32***a* in the cap main body portion **31**. The supply tube **16** which forms a liquid flow path to the relay apparatus **14** is connected to the connection port **32***a*. A supply needle (not shown) is provided on the distal end of the protruding portion **32***b*, and a liquid flow path which communicates the connection port **32***a* with the supply needle is formed on the inner portion of the protruding portion **32***b*.

[0057] As illustrated in FIG. **4**, the mounting member **50** is provided with a mounting member main body portion **50**A and end plate portions **50**B and **50**C. The mounting member main body portion **50**A is a substantially rectangular shape which is long in the container width direction X, and each of the end plate portions **50**B and **50**C is provided on one of the end portions in the container width direction X of the mounting member main body portion **50**A. A penetrating portion **51** is formed in a region of the mounting member main body portion **50**A which overlaps the liquid supply portion **32** in the container front-rear direction Y. The penetrating portion **51** penetrates the mounting member main body portion **50**A in the container front-rear direction Y. The mounting member **50** and the cap body **30** are disposed to interpose the cylindrical portion **42** of the blown tank **40**, and are fixed by the fixing structure described hereinafter. At this time, the supply needle of the liquid supply portion **32** is facing the penetrating portion **51**, and is facing the liquid container **23** which is mounted to the rear surface side of the mounting member main body portion **50**A.

Fixing Structure of Cap Body and Mounting Member

[0058] As illustrated in FIGS. **5**A to **5**C, alignment protrusions **33** and **34** which protrude to the −Y direction side are provided in two symmetrical locations on the cap main body portion **31** to interpose the center of rotation A. The base end portion of the alignment protrusion **33** is a cylindrical large diameter portion **33***a*, and the distal end portion is a cylindrical small diameter portion **33***b* which has a smaller diameter than the large diameter portion **33***a*.

[0059] A tapered portion is formed on the distal end of the small diameter portion **33***b*. The closer to the distal end side, the smaller the diameter of the tapered portion becomes. The alignment protrusion **34** has the same shape as the alignment protrusion **33** and is provided with a large diameter portion **34***a* and a small diameter portion **34***b*.

[0060] Meanwhile, cylindrical protruding portions **52** and **53** (refer to FIGS. **4** and **6**) are formed in positions which overlap the alignment protrusions **33** and **34** in the mounting member main body portion **50**A in the container front-rear direction Y. The cylindrical protruding portions **52** and **53** protrude in the +Y direction from the mounting member main body portion **50**A. Alignment holes **52***a* and **53***a* are formed in the end surfaces of the +Y direction sides of the cylindrical protruding portions **52** and **53**. The alignment holes **52***a* and **53***a* are concave portions which do not penetrate the mounting member main body portion **50**A, and the depth thereof is deeper than the lengths of the small diameter portions **33***b* and **34***b*.

[0061] Boss portions **35** and **36** are formed on the cap main body portion **31** in positions separated from the center of rotation A, at two locations in different positions from the alignment protrusions **33** and **34** in the circumferential direction. The boss portions **35** and **36** are disposed at two symmetrical locations to interpose the center of rotation A, and protrude from the cap main body portion **31** in the −Y direction. Fixing through-holes **35***a* and **36***a* which penetrate the cap main body portion **31** and the boss portions **35** and **36** in the container front-rear direction Y are formed in the cap body **30**.

[0062] Meanwhile, boss portions **54** and **55** are formed in the mounting member main body portion **50**A in positions which overlap the fixing through-holes **35***a* and **36***a* in the container front-rear direction Y. Fixing holes **54***a* and **55***a* are formed in the end surfaces of the +Y direction side of the boss portions **54** and **55**. The fixing holes **54***a* and **55***a* are concave portions which do not penetrate the mounting member main body portion **50**A.

[0063] As described above, the cap body **30** and the mounting member **50** interpose the cylindrical portion **42** which is provided on the opening edge of the circular opening **41** of the

blown tank **40**, from both sides in the container front-rear direction Y, and are fixed to each other by screws.

[0064] As illustrated in FIG. **6**, when performing the fixing, first, the small diameter portions **33***b* and **34***b* of the alignment protrusions **33** and **34** which protrude from the cap body **30**, and the alignment holes **52***a* and **53***a* of the cylindrical protruding portions **52** and **53** which protrude from the mounting member **50** are caused to face each other in the container front-rear direction Y. The mounting member **50** and the cap body **30** are caused to approach each other in the container front-rear direction Y, the small diameter portion **33***b* is inserted into the alignment hole **52***a*, and the small diameter portion **34***b* is inserted into the alignment hole **53***a*. At this time, the insertion of the small diameter portions **33***b* and **34***b* is guided by the tapered portion of the distal ends. The mounting member **50** is aligned with the cap body **30** in the container front-rear direction Y due to the distal end surfaces of the boss portions **54** and **55** abutting the distal end surfaces of the boss portions **35** and **36**. At this time, the mounting member **50** and the cap body **30** are aligned in a relative rotation direction around the center of rotation A.

[0065] In this manner, when the mounting member **50** is aligned with the cap body **30**, the fixing through-holes **35***a* and **36***a* of the cap body **30** side overlap the fixing through-holes **54***a* and **55***a* of the mounting member main body portion **50**A side in the container front-rear direction Y. In this state, fixing screws **37** are attached to the fixing through-holes **35***a* and **36***a* from the outside of the tank (the +Y direction side), and the fixing screws **37** are fastened until the distal ends thereof are screwed into the fixing holes **54***a* and **55***a*. Accordingly, the mounting member **50** is fixed to the cap body **30** by screws.

Pressurizing Through-Hole

[0066] As illustrated in FIGS. **2** to **5**C, a pressurization tube connection portion **38** is formed in the cap body **30** to protrude in the +Y direction to the outside of the fixing through-hole **35***a* in the radial direction. A pressurizing through-hole **38***a* (refer to FIGS. **5**A to **5**C) is formed in the distal end of the pressurization tube connection portion **38**. The pressurizing through-hole **38***a* penetrates the pressurization tube connection portion **38** and the cap main body portion **31** in the container front-rear direction Y. The pressurization tube connection portion **38** is connected to the pressurization unit of the main body portion **10** by a pressurization tube.

[0067] When the circular opening **41** and the rear side opening are sealed, the inner portion of the container storage portion **22** becomes a sealed space. Pressurized air is pumped into the sealed space from the pressurizing through-hole **38***a*, and the container storage portion **22** is pressurized. As described above, since the fixing holes **54***a* and **55***a* and the alignment holes **52***a* and **53***a* which are used in fixing the cap body **30** to the mounting member **50** do not penetrate the mounting member **50**, the pressurizing through-hole **38***a* and the liquid supply portion **32** are the only two locations in the container storage portion **22** which form communication portions with the outside.

Terminal Disposition Portion

[0068] As illustrated in FIGS. **5**A to **5**C, a terminal disposition portion **39** is provided in the cap body **30** between the alignment protrusion **33** and the fixing through-hole **36***a*. The terminal disposition portion **39** protrudes in the −Y direction from the cap main body portion **31**. When the cap body **30** is fixed to the mounting member **50**, the terminal disposition portion **39** is disposed on the penetrating portion **51** of the mounting member main body portion **50**A and protrudes into the space in which the liquid container **23** is disposed. A penetrating portion **39***a* which penetrates the terminal disposition portion **39** in the container front-rear direction Y is formed therein.

[0069] The opening of one end of the penetrating portion **39***a* is formed in the distal end surface (the end surface of the −Y direction side) of the terminal disposition portion **39**, and the opening of the other end is formed in the surface of the +Y direction side of the cap main body portion **31**. The connector unit **60** (refer to FIGS. **2** and **4**) is mounted to the penetrating portion **39***a*. A substrate holding portion **82** (refer to FIGS. **3** and **4**) which is provided on the front end of the liquid container **23** is inserted into the penetrating portion **39***a* in the +Y direction. Note that, FIGS. **5**A to **5**C illustrate a state in which the connector unit **60** is not mounted to the terminal disposition portion **39** of the cap body **30**. Detailed description will be given of the connector unit **60** and the substrate holding portion **82** later.

Liquid Container

[0070] As illustrated in FIG. **7**, the liquid container **23** is provided with a liquid storage pouch **70**, and an adapter **80**. The liquid storage pouch **70** is long in the container front-rear direction Y, and the adapter **80** is attached to one end of the liquid storage pouch **70** in the longitudinal direction. The removal and the insertion of the liquid container **23** from and to the container storage portion **22** is performed in a state in which the liquid container **23** is placed on the tray **24**.

Liquid Storage Pouch

[0071] As illustrated in FIG. **7**, the liquid storage pouch **70** is flexible and a liquid is sealed in the inner portion thereof. The planar shape of the liquid storage pouch **70** is substantially rectangular, and is of a size which fits on the tray **24**. A communication portion **71** which communicates the inside of the liquid storage pouch **70** with the outside thereof is formed on the end portion of the +Y direction side of the liquid storage pouch **70**. The liquid storage pouch **70** maintains a sealed state except for the communication portion **71**. The communication portion **71** is formed by attaching a pipe-shaped part to the edge of the flexible pouch body.

