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(54) Ink cartridge and printer

(57) An ink cartridge 7 includes a cartridge main body 71 forming an ink storage chamber, an ink supply port 39 formed in a bottom section of the ink storage chamber for supplying an ink fluid stored in the ink storage chamber to a print head mounted on a carriage of a printer, and a positioning protrusion 87 projectingly provided on a front wall 73 of the cartridge main body 71. The positioning protrusion 87 fits into a positioning groove of the carriage, so that the cartridge main body 71 is positioned at a cartridge mount section of the carriage. The positioning protrusion 87 is formed integrally into a hollow bag structure where a pair of mutually-opposing plate-like sections 87a, 87b are joined together by means of an extremity joint wall 87c and a joint bottom wall 87d.

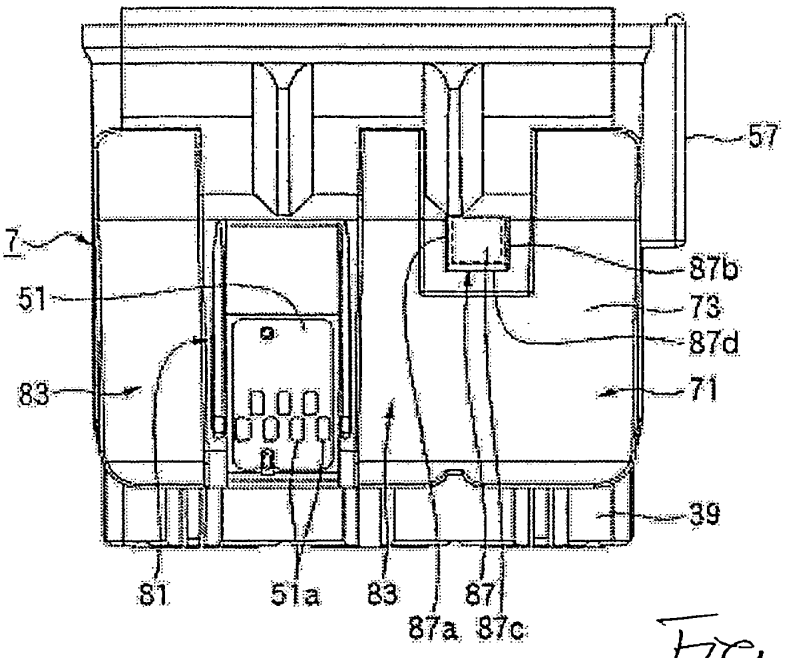

Fig. 4

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Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to an ink cartridge containing ink fluid in an ink storage chamber, as well as to a printer equipped with the ink cartridge.

[0002] Fig. 10 shows a related-art example of a carriage to be set in an inkjet printer and a related-art example of an ink cartridge set in this carriage.

[0003] The carriage 1 shown in Fig. 10 has a first cartridge mount section 13 for housing a color ink cartridge on an upper surface of a carriage main body 11 which is reciprocally driven by an unillustrated carriage drive mechanism in a direction (direction of arrow A in the drawing) orthogonal to a transport direction of print paper in a printer; and a second cartridge mount section 15 for housing a black ink cartridge. A print head 21 is provided on a lower portion of the carriage main body 11, and ejects, on print paper and in the form of ink droplets of predetermined particle sizes, ink fluids supplied from the respective ink cartridges mounted on the first and second cartridge mount sections 13, 15.

[0004] The ink cartridge 3 shown in Fig. 10 is a color ink cartridge independently containing ink fluids of three colors; namely, cyan, magenta, and yellow, for color printing purpose.

[0005] As shown in Figs. 10 and 11, this ink cartridge 3 comprises a cartridge main body 35 which forms three ink storage chambers 31, 32, and 33, whose upper portions are opened, by means of partitioning; porous elastic bodies (foam bodies) 37 which are housed and retained by the respective ink storage chambers 31, 32, and 33; ink supply ports 39 formed in bottom sections of the respective ink storage chambers 31, 32, and 33 for supplying to the print head 21 of the inkjet printer the ink fluids, which are stored in the respective ink storage chambers 31, 32, and 33 while the porous elastic bodies 37 are impregnated with the ink fluids—; elastic-body retaining ribs 43 which are projectingly provided on the interior surface of a front wall 41 of the cartridge main body 35—the front wall forming the respective ink storage chambers 31, 32, and 33 by partitioning—and retain the porous elastic bodies 37 in a predetermined compressed state; and a cover member 47 bonded to the upper surface of the cartridge main body 35 so as to cover the upper open sections of the respective ink storage chambers 31, 32, and 33. In order to supply ink fluids to the print head 21, the ink cartridge 3 is attached to the first cartridge mount section 13 of the carriage main body 11.

[0006] The front wall 41 of the cartridge main body 35 is a side-face wall provided essentially perpendicular to the bottom wall of the cartridge main body 35. As shown in Fig. 11, the elastic-body retaining ribs 43 provided projectingly on the interior surface of the front wall 41 press one end face 37a of the corresponding porous elastic body 37, to thus retain the porous elastic body 37 as being compressed at a predetermined compression rate and, simultaneously, to ensure a space 42 required to prevent occurrence of fluctuations in pressure, which would otherwise be caused by sucking an ink fluid at a negative pressure, between the one end face 37a of the porous elastic body 37 and the interior surface of the front wall 41.

[0007] As shown in Fig. 11, a data recorder 51 is attached to an exterior surface of the front wall 41 of the cartridge main body 35.

[0008] This data recorder 51 is formed from a memory element which enables reading or writing of data pertaining to the quantities of ink remaining in the respective ink storage chambers 31, 32, and 33 and the date of manufacture of the ink cartridge; and a plurality of connection terminals 51a by way of which information is input to or output from the memory element. The connection terminals 51a are attached to the exterior surface of the front wall 41 so as to become exposed on the outer surface of the cartridge main body 35.

[0009] A carriage-side connection terminal 53 to be electrically connected to the connection terminal 51a is provided, in correspondence to the position on the ink cartridge 3 where the data recorder 51 is to be provided, on the first cartridge mount section 13 of the carriage main body 11 into which the ink cartridge 3 is to be mounted.

[0010] As shown in Fig. 10, the carriage-side connection terminal 53 is provided in the interior surface of a front partition 13a which partitions the first cartridge mount section 13.

[0011] The carriage-side connection terminal 53 is connected to a control circuit in a printer, and the carriage-side connection terminal 53 and the connection terminal 51a are electrically connected together. As a result, the control circuit in the printer can read or write data from and into the data recorder 51 on the ink cartridge 3.

[0012] In order to accurately, electrically connect the plurality of connection terminals 51a of the data recorder 51 to the carriage-side connection terminal 53, the positioning accuracy of the ink cartridge 3 to the first cartridge mount section 13 of the carriage main body 11 must be enhanced.

[0013] In order to enhance the positioning accuracy of the cartridge main body 35 to the carriage main body 11, the carriage main body 11 is provided with an erroneous-insertion-prevention groove 54 which prevents insertion of the ink cartridge 3 into the first cartridge mount section 13 while being oriented in a wrong direction; and a positioning groove 55 for aligning the position of the connection terminal 51a on the ink cartridge 3 with the carriage-side connection terminal 53 of the carriage main body 11 in connection with the ink cartridge 3 inserted into the first cartridge mount section 13 in an appropriate orientation.

[0014] In the carriage main body 11, the erroneous-insertion-prevention groove 54 is formed at an upper end portion of a side partition 13b which forms the first cartridge mount section 13, and the positioning groove 55

is formed at an upper end portion of the front partition 13a.

[0015] In the ink cartridge 3, an erroneous-insertion-prevention rib 57 to fit into the erroneous-insertion-prevention groove 54 is projectingly formed on one side wall 38 of the cartridge main body 35. A positioning rib 58 to fit into the positioning groove 55 is projectingly provided on an exterior surface of the front wall 41 equipped with the data recorder 51.

[0016] Specifically, when the erroneous-insertion-prevention rib 57 is not oriented for insertion into the erroneous-insertion-prevention groove 54 of the carriage main body 11, the ink cartridge 3 cannot be inserted into the first cartridge mount section 13. When the ink cartridge 3 has been inserted while being oriented in an appropriate direction, positional adjustment is performed such that the extremity of the positioning rib 58 comes into intimate contact with a positioning surface 55b, which is formed on one side of the positioning groove 55, by means of a tapered surface 55a formed in the positioning groove 55. As a result, the plurality of connection terminals 51a are accurately connected to the carriage-side connection terminal 53 (see, e.g., Patent Document 1).