[0072] A gusset portion **72** is formed on each of the side surfaces of the +X direction side and the −X direction side of the liquid storage pouch **70**. When the amount of the liquid with which the liquid storage pouch **70** is filled is great, the gusset portion **72** stretches in the container vertical direction Z, and the volume of the liquid storage pouch **70** is great. When the liquid is pumped out from the liquid storage pouch **70** and the amount of liquid is reduced, the gusset portion **72** folds up, the liquid storage pouch **70** becomes thinner, and the capacity is reduced.

Adapter

[0073] As illustrated in FIG. **7**, in a state in which the liquid container **23** is placed on the tray **24** with the adapter **80** leading, the liquid container **23** is inserted into the container storage portion **22** from the rear side opening thereof in the mounting direction B (in the present embodiment, the +Y direction). The adapter **80** is provided with a front plate por-

tion **80**A, end plate portions **80**B and **80**C, and an attachment portion **80**D. The front plate portion **80**A is long in the container width direction X, each of the end plate portions **80**B and **80**C is provided on one of the sides in the container width direction X of the front plate portion **80**A, and the attachment portion **80**D is provided on the rear surface side (the −Y direction side) of the front plate portion **80**A. The attachment portion **80**D is fixed to interpose the edge of the +Y direction side of the liquid storage pouch **70**. The end plate portions **80**B and **80**C extend in the −Y direction from the both ends of the front plate portion **80**A.

Ink Outlet Portion

[0074] As illustrated in FIGS. **7** to **8**B, the front plate portion **80**A is provided with a substantially rectangular adapter front end surface which faces the +Y direction. A protruding portion **81***a* which protrudes in the +Y direction is formed in the center of the front plate portion **80**A in the container width direction X. On the reverse side (the −Y direction side) of the protruding portion **81***a*, a ridge portion **81***b* which is formed on the top surface (the +Z direction surface) of the attachment portion **80**D extends in the container front-rear direction Y.

[0075] The adapter **80** is provided with a liquid flow path which penetrates the protruding portion **81***a* and the ridge portion **81***b* in the container front-rear direction Y, and the opening of one end of the liquid flow path is formed in the distal end surface of the protruding portion **81***a*. The other end of the liquid flow path is connected to the communication portion **71** of the liquid storage pouch **70**. A liquid outlet portion **81** (the liquid outlet portion) which allows the liquid to flow out from the liquid storage pouch **70** is formed of the protruding portion **81***a*, the ridge portion **81***b*, and the communication portion **71**.

[0076] The liquid outlet portion **81** is connected to the liquid supply portion **32** of the cap body **30** when the liquid container **23** is mounted to the container storage portion **22**. Therefore, the liquid which is pumped from the liquid outlet portion **81** is supplied to the relay apparatus **14** via the liquid supply portion **32** and the supply tube **16**. At this time, when the container storage portion **22** is pressurized, the liquid storage pouch **70** is crushed by the air pressure, and the pumping out of the liquid in the inner portion thereof is promoted.

Engagement Structure of Liquid Container and Tray

[0077] As illustrated in FIGS. **7** to **8**B, tray **24** on which the liquid container **23** is mounted is provided with a rectangular bottom plate portion **24***a* and a side wall portion **24***b*. The bottom plate portion **24***a* is long in the container front-rear direction Y, and the side wall portion **24***b* protrudes in the +Z direction along the edges of the three directions of the +X direction side, the −Y direction side, and the −X direction side of the bottom plate portion **24***a*. In the tray **24**, a first engagement portion **25** and a second engagement portion **26** are provided on the edge of the +Y direction side of the bottom plate portion **24***a*. The first engagement portion **25** and the second engagement portion **26** are protruding portions which protrude from the bottom plate portion **24***a* in the +Z direction, and are disposed to be separated from each other in the container width direction X.

[0078] The liquid container **23** is disposed on the edge of the +Y direction side of the tray **24** such that the adapter **80** sits on the tray **24**. As illustrated in FIGS. **8**A and **8**B, when the front plate portion **80**A of the adapter **80** is disposed on the front end of the tray **24**, a first engagement target portion **84** is formed in a position which overlaps the first engagement portion **25** in the container vertical direction Z, and a second engagement target portion **85** is formed in a position which overlaps the second engagement portion **26** in the container vertical direction Z. The first engagement target portion **84** and the second engagement target portion **85** are both concave portions which are open in the −Z direction.

[0079] When the liquid container **23** is placed on the tray **24**, the first engagement portion **25** engages with the first engagement target portion **84** in the container vertical direction Z, and the second engagement portion **26** engages with the second engagement target portion **85** in the container vertical direction Z. Accordingly, the liquid container **23** is aligned with the tray **24** in the container width direction X and the container front-rear direction Y.

Connection Between Circuit Board and Connection Terminal

[0080] As illustrated in FIG. **7**, the substrate holding portion **82** (the protrusion) which protrudes in the +Y direction is formed on the −X direction side of the protruding portion **81***a* in the front plate portion **80**A. The substrate holding portion **82** is provided with a substantially cylindrical base end portion **82***a*, and a substrate attachment portion **82***b* which protrudes further in the +Y direction from the distal end surface of the base end portion **82***a*. An inclined surface **82***c* is formed on the distal end of the substrate attachment portion **82***b*. The inclined surface **82***c* is a surface which is obtained by inclining the XZ plane in an inclination direction which moves in the +Y direction approaching the −Z direction.

[0081] The O-ring (not shown) is mounted to the outer circumference of the foot of the base end portion **82***a*. When the liquid container **23** is mounted to the container storage portion **22**, the substrate holding portion **82** is inserted into the penetrating portion **39***a* (refer to FIG. **5**A) of the terminal disposition portion **39** which is protruding to the reverse side of the cap body **30**. The substrate holding portion **82** faces the connector unit **60** (refer to FIGS. **4** and **9**A to **9**C), which is mounted in the penetrating portion **39***a* from the +Y direction, in the container front-rear direction Y.

[0082] As illustrated in FIGS. **9**A to **9**C, the substrate holding portion **82** is formed to mount a separate part to the mounting through-hole which is formed in the front plate portion **80**A of the adapter **80**. Note that, the substrate holding portion **82** may be formed integrally with the front plate portion **80**A. The circuit board **83** is attached to the inclined surface **82***c* of the substrate holding portion **82**. The circuit board **83** is a circuit board in which memory elements, which store the amount of the liquid which is inside the liquid container **23** and the like, are provided.

[0083] An inclined surface **61** which faces the inclined surface **82***c* of the substrate holding portion **82** is provided on the connector unit **60**. The inclined surface **61** is a surface which is parallel with the inclined surface **82***c*, and is disposed inside the penetrating portion **39***a* when the connector unit **60** is mounted to the terminal disposition portion **39** of the cap body **30**. A connection terminal **62** is disposed on the inclined surface **61**. A wiring **63** which is conductively connected to the connection terminal **62** is routed to the rear surface side of the inclined surface **61**. The wiring **63** is routed from the connector unit **60** to the front surface side of the cap body **30**, and is routed to the main body portion **10** side together with the supply tube **16** for supplying the liquid.

[0084] When the liquid container **23** is mounted to the container storage portion **22**, the substrate holding portion **82** is inserted into the penetrating portion **39***a* of the cap body **30** as the liquid container **23** moves in the mounting direction B. As illustrated in FIGS. **9**A to **9**C, when the mounting of the liquid container **23** to the container storage portion **22** is complete, a state is assumed in which the terminal portion on the circuit board **83** which is disposed on the inclined surface **82***c* of the adapter **80** side is in contact with the connection terminal **62** which is disposed on the inclined surface **61** of the connector unit **60** side. Accordingly, the connection between the circuit board **83** and the connection terminal **62** is formed.

Alignment of Liquid Container and Shock Absorption Using Damper

[0085] As illustrated in FIGS. **8**A and **8**B, a first guide through-hole **86** and a second guide through-hole **87** (liquid container side alignment portions) which are open to the +Y direction are formed in the front plate portion **80**A of the adapter **80**. The first guide through-hole **86** and the second guide through-hole **87** are disposed to mirror each other in the container width direction X, using the YZ plane (the YZ plane containing the C-C line in FIG. **8**B) as a reference. The YZ plane passes through the center of the distal end of the protruding portion **81***a* of the liquid outlet portion **81**.

[0086] The first guide through-hole **86** is disposed on the +X direction side in relation to the protruding portion **81***a*, and the second guide through-hole **87** is disposed on the −X direction side in relation to the protruding portion **81***a*. The first guide through-hole **86** and the second guide through-hole **87** penetrate the front plate portion **80**A in the container front-rear direction Y. The first guide through-hole **86** is a long hole which is narrow and long in the container width direction X. Meanwhile, the second guide through-hole **87** is a circular through-hole.

[0087] A first concave portion **88** and a second concave portion **89** are formed in the front plate portion **80**A of the adapter **80**. The first concave portion is formed further to the +X direction side than the first guide through-hole **86**, and the second concave portion **89** is formed further to the −X direction side than the second guide through-hole **87**. The first concave portion **88** and the second concave portion **89** are concave portions which are concave in the −Y direction.

[0088] The first concave portion **88** and the second concave portion **89** are disposed to mirror each other in the container width direction X, using the C-C line as a reference, and are disposed at equal distances from the protruding portion **81***a* of the liquid outlet portion **81**. The first concave portion **88**, the first guide through-hole **86**, the second guide through-hole **87**, and the second concave portion **89** are disposed on a straight line which is parallel to the container width direction X in the front end surface of the adapter. The liquid outlet portion **81** is disposed closer to the container top side (the +Z direction side) than the positions in which the abovementioned components are arranged. The center of a bottom surface **88***a* of the first concave portion **88** and the straight line D which passes through the center of the bottom surface **89***a* of the second concave portion **89** overlap the first and second engagement target portions **84** and **85** which are the parts which engage with the tray **24** in the adapter **80** (refer to FIGS. **8**A and **8**B).

[0089] Meanwhile, as illustrated in FIG. **3**, the mounting member **50** is provided with two guide pins **56** and **57** (mounting member side engagement portions) which protrude from the mounting member main body portion **50**A in the −Y direction. The guide pin **56** is disposed on the +X direction side in relation to the penetrating portion **51**, and the guide pin **57** is disposed on the −X direction side in relation to the penetrating portion **51**. Dampers **58** and **59** (buffering portions) are disposed on the outside of the container width direction X in relation to the guide pins **56** and **57**.

[0090] The damper **58** is disposed on the +X direction side in relation to the guide pin **56**, and the damper **59** is disposed on the −X direction side in relation to the guide pin **57**. The distal end portions of the dampers **58** and **59** protrude from the mounting member main body portion **50**A in the −Y direction. The damper **58**, the guide pin **56**, the guide pin **57**, and the damper **59** are disposed on a straight line which is parallel to the container width direction X.

[0091] The liquid container **23** is inserted into the container storage portion **22** by causing the adapter **80**, which is disposed to lead the liquid container **23**, to face the mounting member **50** in the container front-rear direction Y. At this time, the guide pin **56** of the mounting member **50** faces the first guide through-hole **86** of the adapter **80**, and the guide pin **57** of the mounting member **50** faces the second guide through-hole **87**.

[0092] The damper **58** of the mounting member **50** faces the first concave portion **88** of the adapter **80**, and the damper **59** of the mounting member **50** faces the second concave portion **89** of the adapter **80**. When the liquid container **23** is moved in the mounting direction B, the adapter **80** which is disposed to lead the liquid container **23** approaches the mounting member **50**. At this time, at first, the insertion of the dampers **58** and **59** to the first and second concave portions **88** and **89** is started. Subsequently, the insertion of the guide pins **56** and **57** to the first and second guide through-holes **86** and **87** is started before the distal ends of the dampers **58** and **59** make contact with the bottom surfaces **88***a* and **89***a* of the first and second concave portions **88** and **89**.

[0093] The guide pins **56** and **57** are inserted into the first and second guide through-holes **86** and **87** while being guided by the tapered portions which are formed on the distal ends of the guide pins **56** and **57**. The guide pins **56** and **57** are shaped as cylinders with fixed diameters except for the tapered portions. When the cylindrical portions of the guide pins **56** and **57** are inserted into the first and second guide through-holes **86** and **87**, the adapter **80** is aligned on the XZ plane in relation to the mounting member **50**. At this time, since the second guide through-hole **87** is circular, the second guide through-hole **87** serves as a reference for the alignment.

[0094] Meanwhile, since the other first guide through-hole **86** is a long through-hole, the first guide through-hole **86** serves to prevent the rotation of the adapter **80** in relation to the mounting member **50**. After the alignment on the XZ plane using the guide pins **56** and **57** and the first and second guide through-holes **86** and **87** is completed, the distal ends of the dampers **58** and **59** abut the bottom surfaces **88***a* and **89***a* (abutting portions: refer to FIGS. **8**A, **8**B, and **10**) of the first and second concave portions **88** and **89**.

[0095] The dampers **58** and **59** are air dampers which are capable of expanding and contracting in the container front-rear direction Y. The detailed configuration of the dampers **58** and **59** will be described later. The dampers **58** and **59** abut the bottom surfaces **88***a* and **89***a* of the first and second concave portions **88** and **89**, and subsequently, are compressively pressed in the +Y direction with the further movement of the liquid container **23** in the mounting direction B.

[0096] At this time, the dampers **58** and **59** generate a buffering force which counters the inertial force of the liquid container **23** which moves in the mounting direction B. Accordingly, after the dampers **58** and **59** abut the bottom surfaces **88***a* and **89***a* of the first and second concave portions **88** and **89**, the impact force which acts on the colliding parts of the container storage portion **22** and the liquid container **23** is reduced by the buffering action of the abutting.

[0097] As described above, the liquid container **23** is provided with the liquid outlet portion **81** which protrudes from the adapter **80** in the +Y direction. Meanwhile, the container storage portion **22** is provided with the liquid supply portion **32** which protrudes from the penetrating portion **51** of the mounting member **50** to the liquid container **23** side. When the positioning of the adapter **80** on the XZ plane in relation to the mounting member **50** is performed by the guide pins **56** and **57**, the liquid outlet portion **81** of the liquid container **23** faces the liquid supply portion **32** of the container storage portion **22**.

[0098] The liquid outlet portion **81** is connected to the liquid supply portion **32** after a state is assumed in which the compression of the dampers **58** and **59** is started and the buffering action occurs. A seal member (not shown) is provided on the distal end portion of the liquid outlet portion **81**. The seal member is biased in the +Y direction by a spring seat. When the liquid outlet portion **81** is not connected to the liquid supply portion **32**, the seal member seals the liquid outlet portion **81** and stops the liquid from flowing out.

[0099] When the liquid outlet portion **81** is connected to the liquid supply portion **32**, the seal member is compressed to move in the −Y direction by the supply needle, and, as a result, the flow path within the liquid outlet portion **81** and the flow path within the liquid supply portion **32** are communicated.

[0100] After the liquid supply portion **32** is connected to the liquid outlet portion **81**, the liquid container **23** is moved further in the mounting direction B (the +Y direction). At this stage, the connection between the connection terminal **62** and the circuit board **83** is performed. The connection terminal **62** is held in the cap body **30** of the container storage portion **22**, and the circuit board **83** is held in the adapter **80** of the liquid container **23**. In other words, when the liquid supply portion **32** is connected to the liquid outlet portion **81**, the substrate holding portion **82** which holds the circuit board **83** is already inserted into the distal end side of the penetrating portion **39***a* to which the connector unit **60** is attached.

[0101] If the liquid container **23** is moved further in the mounting direction B from this state, first, the O-ring (not shown) which is mounted in the base end portion **82***a* of the substrate holding portion **82** is crushed by the distal end surface of the terminal disposition portion **39**. Accordingly, the penetrating portion **39***a* stops communicating with the pressurized space inside the container storage portion **22**, and it is possible to perform the connection of the circuit board **83** to the connection terminal **62** outside of the pressurized space.

[0102] Subsequently, inside the penetrating portion **39***a*, the connection terminal **62** which is attached to the inclined surface **61** of the connector unit **60** makes contact with the circuit board **83** which is attached to the inclined surface **82***c* of the substrate attachment portion **82***b*. The circuit board **83** and the connection terminal **62** make sliding contact along the inclination direction of the inclined surfaces **61** and **82***c* when the contact is made.

[0103] As described above, the liquid container **23** is mounted to the container storage portion **22** by undergoing the five steps (1) to (5) described below.

[0104] (1) Align the tray **24** and the liquid container **23** using two engagement portions.

[0105] (2) Align the mounting member **50** and the liquid container **23** using the two guide pins **56** and **57**.

[0106] (3) A buffering action is generated by the dampers **58** and **59**.

[0107] (4) The liquid supply portion **32** is connected to the liquid outlet portion **81**.

[0108] (5) The connection terminal **62** of the container storage portion **22** side makes contact with the circuit board **83** of the liquid container **23** side.

Release-Stop Structure of Liquid Container

[0109] When the liquid container **23** is mounted to the container storage portion **22**, the end plate portion **80**B of the adapter **80** is positioned on the inside of the container width direction X of the end plate portion **50**B of the mounting member **50**, and the end plate portion **80**C is positioned on the inside of the container width direction X of the end plate portion **50**C of the mounting member **50**. A plate spring **90** is attached to the inside surface in the container width direction X of each of the end plate portions **50**B and **50**C.