[0017] Patent Document 1: JP-A-2004-1430

[0018] The ink cartridge as discussed above suffers from the following problems:

[0019] (1) The positioning rib 58 provided on the related-art ink cartridge 3 shown in Fig. 11 is a single piece of thin-walled plate. When the carriage main body 11 is manufactured by a method for ejecting and molding synthetic resin, the rib exhibits superior moldability. However, when the rib has become deficient in rigidity strength, there may be a possibility of positioning accuracy being reduced by elastic deformation, and the like, which would otherwise be caused when the rib comes into contact with the positioning groove 55.

[0020] In contrast, when the positioning rib 58 is formed into a thick plate in order to improve the rigidity strength of the positioning rib 58, a problem of difficulty being encountered in maintaining dimensional accuracy is caused by molding defects, such as a sink mark.

[0021] Accordingly, an object of the present invention is to solve the problem and to provide an ink cartridge which can maintain high positional accuracy when being set to a carriage of a printer by virtue of having a positioning projection of high rigidity strength, as well as to provide a printer.

[0022] (2) The outer dimension of the ink cartridge 3 must match the dimension of the first cartridge mount section 13 of the carriage main body 11, in order to achieve electrical conduction between the connection terminal 51a and the carriage-side connection terminal 53 and positional alignment of the ink supply port 39 with an ink supply passage for the print head 21. For instance, even when the porous elastic bodies 37 are made compact, changes must be prevented from arising in the outer dimension of the principal section.

[0023] For example, when the outer dimension of the principal section of the ink cartridge is changed for miniaturizing the ink storage chambers 31, 32, and 33 in association with miniaturization of the porous elastic bodies 37, the metal mold for the carriage main body 11 as well as metal mold used for manufacturing the ink cartridge 3 must be newly created, which in turn entails high development cost.

[0024] Conventionally, when the porous elastic bodies 37 are miniaturized, the storage space for the porous elastic body 37 in each of the ink storage chambers 31, 32, and 33 is diminished by means of increasing the protruding length of the elastic-body retaining ribs 43 which protrude toward the inside of the ink storage chambers 31, 32, and 33, thereby maintaining the outer dimension of the ink cartridge.

[0025] However, such a technique results in the space 42—existing between the interior surface of the front wall 91 on which the elastic-body retaining ribs 43 are projectingly provided and the one end face 37a of the porous elastic body 37—expanding to a required volume or more. There may arise a failure to appropriately prevent pressure fluctuations during suction of an ink fluid at a negative pressure, or an increase in the quantity of ink remaining during exchange of a cartridge.

[0026] Accordingly, another object of the present invention is to solve the above-described problem and to provide an ink cartridge which enables miniaturization of a porous elastic body and reduction of ink remaining in the cartridge, as well as to provide a printer.

SUMMARY OF THE INVENTION

[0027] An embodiment of the present invention is directed to an ink cartridge having a cartridge main body forming an ink storage chamber, an ink supply port formed in a bottom section of the ink storage chamber for supplying an ink fluid stored in the ink storage chamber to a print head mounted on a carriage of a printer, and a positioning protrusion projectingly provided on a side-face wall of the cartridge main body, the positioning protrusion fitting into a positioning groove of the carriage, so that the cartridge main body is positioned at a cartridge mount section of the carriage. The positioning protrusion has a pair of plate-like sections opposing each other with a partition therebetween, and a joint section which joins the plate-like sections together. An outer surface of the one plate-like section is set as a positioning surface which comes into contact with the positioning groove.

[0028] According to the ink cartridge having the above-described configuration, a pair of mutually-opposing plate-like sections are coupled together by means of a joint section, thereby forming a positioning protrusion. Even when each of the plate-like sections is a single piece of thin plate, rigidity strength, which is higher than that achieved in a case where each of the plate-like sections is solely used for positioning, can be achieved.

[0029] Accordingly, when the ink cartridge is attached to the carriage of the printer, high positioning accuracy can be maintained by means of the above-described po-

sitioning protrusion having high rigidity strength.

[0030] In relation to the pair of plate-like sections constituting the positioning protrusion and the joint section, the essential requirement for each of these sections is to have a thin-walled structure. Therefore, molding defects, such as sink marks, tend not to arise, and an attempt to enhance dimensional accuracy can be realized.

[0031] In the ink cartridge having the above-described configuration, the positioning protrusion preferably includes the pair of plate-like sections and the joint section, and is preferably formed integrally into a bag structure whose inside is hollowed by a relief which is in mutual communication with the ink storage chamber.

[0032] Bymeans of the conf iguration, the structure of the positioning protrusion becomes a bag structure, whereby a further improvement in rigidity strength can be expected. As a result of the positioning protrusion being formed into a hollow structure, occurrence of molding distortions, such as sink marks, can be suppressed, thereby enabling an attempt can be made to improve dimensional accuracy of the positioning protrusion.

[0033] In the ink cartridge having the above-described configuration, a data recorder having a connection terminal electrically connected to a carriage-side connection terminal provided on a cartridge mount section of the carriage is preferably mounted on the side-face wall of the cartridge main body.

[0034] By means of this configuration, a connection terminal of the data recorder attached to the side-face wall of the cartridge main body is matched, with high accuracy, to the carriage-side connection terminal provided on the cartridge mount section. Hence, the operation reliability of the data recorder can be enhanced.

[0035] According to a printer having the ink cartridge of the above-described configuration, high positioning accuracy required during attachment of the ink cartridge to the carriage can be maintained, and ease of operation for mounting the ink cartridge can be enhanced.

[0036] According to the ink cartridge and the printer of the present invention, the positioning protrusion is formed by joining a pair of mutually-opposing plate-like sections. Even when each of the plate-like sections is a single piece of thin plate, high rigidity strength can be acquired.

[0037] Moreover, each of the pair of plate-like sections constituting the positioning protrusion and the joint section requires only a thin-walled structure. Therefore, molding distortions, such as sink marks, tend not to arise, thereby enabling an attempt to improve dimensional accuracy.

[0038] Consequently, as a result of adoption of the positioning protrusion having high rigidity strength, there can be provided an ink cartridge capable of maintaining high positional accuracy when being mounted to the carriage of the printer, as well as a printer.

[0039] Another embodiment of the present invention is directed to an ink cartridge having a cartridge main body forming an ink storage chamber, a porous elastic body retained in the ink storage chamber, an ink fluid stored in the ink storage chamber while the porous elastic body is impregnated with the ink fluid, an ink supply port formed in a bottom section of the ink storage chamber for supplying the ink fluid stored in the ink storage chamber to a print head of the printer, and an elastic-body retaining rib which is provided projectingly on an interior surface of a side-face wall of the cartridge main body and retains the porous elastic body in a compressed state. The ink cartridge comprises recessed sections, which cause an interior surface of the side-face wall to protrude toward the inside of the ink storage chamber, formed on the side-face wall of the cartridge main body on which the elastic-body retaining rib is projectingly provided, such that a projecting height of the elastic-body retaining rib with reference to an interior surface of the side-face wall becomes smaller.

[0040] According to the ink cartridge having the above-described configuration, the interior surface of the side-face wall is caused to protrude toward the inside of the ink storage chamber by means of the recessed sections formed on the side-face wall of the cartridge main body on which the elastic-body retaining ribs are projectingly provided. Hence, the projecting height of the elastic-body retaining ribs with reference to the interior surface of the side-face wall can be reduced.

[0041] Therefore, even when the porous elastic bodies are made compact, the space—which is formed between the interior surface of the side-face wall of the cartridge main body on which the elastic-body retaining ribs are projectingly provided and the one end face of the porous elastic body pressed by the elastic-body retaining ribs—is suppressed to a minimum-required space. Occurrence of pressure fluctuations, which would otherwise arise during suction of an ink fluid at a negative pressure, can be prevented, and the amount of ink remaining during replacement of the cartridge can be diminished.

[0042] The recessed sections which cause the interior surface of the side-face wall to protrude toward the inside of the ink storage chamber are solely limited to the range where the elastic-body retaining ribs are projectingly provided. Areas outside the range can be maintained to outer dimensions in the related art. The outer dimensions of the principal sections of the ink cartridge which contribute to attachment of the ink cartridge to the carriage on the printer can be maintained to the conventional dimensions.

[0043] Therefore, modifications in the metal mold associated with miniaturization of the porous elastic bodies are limited solely to the metal mold for a cartridge main body. A known metal mold for a carriage can also be used, and development cost attributable to modifications in the metal molds can also be reduced.