[0110] Meanwhile, a locking portion **91** is formed on each of the end plate portions **80**B and **80**C. The locking portions **91** are protrusions which protrude from the outside surfaces of the end plate portions **80**B and **80**C in the container width direction X. When the liquid container **23** moves in the mounting direction B within the container storage portion **22**, the plate springs **90** and the locking portions **91** engage at the two locations between the end plate portion **50**B and the end plate portion **80**B, and between the end plate portion **50**C and the end plate portion **80**C.

[0111] When the five steps described above, (1) to (5), are completed, the engagement between the plate springs **90** and the locking portions **91** at both end portions of the liquid container **23** in the container width direction X is also completed. The locations at which the plate springs **90** are engaged with the locking portions **91** will not be disengaged by a degree of force exerted by weak vibrations. Accordingly, the plate springs **90** and the locking portions **91** function as release-stops for the liquid container **23** during vibration. Meanwhile, the engagement locations will be easily disengaged by a degree of force exerted by a user pulling the liquid container **23**. Accordingly, it is easy to exchange the liquid containers **23**.

Damper

[0112] As illustrated in FIG. **10**, the dampers **58** and **59** are air dampers in which a buffering force is generated by compressing air. The dampers **58** and **59** have the same configuration. A protruding portion **100** which protrudes in the −Y direction is formed in each formation position of the dampers **58** and **59** in the mounting member main body portion **50**A.

[0113] Each of the dampers **58** and **59** is provided with a concave portion **101**, a linear piston **102** (a movement unit), and a coil spring **103** (a biasing portion). The concave portion **101** is formed in the distal end surface of the protruding portion **100**, one end of the piston **102** is inserted into a space (a concave portion space **101***a*) inside the concave portion **101**, and the coil spring **103** is disposed in the concave portion

space **101***a*. The concave portion **101** is concave in a linear shape in the +Y direction. An end portion **102***a* of the +Y direction side of the piston **102** is inserted into the concave portion space **101***a*. The end portion **102***a* makes contact with the inner circumferential surface of the concave portion **101** from the inside, and locks the concave portion space **101***a* in an airtight state.

[0114] The piston **102** is capable of reciprocal movement in a compression direction E in which the air of the concave portion space **101***a* is compressed, and in the reverse direction. The dampers **58** and **59** are formed such that the compression direction E and the mounting direction B of the liquid container **23** match. In the present embodiment, the compression direction E and the mounting direction B are both the +Y direction. The coil spring **103** is of a free length in the state in which the coil spring **103** is not being compressed by the piston **102**.

[0115] An end portion **102***b* of the other side of the piston **102** faces the bottom surface **88***a* (**89***a*) of the first concave portion **88** (the second concave portion **89**) of the adapter **80**. When the liquid container **23** moves in the mounting direction B (the +Y direction), the piston **102** abuts the bottom surface **88***a* (**89***a*), and the liquid container **23** is pressed to move in the compression direction E (the +Y direction or the mounting direction B) by the bottom surface **88***a* (**89***a*).

[0116] At this time, since the length of the damper **58** (**59**) is compressed, and the air which is sealed in the concave portion **101** is compressed, a restorative force which acts to restore the piston **102** acts in the opposite direction from the compression direction E. At this time, since the coil spring **103** is compressed, the piston **102** is biased in the opposite direction (the −Y direction) to the compression direction E by the coil spring **103**.

[0117] The restorative force and the biasing force act on the liquid container **23** in the opposite direction to the mounting direction B, and increases as the piston **102** moves in the +Y direction. When the liquid container **23** is pressed by the damper **58** (**59**), a buffering action is caused by the restorative force and the biasing force, and the shock which occurs when the liquid container **23** collides with the container storage portion **22** is reduced.

[0118] Accordingly, the shock which is applied to the locations (in particular, the liquid supply portion **32** and the liquid outlet portion **81**) which make contact when the liquid container **23** is mounted to the container storage portion **22**. Note that, a configuration may be adopted in which a minute communication portion which communicates with the outside of the mounting member main body portion **50**A is provided in one of the surfaces or the opening side of the concave portion space **101***a*, and the compressed air slowly escapes. Accordingly, the behavior during insertion is softened, and the shock when the collision occurs is reduced. Since the compressed air of the concave portion space **101***a* escapes and the restorative force is weakened, it is possible to render the engagement between the plate springs **90** and the locking portions **91** more difficult to disengage.

[0119] Next, description will be given of the actions of the liquid ejecting apparatus **1**, which is configured as described above.

[0120] The liquid ejecting apparatus **1** is provided with the main tank **21** which stores the liquid which is supplied to the liquid ejecting unit **11**, and the liquid container **23** can be attached to and detached from the container storage portion **22** of the main tanks **21**. The container storage portion **22** is provided with the liquid supply portion **32** which supplies the liquid to the liquid ejecting unit **11** side, and the dampers **58** and **59**. In each of the dampers **58** and **59**, the piston **102** is disposed so as to seal one end of the concave portion space **101***a* which is concave in the mounting direction B of the liquid container **23**. Each of the dampers **58** and **59** is an air-damper which compresses the air of the concave portion space **101***a* and generates a buffering action by causing the piston **102** to move in the mounting direction B.

[0121] Meanwhile, the liquid container **23** is provided with the adapter **80** which is disposed on the side portion of the side of the direction of mounting to the container storage portion **22** (the mounting direction B side), and the liquid storage pouch **70** is aligned using the adapter **80**. The liquid outlet portion **81** which is connected to the liquid supply portion **32** is formed on the adapter **80**, and in addition, the first concave portion **88** and the second concave portion **89** which are concave in the opposite direction to the mounting direction B are formed on each side of the liquid outlet portion **81**. The bottom surface **88***a* of the first concave portion **88** and the bottom surface **89***a* of the second concave portion **89** respectively face the dampers **58** and **59** in the mounting direction B. Therefore, when the liquid container **23** moves in the mounting direction B, the liquid container **23** abuts the pistons **102** of the dampers **58** and **59**, causes the pistons **102** to move in the mounting direction B, and compresses the air of the concave portion spaces **101***a*.

[0122] In this manner, by disposing the dampers **58** and **59**, in which the direction in which the buffering action is generated (the compression direction E) matches the mounting direction B of the liquid container **23**, between the liquid container **23** and the container storage portion **22**, it is possible to reduce the shock that arises when the liquid container **23** collides with the container storage portion **22** due to the buffering action of the dampers **58** and **59** when the liquid container **23** is mounted to the container storage portion **22**.

[0123] It is possible to increase the length of the expansion and contraction stroke (the movement strokes of the pistons **102**) of the dampers **58** and **59** by the depth of the concave portions due to the abutting portions with which the dampers **58** and **59** abut (the first concave portion **88** and the second concave portion **89**) being concave portions. Therefore, it is possible to increase the buffering action, and it is possible to further reduce the shock which is applied to the liquid container **23** during mounting.

[0124] In the present embodiment, since the buffering action of the dampers **58** and **59** is generated before the liquid outlet portion **81** is connected to the liquid supply portion **32**, the shock that is sustained by the liquid outlet portion **81** and the liquid supply portion **32** is reduced. The dampers **58** and **59** are disposed at equal distance from each other to interpose the liquid outlet portion **81**. Therefore, the buffering action is generated in mirrored positions in relation to the liquid outlet portion **81** and liquid supply portion **32**, and the liquid container **23** does not incline easily in relation to the container storage portion **22**. Accordingly, it is possible to suppress the misalignment of the liquid outlet portion **81** and the liquid supply portion **32**.

[0125] In the present embodiment, the liquid container **23** is placed on the tray **24** and is removed from and inserted into the container storage portion **22**. In the front ends in the mounting direction B of the liquid container **23** and the tray **24**, the first engagement portion **25** and the second engagement portion **26** which are provided in the tray **24** engage with

the first engagement target portion **84** and the second engagement target portion **85** which are provided in the adapter **80** of the liquid container **23** in a direction (the container vertical direction Z) which orthogonally intersects the mounting direction B.

[0126] The two engagement portions engage at positions which overlap the straight line D which joins the centers of the dampers **58** and **59** when viewed from the mounting direction B (the +Y direction). Due to this disposition, when a repulsive force acts from the dampers **58** and **59** during the mounting of the liquid container **23**, it is possible to suppress the misalignment of the liquid container **23** in an anti-mounting direction (the −Y direction) in relation to the tray **24** due to the repulsive force. Therefore, it is possible to suppress the assumption of a state in which the liquid outlet portion **81** and the liquid supply portion **32** are poorly connected to each other.