[0044] In the ink cartridge having the above-described configuration, the side-face wall of the cartridge main body preferably stands at an inclination with reference to a bottom wall of the cartridge main body such that a space formed between the interior surface of the side-face wall of the cartridge main body, on which the elastic-

body retaining rib is projectingly provided, and one end face of the porous elastic body pressed by the elastic-body retaining rib gradually becomes larger in size upward from the bottom wall of the cartridge main body.

[0045] By means of the above-described configuration, the ink remaining in the space is guided to the porous elastic body by means of the interior surface of the inclined side-face wall. Consequently, the quantity of ink remaining in the space can be reduced to a great extent.

[0046] Another embodiment of the present invention is directed to a printer, in which the ink cartridge having the above-described configuration is attached to a carriage with a print head mounted thereon. The printer comprises: guide protrusions which are provided on a carriage main body of the carriage opposing the recessed sections formed on the side-face wall of the cartridge main body and which come into slidable contact with exterior surfaces of the recessed sections to thus insert and guide the ink cartridge when the ink cartridge is attached to the carriage.

[0047] According to the printer having the above configuration, the recessed sections provided on the side-face wall of the cartridge main body—on which the elastic-body retaining ribs are projectingly provided—function as an insertion guide during attachment of the ink cartridge to the carriage. Therefore, operability achieved during attachment of the ink cartridge to the carriage can be enhanced.

[0048] According to the ink cartridge of the present invention, even when the porous elastic bodies are made compact, the space—which is formed between the interior surface of the side-face wall of the cartridge main body on which the elastic-body retaining ribs are projectingly provided and the one end face of the porous elastic body pressed by the elastic-body retaining ribs—is suppressed to a minimum-required space. Occurrence of pressure fluctuations, which would otherwise arise during suction of an ink fluid at a negative pressure, can be prevented, and the amount of ink remaining during replacement of the cartridge can be diminished.

[0049] Moreover, modifications in the metal mold, or the like, are limited solely to the metal mold for a cartridge main body, thereby curtailing development cost.

[0050] According to the printer of the present invention, operability achieved during attachment of the ink cartridge to the carriage can be enhanced.

[0051] Therefore, there can be provided an ink cartridge which enables miniaturization of a porous elastic body and reduction of ink remaining in the cartridge and provides superior operability, as well as a printer.

[0052] The present disclosure relates to the subject matter contained in Japanese patent application Nos. 2004-288698 (filed on September 30, 2005) and 2004-288699 (filed on September 30, 2005), each of which is expressly incorporated herein by reference in its entirety.

BRIEF DESCRIPTION OF THE DRAWINGS

[0053] Fig. 1 is a perspective view of an ink cartridge of an embodiment of the present invention as well as a carriage of a printer to which the ink cartridge is to be mounted.

[0054] Fig. 2 is a perspective view achieved when the ink cartridge shown in Fig. 1 is viewed from an oblique lower rear position.

[0055] Fig. 3 is a perspective view achieved when the ink cartridge shown in Fig. 1 is viewed from an oblique lower front position.

[0056] Fig. 4 is a front view of the ink cartridge shown in Fig. 1.

[0057] Fig. 5 is a top view of the ink cartridge main body of the cartridge main body shown in Fig. 1.

[0058] Fig. 6 is a cross-sectional view taken along line B-B shown in Fig. 5.

[0059] Fig. 7 is an enlarged cross-sectional view of the principal section for describing insertion guidance performed when the ink cartridge shown in Fig. 1 is mounted to the carriage main body.

[0060] Fig. 8 is an enlarged cross-sectional view of the principal section for describing a section for positioning the ink cartridge and the carriage main body shown in Fig. 1.

[0061] Fig. 9 is an enlarged cross-sectional view of the principal section showing a modification of the positioning protrusion shown in Fig. 8.

[0062] Fig. 10 is a perspective view showing a carriage and an ink cartridge, both pertaining to a related-art inkjet printer.

[0063] Fig. 11 is an exploded perspective view of the ink cartridge shown in Fig. 10.

DESCRIPTION OF THE PREFERRED EMBODIMENT

[0064] An ink cartridge and a printer, both of which pertain to an embodiment of the present invention, will be described hereinbelow by reference to the accompanying drawings.

[0065] Fig. 1 is a perspective view of an ink cartridge and a carriage of a printer equipped with the ink cartridge, both of which pertain to one embodiment of the present invention; Fig. 2 is a perspective view of the ink cartridge shown in Fig. 1 when viewed froman obliquely-lower rear position; Fig. 3 is a perspective view of the ink cartridge shown in Fig. 1 from an obliquely-lower front position; Fig. 4 is a front view of the ink cartridge shown in Fig. 1; Fig. 5 is a top view of a cartridge main body shown in Fig. 1; and Fig. 6 is a cross-sectional view taken along line B-B shown in Fig. 5.