[0127] Note that, in the present embodiment, two sets of the air damper (the dampers **58** and **59**) and the abutting portion (the bottom surface **88***a* of the first concave portion **88** and the bottom surface **89***a* of the second concave portion **89**) are provided; however, three or more sets may be provided. Even when three or more sets are provided, it is preferable to dispose the sets divided over both sides of the liquid outlet portion **81**. It is preferable to dispose the sets to be mirrored in the container width direction X, using the liquid outlet portion **81** as a reference.

Second Embodiment

[0128] Next, description will be given of the second embodiment of the liquid ejecting apparatus and the liquid supply apparatus, and the liquid supply system and the liquid supply method which supply the liquid to the same liquid ejecting apparatus, with reference to the drawings.

[0129] Hereinafter, in the description of the second embodiment, description of components which have the same reference numerals as those in the first embodiment will be omitted, and description will be given mainly of the points which differ from the first embodiment.

[0130] As illustrated in FIG. **11**, the liquid is supplied to a liquid ejecting apparatus **110** of the present embodiment by a liquid supply system **111**. The liquid supply system **111** is formed of a liquid supply apparatus **112** to which the liquid container **23** is mounted.

[0131] The liquid supply apparatus **112** is provided with a liquid storage body holding apparatus **113**, a substitute mounting body **114**, a relay flow path **115**, and a pump mechanism **116**. The relay flow path **115** communicates the liquid container **23** which is capable of storing the liquid with the substitute mounting body **114**, and the pump mechanism **116** is for pumping the liquid which is stored in the liquid container **23** to the liquid ejecting apparatus **110**.

[0132] The liquid storage body holding apparatus **113** is provided with the container storage portion **22** and the tray **24**. The container storage portion **22** serves as the second liquid storage body mounting portion to and from which the liquid container **23** which serves as the second liquid storage body can be attached and detached, and the liquid container **23** is placed on the tray **24**.

[0133] The substitute mounting body **114** is provided with a filter chamber **121**, the storage container **19**, a first supply path **122**, a second supply path **123**, and a third supply path **124**. The filter chamber **121** houses the filter **18**, the downstream end of the first supply path **122** is inserted into the storage container **19**, the downstream end of the second supply path **123** is inserted into the storage container **19** and the downstream end of the second supply path **123** communicates with the filter chamber **121**, and the downstream end of the third supply path **124** communicates with the filter chamber **121**.

[0134] The pump mechanism **116** is provided with a pressurization supply unit **131**, a pressurization tube **132**, an open-close valve **133**, a control unit **134**, and a remaining amount detection unit **137**. The pressurization supply unit **131** pumps pressurized air, the pressurization tube **132** is for introducing the pressurized air which is pumped from the pressurization supply unit **131** into the container storage portion **22**, the open-close valve **133** is capable of blocking the relay flow path **115**, and the control unit **134** controls the pressurization supply unit **131** and the open-close valve **133**. The pressurization supply unit **131** supplies the liquid which is stored in the liquid container **23** to the substitute mounting body **114** under pressure by pumping the pressurized air into the container storage portion **22** through the pressurization tube **132**.

[0135] The remaining amount detection unit **137** is a sensor which detects that the remaining amount of the liquid which is stored in the liquid container **23** is less than a predetermined value. For example, the remaining amount detection unit **137** is provided with an elastic body capable of elastically deforming which is disposed in the relay flow path **115**, and a lever, the position of which changes with the deformation of the elastic body. The remaining amount detection unit **137** detects a change in the lever position which is caused by the elastic body, which had been compressively deformed by the pressure of the liquid in the relay flow path **115**, deforming restoratively with the reduction in the pressure of the liquid.

[0136] Therefore, when the liquid which is stored in the liquid container **23** is depleted and the liquid does not flow out to the relay flow path **115** even using the pressurization, since the pressure in the relay flow path **115** is reduced and the position of the lever changes, it is possible to detect that the remaining amount of the liquid is less than the predetermined value. When the amount of the liquid which is stored in the liquid container **23** is greater than or equal to the predetermined value, it is possible to confirm whether the liquid in the liquid container **23** is in a sufficiently pressurized state by detecting the change in the lever position due to the pressurization using the remaining amount detection unit **137**.

[0137] A first connection portion **135** which has a connection needle **136** is provided on the downstream end of the relay flow path **115**. A second connection portion **125** is provided on the upstream end of the first supply path **122** of the substitute mounting body **114** and is capable of connecting to and detaching from the connection needle **136** of the first connection portion **135**.

[0138] The pump mechanism **116** is provided with a mounting detection unit **117** which is capable of detecting whether or not the liquid container **23** is mounted to the container storage portion **22**. In the present embodiment, the mounting detection unit **117** detects that the liquid container **23** is mounted to the container storage portion **22** due to the connection terminal **62** (refer to FIG. **9**B) which is provided in the container storage portion **22** being electrically connected to the terminal portion of the circuit board **83** (refer to FIG. **9**B) which is provided in the liquid container **23**.

[0139] The liquid ejecting apparatus **110** of the present embodiment is provided with a common mounting portion **141** and a mounting target detection unit **142**. A first liquid

storage body **95** (refer to FIG. **12**) which is capable of storing the liquid and the substitute mounting body **114** can be exchangeably mounted to the common mounting portion **141**, and the mounting target detection unit **142** is capable of detecting whether or not the first liquid storage body **95** and the substitute mounting body **114** are mounted to the common mounting portion **141**. The first liquid storage body **95** is, for example, an ink cartridge which stores an ink.

[0140] The liquid ejecting apparatus **110** is provided with a main control unit **143**, an operation unit **156**, and a display unit **157**. The main control unit **143** performs the control of the liquid ejecting unit **11** and the like, the operation unit **156** is for inputting instructions to the main control unit **143** or the like, and the display unit **157** displays the control status or the like according to the main control unit **143**.

[0141] In the present embodiment, a circuit board **126** which has a terminal portion on the distal end portion is attached to the substitute mounting body **114** in the insertion direction C (the direction illustrated by the white-filled arrow in FIG. **11**) in relation to the common mounting portion **141**. A connection terminal **155** which is capable of electrically connecting to the terminal portion of the circuit board **83** is provided on the inner side of the common mounting portion **141**. The mounting target detection unit **142** detects that the substitute mounting body **114** is mounted to the common mounting portion **141** due to the terminal portion of the circuit board **126** which is attached to the substitute mounting body **114** electrically connecting to the connection terminal **155** with the insertion of the substitute mounting body **114** into the common mounting portion **141**.

[0142] As illustrated in FIG. **12**, a circuit board **97** is attached to the first liquid storage body **95**. The circuit board **97** has a terminal portion on the distal end portion thereof in the insertion direction C in relation to the common mounting portion **141**. The mounting target detection unit **142** detects that the first liquid storage body **95** is mounted to the common mounting portion **141** due to the terminal portion of the circuit board **97** which is attached to the first liquid storage body **95** electrically connecting to the connection terminal **155** with the insertion of the first liquid storage body **95** into the common mounting portion **141**.

[0143] As illustrated in FIG. **11**, the common mounting portion **141** is provided with an attachment portion **144** and an attachment detection unit **145**. The first connection portion **135** is attached to the attachment portion **144** in a removable state, and the attachment detection unit **145** is capable of detecting whether or not the first connection portion **135** is in a state of being attached to the attachment portion **144**. When the first connection portion **135** is appropriately attached to the attachment portion **144**, the connection needle **136** protrudes from the common mounting portion **141** in the opposite direction from the insertion direction C.

[0144] Note that, in the substitute mounting body **114**, when a configuration is adopted in which the portion at which the second connection portion **125** is provided protrudes further than the outer shape of the first liquid storage body **95**, even if the state in which the first connection portion **135** is attached to the attachment portion **144** is maintained, it is possible to mount the first liquid storage body **95** to the common mounting portion **141**.

[0145] In the state in which the first connection portion **135** is attached to the attachment portion **144**, the substitute mounting body **114** is connected to the relay flow path **115** in the process of the substitute mounting body **114** being mounted to the mounting portion **13** by the first connection portion **135** being connected to the second connection portion **125**.

[0146] The common mounting portion **141** is provided with a restriction portion **146** which is capable of restricting the detachment of the substitute mounting body **114** and the first liquid storage body **95** which are mounted to the common mounting portion **141**. The restriction portion **146** is capable of moving between a restriction position illustrated by the solid line in FIG. **11**, and a restriction released position illustrated by the double-dot-dash line in FIG. **11**. The restriction position is a position which restricts the detachment (the pulling out) of the first liquid storage body **95** and the substitute mounting body **114** which are mounted to the common mounting portion **141**, and the restriction released position is a position which allows the attachment and detachment of the first liquid storage body **95** and the substitute mounting body **114** which are mounted in the common mounting portion **141**. The common mounting portion **141** is provided with a restriction detection unit **147** which is capable of detection whether or not the restriction portion **146** is in the restriction position.

[0147] As illustrated in FIG. **12**, it is possible to use a locking lever for the restriction portion **146**, for example, and in this case, it is preferable to provide the first liquid storage body **95** and the substitute mounting body **114** with an engagement concave portion **96** capable of inserting or extracting the restriction portion **146** which is a locking lever in the proximity of the opening portion of the common mounting portion **141** in a state of being mounted to the common mounting portion **141**. It is preferable for the liquid ejecting apparatus **110** to be provided with a plurality (in the present embodiment, four) of the common mounting portions **141**.

[0148] As illustrated in FIG. **11**, the liquid ejecting apparatus **110** of the present embodiment is provided with a supply flow path **149**, a pressurization unit **151**, and a pressure adjustment mechanism **152**. A supply needle **148** is provided on the downstream end of the supply flow path **149**, the liquid ejecting unit **11** is connected to the upstream end of the supply flow path **149**, the pressurization unit **151** is provided part way down the supply flow path **149**, and the downstream end of the supply flow path **149** communicates with the pressure adjustment mechanism **152**. The liquid ejecting unit **11** is provided with a plurality of nozzles **153** which eject the liquid, and liquid supply paths **154** which communicate the pressure adjustment mechanism **152** with the nozzles **153**.

[0149] When the liquid is ejected from the nozzles **153** or the like and the pressure of the liquid supply path **154** assumes a lower negative pressure than a threshold Pm ($Pm<0$) which is set in advance, the pressure adjustment mechanism **152** communicates the supply flow path **149** with the liquid supply path **154**, and when the pressure of the liquid supply path **154** is greater than or equal to the threshold Pm, the pressure adjustment mechanism **152** restricts the communication between the supply flow path **149** and the liquid supply path **154**. Therefore, even if the pressure in the supply flow path **149** assumes a pressurized state due to the driving of the pressurization unit **151**, the liquid is not supplied to the nozzles **153** due to the pressure adjustment mechanism **152** restricting the communication between the supply flow path **149** and the liquid supply path **154**.

[0150] Note that, a configuration may be adopted in which the liquid which is supplied to the liquid ejecting unit **11** through the supply flow path **149** is returned to the storage

container **19** through a cyclic flow path (not shown). The upstream end of the cyclic flow path is connected to the liquid ejecting unit **11**, and the downstream end of the cyclic flow path is inserted into the storage container **19**. In this case, since it is possible to cause the liquid to cycle between the storage container **19** and the liquid ejecting unit **11** through the cyclic flow path and the supply flow path **149**, it becomes possible to suppress the precipitation of a precipitate component, even when the liquid contains a precipitate component such as pigment, for example.

[0151] Here, it is preferable that, when the substitute mounting body **114** is mounted to the common mounting portion **141**, the inside of the storage container **19** is filled with the liquid and the substitute mounting body **114** is subsequently mounted to the common mounting portion **141**. If such a configuration is adopted, it is possible to suppress the entrance of bubbles into the supply flow path **149** when connecting the third supply path **124** to the supply flow path **149**.

[0152] It is preferable to allow the liquid which is stored in the liquid container **23** to the relay flow path **115** using the drive of the pressurization supply unit **131** and render the connection needle **136** filled with the liquid to the distal end before attaching the first connection portion **135** to the attachment portion **144**. If such a configuration is adopted, it is possible to suppress the entrance of bubbles into the first supply path **122** when connecting the relay flow path **115** to the first supply path **122** with the mounting of the substitute mounting body **114** to the common mounting portion **141**.

[0153] It is preferable that, when starting the supply of the liquid from the liquid container **23**, the relay flow path **115** which is filled with the liquid is connected to the first supply path **122** and the storage container **19** which is filled with the liquid is connected to the supply flow path **149**, and subsequently, the supply flow path **149**, the pressure adjustment mechanism **152**, the liquid supply path **154**, and the nozzles **153** are filled with the liquid by discharging the liquid from the nozzles **153**. If such a configuration is adopted, it is possible to discharge the bubbles from inside the flow path in one filling operation, even if the bubbles enter the flow path with the connection of the substitute mounting body **114** or the relay flow path **115**.

[0154] Next, description will be given of the electrical configuration of the liquid supply system **111**.

[0155] As illustrated in FIG. **13**, the liquid ejecting apparatus **110** is provided with a plurality of (in the present embodiment, four) connectors **158** which correspond to the number of the common mounting portions **141**. The connector **158** is for electrically connecting the pump mechanism **116** to the liquid ejecting apparatus **110**, such as a USB connector, for example.

[0156] A cable **139** such as a USB cable which is connected to the connector **138** which provided in the pump mechanism **116** is connected to the connector **158**. The main control unit **143** of the liquid ejecting apparatus **110** is connected to the control unit **134** of the pump mechanism **116** in a state of being capable of communication via the connectors **138**, **158**, and the cable **139**.

[0157] Note that, although it is also possible to supply power from the liquid ejecting apparatus **110** through the cable **139**, it is preferable to provide the pump mechanism **116** with a power plug and to drive the pump mechanism **116** using the power which is supplied through the power plug.

[0158] The main control unit **143** of the liquid ejecting apparatus **110** is electrically connected to the liquid ejecting unit **11**, the operation unit **156**, the display unit **157**, the pressurization unit **151**, the mounting target detection unit **142**, the attachment detection unit **145**, and the restriction detection unit **147**. The main control unit **143** transmits the detection results of the mounting target detection unit **142**, the attachment detection unit **145**, and the restriction detection unit **147** to the control unit **134**.

[0159] The control unit **134** of the pump mechanism **116** is electrically connected to the pressurization supply unit **131**, the open-close valve **133**, the mounting detection unit **117**, and the remaining amount detection unit **137**. The control unit **134** transmits the detection results of the mounting detection unit **117** and the remaining amount detection unit **137** to the main control unit **143**. The control unit **134** controls the pressurization supply unit **131** and the open-close valve **133** based on the detection results of the mounting target detection unit **142**, the attachment detection unit **145**, the restriction detection unit **147**, the mounting detection unit **117**, and the remaining amount detection unit **137**.

[0160] Next, description will be given of the liquid supply method which is used by the liquid supply apparatus **112** of the present embodiment.

[0161] When all of a plurality (in the present embodiment, the five control conditions (1) to (5) indicated below) of control conditions are satisfied, the control unit **134** starts the driving of the pressurization supply unit **131**, the control unit **134** causes the pressurization supply unit **131** to start being driven, assuming that the open-close valve **133** is in the closed-valve state in the pump mechanism **116** in which the mounting of the substitute mounting body **114** is detected in the control condition (2) below.

[0162] (1) The liquid which is stored in the liquid container **23** is in a pressurizable state.

[0163] (2) The mounting target detection unit **142** detects the mounting of the substitute mounting body **114** to the common mounting portion **141**.

[0164] (3) The attachment detection unit **145** detects the attachment of the first connection portion **135** to the attachment portion **144**.

[0165] (4) The restriction detection unit **147** detects that the restriction portion **146** is in the restriction position.

[0166] (5) The mounting target detection unit **142** detects the mounting of the first liquid storage body **95** or the substitute mounting body **114** in relation to all of the common mounting portions **141**.

[0167] Note that, in the present embodiment, when the mounting detection unit **117** detects the mounting of the liquid container **23** to the container storage portion **22**, the control unit **134** determines that the liquid which is stored in the liquid container **23** is in a pressurizable state in the control condition (1).

[0168] In other words, in the liquid supply apparatus **112**, when the liquid which is stored in the liquid container **23** assumes a pressurizable state due to the mounting of the liquid container **23** to the container storage portion **22**, and the supply of the liquid to the liquid ejecting apparatus **110** becomes possible due to the mounting of the substitute mounting body **114** to the common mounting portion **141**, the pressurization supply unit **131** starts the driving.

[0169] When the pressurized air is pumped to the container storage portion **22** by the driving of the pressurization supply unit **131**, the pressure within the container storage portion **22** rises, the liquid storage pouch **70** of the liquid container **23** is

crushed by the air pressure, and the liquid of the inner portion of the liquid storage pouch **70** is pressurized.

[0170] Therefore, the pressurized liquid flows out from the liquid container **23** to the relay flow path **115**, and the pressure of the liquid in the relay flow path **115** rises.

[0171] When the pressure of the liquid inside the relay flow path **115** rises, since the elastic body which is disposed in the relay flow path **115** compressively deforms, it is confirmed that the liquid inside the liquid container **23** is in the pressurized state based on the detection results of the remaining amount detection unit **137**. Note that, causing the liquid within the liquid container **23** to rise to a pressure at which it is possible to perform pressurized supply of the liquid by driving the pressurization supply unit **131** is referred to as preliminary pressurization.