[0066] As shown in Fig. 1, an ink cartridge 7 of the present embodiment is mounted to a carriage 6 attached to the inkjet printer.

[0067] The carriage 6 of the present embodiment comprises a first cartridge mount section 63 which stores a color ink cartridge on an upper surface of a carriage main

body 61 which is reciprocally driven by an unillustrated carriage drive mechanism in a direction (direction of arrow A in the drawing) orthogonal to a transport direction of print paper in the printer; and a second cartridge mount section 65 which houses a black ink cartridge. A print head 21 is mounted on a lower portion of the carriage main body 61, and ejects, in the form of ink droplets of predetermined particle sizes on print paper, ink fluids supplied from respective ink cartridges attached to the first and second ink cartridge mount sections 63, 65.

[0068] The ink cartridge 7 shown in Figs. 1 through 6 is a color ink cartridge for color printing purpose which independently houses ink fluids of three colors; namely, cyan, magenta, and yellow.

[0069] As in the case of the related-art ink cartridge 3 shown in Figs. 10 and 11, the ink cartridge 7 of the present embodiment comprises a cartridge main body 71 which partitions three ink storage chambers 31, 32, and 33 whose upper portions are opened; porous elastic bodies (foam bodies) 37 housed and retained in the respective ink storage chambers 31, 32, and 33; ink supply ports 39 formed in bottom sections of the respective ink storage chambers 31, 32, and 33 for supplying to the print head 21 of the inkjet printer the ink fluids, which are stored in the respective ink storage chambers 31, 32, and 33 while the porous elastic bodies 37 are impregnated with the ink fluids—; elastic-body-retaining ribs 75 which are projectingly provided on an interior surface 73a of a front wall 73 of the cartridge main body 71—the front wall partitions the respective ink storage chambers 31, 32, and 33—and retain the porous elastic bodies 37 in a predetermined compressed state; and a cover member 47 bonded to the upper surface of the cartridge main body 71 so as to cover the upper open sections of the respective ink storage chambers 31, 32, and 33. In order to supply ink fluids to the print head 21, the ink cartridge 3 is attached to the first cartridge mount section 63 of the carriage main body 61.

[0070] The cartridge main body of the black ink cartridge, which is to be attached to the second cartridge mounting section 65 of the carriage main body 61 and which independently contains a black ink fluid for monochrome printing purpose, is essentially identical in configuration with the cartridge main body 71 of the color ink cartridge, except that the number of the ink storage chambers into which the porous elastic bodies 37 are to be set is limited to one. The cartridge main body 71 of the color ink cartridge will be described hereinbelow, and detailed description of the cartridge main body of the black ink cartridge is omitted.

[0071] The front wall 73 of the cartridge main body 71 of the present embodiment is a side-face wall standing upright on the bottom wall of the cartridge main body 71. As shown in Fig. 6, the elastic-body retaining ribs 5 projectingly provided on the interior surface 73a of the front wall 73 press one end face 37a of the porous elastic body 37, thereby retaining the porous elastic body 37 while compressing the same at a predetermined compression rate. Concurrently, a space 77 required to prevent pressure fluctuations, which arise during suction of an ink fluid at a negative pressure, is assured between the one end face 37a of the porous elastic body 37 and interior surface 73a of the front wall 73.

[0072] As shown in Figs. 5 and 6, the front wall 73 of the cartridge main body 71 of the present embodiment is provided with recessed sections 83 such that the projecting height T of the elastic-body-retaining ribs 75 in relation to the interior surface 73a of the front wall 73 becomes smaller, wherein the recessed sections 83 are formed by causing a range L of a lower portion of the interior surface 73a—into which the elastic-body-retaining ribs 75 are projected—to protrude toward the insides of the ink storage chambers 31, 32, and 33.

[0073] In addition, in the case of the present embodiment, a space 77 is formed between the interior surface 73a of the front wall 73 of the cartridge main body 71—on which the elastic-body retaining ribs 75 are projectingly formed—and an end face 37a of the porous elastic body 37 pressed by the elastic-body-retaining ribs 75. The front wall 73 located between the recessed sections 83 stands at an inclination of θ with reference to the normal line on the bottom wall of the cartridge main body 71 such that the space 77 becomes gradually wider with upward movement from the bottom wall of the cartridge main body 71.