[0172] When the preliminary pressurization ends, the control unit **134** transmits a signal indicating that the preliminary pressurization has ended to the main control unit **143** of the liquid ejecting apparatus **110**. The main control unit **143** of the liquid ejecting apparatus **110** which receives the signal controls the pressurization unit **151** to start the supply of the liquid to the liquid ejecting unit **11**, and controls the liquid ejecting unit **11** to perform the printing onto the medium P. Meanwhile, the control unit **134** supplies the liquid which is stored in the liquid container **23** to the substitute mounting body **114** under pressure, assuming that the open-close valve **133** is in the open-valve state.

[0173] Accordingly, the liquid which is stored in the liquid container **23** is introduced into the storage container **19** by the pressurization force of the pressurization supply unit **131**, and the liquid in the storage container **19** is supplied to the liquid ejecting unit **11** by the pressurization force of the pressurization unit **151**. At this time, even if the drive timing of the pressurization supply unit **131** is shifted from the drive timing of the pressurization unit **151**, the variation in the pressure of the supply flow path **149** which communicates with the liquid ejecting unit **11** is suppressed due to the storage container **19** flexibly deforming. Unnecessary variations in the pressure of the liquid supply path **154** which communicates with the nozzles **153** are suppressed by the effect of the pressure adjustment mechanism **152** which is connected to the supply flow path **149**. Therefore, it is possible to perform the operation of ejecting the liquid from the liquid ejecting unit **11** in a stable manner.

[0174] Next, description will be given of the operations of the liquid ejecting apparatus **110**, the liquid supply apparatus **112**, the liquid supply method carried out by the liquid supply apparatus **112**, and the liquid supply system **111**, which are configured as described above.

[0175] In the present embodiment, the liquid container **23** is connected to the liquid ejecting apparatus **110** after undergoing the following procedures (1) to (4).

[0176] (1) Mount the liquid container **23** to the container storage portion **22**.

[0177] (2) Attach the first connection portion **135** to the attachment portion **144**.

[0178] (3) Mount the substitute mounting body **114** to the common mounting portion **141**.

[0179] (4) Restrict the detachment of the substitute mounting body **114** using the restriction portion **146**.

[0180] When the procedure (1) is carried out, since the mounting detection unit **117** detects the mounting of the liquid container **23** to the container storage portion **22**, the control condition (1) is satisfied.

[0181] Next, when the procedure (2) is carried out, since the attachment detection unit **145** detects the attachment of the first connection portion **135** to the attachment portion **144**, the control condition (3) is satisfied.

[0182] When the procedure (3) is carried out, since the mounting target detection unit **142** detects the mounting of the substitute mounting body **114** to the common mounting portion **141**, the control condition (2) is satisfied.

[0183] Subsequently, when the procedure (4) is carried out, since the restriction detection unit **147** detects that the restriction portion **146** is in the restriction position, the control condition (4) is satisfied.

[0184] The control condition (5) is satisfied due to all of the mounting target detection units **142** detecting the mounting of the first liquid storage body **95** or the substitute mounting body **114** to the corresponding common mounting portions **141**. When the control conditions (1) to (5) are satisfied in this manner, the preliminary pressurization is started by the pressurization supply unit **131**.

[0185] In addition, when the procedure (3) is carried out, since the first connection portion **135** is connected to the second connection portion **125** and the supply needle **148** is connected to the third supply path **124**, the liquid container **23** assumes a state of being capable of communicating with the liquid ejecting unit **11** through the relay flow path **115**, the storage container **19**, the first supply path **122**, the second supply path **123**, the third supply path **124**, and the supply flow path **149**.

[0186] In other words, when the preliminary pressurization is started by the pressurization supply unit **131**, since the liquid container **23** is in a state of being capable of communicating with the liquid ejecting unit **11**, after the preliminary pressurization is completed, it is possible to quickly start the pressurized supply of the liquid to the liquid ejecting unit **11** by opening the open-close valve **133**.

[0187] Therefore, the occurrence of a situation in which the preliminary pressurization is performed despite the liquid container **23** not being in a state of being capable of communicating with the liquid ejecting unit **11** due to the liquid container **23** not being mounted to the container storage portion **22**, the first connection portion **135** not being connected to the second connection portion **125**, or the like, resulting in the driving of the pressurization supply unit **131** being performed wastefully is suppressed.

[0188] Note that, when any of the control conditions (1) to (4) is not satisfied, it is preferable for the control unit **134** to quickly or, after a predetermined time has elapsed, stop the driving of the pressurization supply unit **131**. If such a configuration is adopted, when the liquid container **23** enters a state of being unable to communicate with the liquid ejecting unit **11** due to the liquid container **23** being detached from the container storage portion **22**, the substitute mounting body **114** being detached from the common mounting portion **141**, or the like, since the driving of the pressurization supply unit **131** is stopped, it is possible to suppress the wasteful driving of the pressurization supply unit **131**.

[0189] Additionally, it is preferable to provide a sensor which detects the opening and closing of the opening and closing door **43** (refer to FIG. **2**) of the blown tank **40** (refer to FIG. **2**), and that even when the sensor detects that the opening and closing door **43** is open, the driving of the pressurization supply unit **131** is stopped.

[0190] In this case, even if the control condition (4) is not satisfied, since the substitute mounting body **114** is not nec-

essarily detached from the common mounting portion **141** straight away, the time until the driving of the pressurization supply unit **131** is stopped may be long. Since the substitute mounting body **114** is provided with the storage container **19**, even if the liquid container **23** is detached from the container storage portion **22**, it is possible to continue supplying the liquid to the liquid ejecting unit **11** while the liquid which is stored in the storage container **19** remains.

[0191] Even if a predetermined time elapses from the start of the driving of the pressurization supply unit **131**, it is preferable to stop the driving of the pressurization supply unit **131**, even when the remaining amount detection unit **137** does not confirm that the liquid within the liquid container **23** is in a pressurized state. In this case, since causes such as operational faults of the pressurization supply unit **131**, mounting faults of the liquid container **23**, or the liquid within the liquid container **23** being depleted by the leaking out of the liquid from the liquid container **23** are conceivable, it is preferable to notify the user of the fact using a buzzer, an error display, or the like.

[0192] In this manner, even if the liquid container **23** is detached, since it is possible to continue supplying the liquid to the liquid ejecting unit **11** while the liquid which is stored within the storage container **19** remains, when the remaining amount detection unit **137** detects that the remaining amount of the liquid which is stored in the liquid container **23** is less than a predetermined value, the exchanging of the liquid container **23** may be performed while continuing the printing.

[0193] According to the embodiments described above, it is possible to obtain the following effects.

[0194] (1) When the liquid which is stored in the liquid container **23** enters a pressurizable state and the mounting target detection unit **142** detects the mounting of the substitute mounting body **114** to the common mounting portion **141**, since the pressurization supply unit **131** is driven, it is possible to appropriately supply the liquid which is stored in the liquid container **23** through the relay flow path **115** due to the pressurization supply unit **131** being driven. Meanwhile, when the liquid which is stored in the liquid container **23** is not in the pressurizable state, or when the substitute mounting body **114** is not mounted to the common mounting portion **141**, since the pressurization supply unit **131** is not driven, the wasteful driving of the pressurization supply unit **131** does not occur. Therefore, it is possible to appropriately supply the liquid according to the mounting state of the liquid storage body.

[0195] (2) When the liquid container **23** is mounted to the container storage portion **22**, since the liquid which is stored in the liquid container **23** is determined to be in the pressurizable state, it is possible to appropriately supply the liquid according to the mounting state of the liquid container **23** to the container storage portion **22**. Meanwhile, when the liquid container **23** is not mounted to the container storage portion **22**, since the pressurization supply unit **131** is not driven, the wasteful driving of the pressurization supply unit **131** does not occur.

[0196] (3) Since the driving of the pressurization supply unit **131** is started after the attachment detection unit **145** detects the fact that the first connection portion **135** which is provided on the downstream end of the relay flow path **115** is attached to the attachment portion **144** of the common mounting portion **141**, when the liquid is supplied, it is possible to reliably hold the relay flow path **115** in the common mounting portion **141**.

[0197] (4) The first connection portion **135** is connected to the second connection portion **125** in a state in which the first connection portion **135** is attached to the attachment portion **144** through the process of the substitute mounting body **114** being mounted to the common mounting portion **141**. Therefore, it is possible to confirm the connection between the substitute mounting body **114** and the relay flow path **115** due to the mounting target detection unit **142** detecting the mounting of the substitute mounting body **114** to the common mounting portion **141**. In addition to this detection, the fact that the common mounting portion **141**, the substitute mounting body **114**, and the relay flow path **115** are connected to each other is confirmed by detecting the attachment of the first connection portion **135** to the attachment portion **144**. Therefore, it is possible to appropriately supply the liquid which is stored in the liquid container **23** to the common mounting portion **141** due to the pressurization supply unit **131** being driven after the confirmation.

[0198] (5) When the restriction detection unit **147** detects that the restriction portion **146** is in the restriction position, since it is conceivable that the substitute mounting body **114** which is mounted to the common mounting portion **141** is restricted from being detached, it is possible to appropriately supply the liquid in a state in which the substitute mounting body **114** is reliably mounted to the common mounting portion **141**.

[0199] (6) Since the driving of the pressurization supply unit **131** is started when one or more of the first liquid storage bodies **95** or the substitute mounting bodies **114** are mounted to a plurality of the common mounting portions **141**, it is possible to appropriately supply the liquid of the first liquid storage bodies **95** or the liquid containers **23** which are mounted to the plurality of common mounting portions **141**.

[0200] Note that, the second embodiment may be modified as in the modification examples indicated below.

[0201] A configuration may be adopted in which the liquid ejecting apparatus **110** is provided with the pressurization supply unit **131**, and the pressurization supply unit **131** is driven by the control of the main control unit **143** of the liquid ejecting apparatus **110**.

[0202] The first connection portion **135** may be attached to the attachment portion **144** in a non-removable state. In this case, a configuration may be adopted in which the attachment detection unit **145** and the control condition (3) are not provided.

[0203] The first connection portion **135** may be directly connected to the substitute mounting body **114** without the attachment portion **144** being provided on the liquid ejecting apparatus **110**. In this case, a configuration may be adopted in which the attachment detection unit **145** and the control condition (3) are not provided.

[0204] It is possible to arbitrarily change the number of the common mounting portions **141** to be provided in the liquid ejecting apparatus **110**. For example, a configuration may be adopted in which the liquid ejecting apparatus **110** is provided with one or a plurality of the first liquid storage body mounting portions, to which only the first liquid storage body **95** is mounted, and one or a plurality of the common mounting portions **141**. A configuration may be adopted in which, when only one of the common mounting portions **141** is provided in the liquid ejecting apparatus **110**, it is not necessary to

include the control condition (5) in the control conditions for starting the driving of the pressurization supply unit **131**.

[0205] The restriction portion **146** may be a cap member which covers the opening of the common mounting portion **141**.

[0206] A configuration may be adopted in which the restriction portion **146**, the restriction detection unit **147**, and the control condition (4) are not provided. Even in this case, it is possible to detect the mounting of the substitute mounting body **114** to the common mounting portion **141** using the mounting target detection unit **142**. However, if the restriction portion **146** is provided in the proximity of the common mounting portion **141**, it is possible to reliably insert the substitute mounting body **114** and the first liquid storage body **95** into the inside of the common mounting portion **141** and to subsequently detect the mounting of the substitute mounting body **114** and the first liquid storage body **95**.

[0207] The pressurization supply unit **131** which supplies the liquid which is stored in the liquid container **23** under pressure is not limited to pumping pressurized air. For example, the pressurization supply unit **131** may supply the liquid under pressure using the variation in a differential head caused by raising the liquid container **23**, and alternatively, the pressurization supply unit **131** may supply the liquid under pressure by sucking the inside of the liquid container **23**, or crushing the liquid container **23** using a spring or the like.

[0208] A configuration may be adopted in which protrusions of different shapes or the like are provided on the substitute mounting body **114** and the first liquid storage body **95**, and the mounting target detection unit **142** detects whether or not the substitute mounting body **114** and the first liquid storage body **95** are mounted by mechanically detecting the protrusions which differ in shape in this manner.

[0209] A configuration may be adopted in which the remaining amount detection unit **137** is disposed closer to the substitute mounting body **114** side (the downstream side) than the open-close valve **133**, and is not disposed closer to the liquid container **23** side (the upstream side) than the open-close valve **133**, as illustrated in FIG. **11**.

[0210] The liquid ejecting apparatus may be changed to a so-called full line type of liquid ejecting apparatus which is provided with the liquid ejecting unit **11** which is fixed and is a long shape corresponding to the total width of the medium P. In this case, the print range of the liquid ejecting unit **11** may be rendered to span the entire width of the medium P by disposing, in parallel, a plurality of unit heads in which the nozzles are formed. Alternatively, the print range of the liquid ejecting unit **11** may be rendered to span the entire width of the medium P by disposing multiple nozzles in a single long head so as to span the entire width of the medium P.

[0211] The liquid that is ejected by the liquid ejecting unit **11** is not limited to an ink, and may be, for example, a liquid-state body in which particles of a functional material are dispersed or mixed into a liquid. For example, a configuration may be adopted in which the liquid ejecting apparatus ejects a liquid-state body which contains a material such as an electrode material or a color material (pixel material) in the form of a dispersion or a solution. The electrode material or the color material may be used in the manufacture or the like of liquid crystal displays, Electro-Luminescence (EL) displays, and surface emission displays.

[0212] The medium P is not limited to paper, and may be plastic film, thin plate material, or the like, and may also be a fabric used in a textile printing apparatus or the like.

[0213] The entire disclosure of Japanese Patent Application No. 2014-157603, filed Aug. 1, 2014 is expressly incorporated by reference herein.

What is claimed is:

1. A liquid supply system, comprising:

a common mounting portion into which a first liquid storage body capable of storing a liquid and a substitute mounting body which is connected to a second liquid storage body capable of storing a liquid via a relay flow path can be exchangeably mounted;

a mounting target detection unit capable of detecting whether or not the first liquid storage body and the substitute mounting body are mounted to the common mounting portion;

a pressurization supply unit which supplies the liquid which is stored in the second liquid storage body to the substitute mounting body under pressure; and

a control unit which drives the pressure supply unit when a plurality of control conditions are satisfied, wherein the control conditions include the liquid which is stored in the second liquid storage body entering a pressurizable state and the mounting target detection unit detecting mounting of the substitute mounting body to the common mounting portion.

2. The liquid supply system according to claim **1**, further comprising:

a second liquid storage body mounting portion to and from which the second liquid storage body can be attached and detached; and

a mounting detection unit capable of detecting whether or not the second liquid storage body is mounted to the second liquid storage body mounting portion,

wherein when the mounting detection unit detects that the second liquid storage body is mounted to the second liquid storage body mounting portion, the control unit determines that the liquid which is stored in the second liquid storage body is in a pressurizable state.

3. The liquid supply system according to claim **1**,

wherein the substitute mounting body is detachably connected to the relay flow path via a first connection portion which is provided on a downstream end of the relay flow path and a second connection portion which is provided on the substitute mounting body,

wherein the common mounting portion includes an attachment portion to which the first connection portion is attached in a removable state, and an attachment detection unit capable of detecting whether or not the first connection portion is in a state of being attached to the attachment portion, and

wherein the control conditions include the attachment detection unit detecting the first attachment unit being attached to the attachment portion.

4. The liquid supply system according to claim **3**,

wherein in a state in which the first connection portion is attached to the attachment portion, the first connection portion is connected to the second connection portion in

a process of the substitute mounting body being mounted to the common mounting portion.

5. The liquid supply system according to claim **1**, further comprising:

a restriction portion which is capable of restricting the substitute mounting body which is mounted to the common mounting portion from being detached and is capable of moving between a restriction position which restricts the substitute mounting body which is mounted to the common mounting portion from being detached and a restriction released position which allows the substitute mounting body which is mounted to the common mounting portion to be detached; and

a restriction detection unit capable of detecting whether or not the restriction portion is in the restriction position,

wherein the control conditions include the restriction detection unit detecting that the restriction portion is in the restriction position.

6. The liquid supply system according to claim **1**, further comprising:

a plurality of the common mounting portions,

wherein the control conditions include the mounting target detection unit detecting that the first liquid storage body or the substitute mounting body is mounted to the common mounting portion.

7. A liquid ejecting apparatus, comprising:

a liquid ejecting unit capable of ejecting a liquid;

a common mounting portion into which a first liquid storage body capable of storing a liquid and a substitute mounting body which is connected to a second liquid storage body capable of storing a liquid via a relay flow path can be exchangeably mounted;

a mounting target detection unit capable of detecting whether or not the first liquid storage body and the substitute mounting body are mounted to the common mounting portion;

a pressurization supply unit which supplies the liquid which is stored in the second liquid storage body to the substitute mounting body under pressure; and

a control unit which drives the pressure supply unit when a plurality of control conditions are satisfied,

wherein the control conditions include the liquid which is stored in the second liquid storage body entering a pressurizable state and the mounting target detection unit detecting mounting of the substitute mounting body to the common mounting portion.

8. A liquid supply method which is carried out by a liquid supply apparatus which includes

a substitute mounting body which can be mounted, so as to be exchangeable with a first liquid storage body, to a common mounting portion to and from which the first liquid storage body capable of storing a liquid can be attached and detached;

a relay flow path which communicates a second liquid storage body capable of storing a liquid with the substitute mounting body; and

a pressurization supply unit which supplies the liquid which is stored in the second liquid storage body to the substitute mounting body through the relay flow path under pressure, the method comprising:

causing the pressurization supply unit to start being driven when the liquid which is stored in the second liquid storage body enters a pressurizable state and the substitute mounting body is mounted to the common mounting portion.

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