[0074] As shown in Figs. 3 and 4, a recorder mounting section 81 on which a data recorder 51 is to be mounted is provided on the exterior surface of the cartridge main body 71. As a result of the recessed sections 83 being formed on both sides of the data recorder mount section 81, the data recorder mount section 81 becomes relatively protruded to the position of the exterior surface of the front wall 41 of the related-art ink cartridge main body 35 in Fig. 11, but is level with the exterior surface of the front wall 41 of the related-art ink cartridge main body 35 shown in Fig. 11.

[0075] The data recorder 51 is formed from a memory element which enables reading or writing of data pertaining to the quantities of ink remaining in the respective ink storage chambers 31, 32, and 33 and the date of manufacture of the ink cartridge; and a plurality of connection terminals 51a by way of which data are input to or output from the memory element. The connection terminals 51a are attached to the front surface of the recorder mount section 81 of the front wall 73 so as to become exposed on the outer surface of the cartridge main body 71.

[0076] As shown in Fig. 1, a carriage-side connection terminal 53 to be electrically connected to the connection terminal 51a is provided, in correspondence to the position on the ink cartridge 7 where the data recorder 51 is to be provided, on the first cartridge mount section 63 of the carriage main body 61 into which the ink cartridge 7 is to be mounted.

[0077] As shown in Fig. 1, the carriage-side connection terminal 53 is provided in the interior surface of a front partition 63a which partitions the first cartridge mount

section 63.

[0078] The carriage-side connection terminal 53 is connected to a control circuit in a printer, and the carriage-side connection terminal 53 and the connection terminal 51a are electrically connected together. As a result, the control circuit in the printer can read or write data from and into the data recorder 51 on the ink cartridge 7.

[0079] In order to accurately, electrically connect the plurality of connection terminals 51a of the data recorder 51 to the carriage-side connection terminal 53, the positioning accuracy of the ink cartridge 7 to the first cartridge mount section 63 of the carriage main body 61 must be enhanced.

[0080] In order to enhance the positioning accuracy of the cartridge main body 71 to the carriage main body 61, the carriage main body 61 is provided with an erroneous-insertion-prevention groove 54 which prevents insertion of the ink cartridge 7 into the first cartridge mount section 63 with an incorrect orientation; and a positioning groove 85 for aligning the position of the connection terminal 51a on the ink cartridge 7 with the carriage-side connection terminal 53 of the carriage main body 61 in connection with the ink cartridge 7 inserted into the first cartridge mount section 63 with an appropriate orientation.

[0081] In the carriage main body 61, the erroneous-insertion-prevention groove 54 is formed at an upper end portion of a side partition 63b which partitions the first cartridge mount section 63, and the positioning groove 85 is formed at an upper end portion of the front partition 63a.

[0082] In the ink cartridge 7, an erroneous-insertion-prevention rib 57 to fit into the erroneous-insertion-prevention groove 54 is projectingly formed on one side wall 78 of the cartridge main body 71. A positioning protuberance 87 to fit into the positioning groove 85 is projectingly provided on an exterior surface of a front wall 73 equipped with the data recorder 51.

[0083] Specifically, when the erroneous-insertion-prevention rib 57 is not oriented for insertion into the erroneous-insertion-prevention groove 54 of the carriage main body 61, the ink cartridge 7 cannot be inserted into the first cartridge mount section 63. When the ink cartridge 7 has been inserted with an appropriate orientation, positional adjustment is performed such that the extremity of the positioning protuberance 87 comes into intimate contact with a positioning surface 85b, which is formed on one side of the positioning groove 85, by means of a tapered surface 85a formed in the positioning groove 85. As a result, the plurality of connection terminals 51a are accurately connected to the carriage-side connection terminal 53.

[0084] Moreover, as shown in Figs. 4 and 8, the positioning protuberance 87 of the present embodiment is formed into a bag structure comprising a pair of plate-like sections 87a, 87b which mutually oppose while being horizontally separated from each other; an extremity joint wall 87c coupling e_xtremities of the plate-like sections 87a, 87b; and a joint bottom wall 87d which is a joint section for coupling lower edges of the left and right plate-like sections 87a, 87b together. The rigidity strength of the positioning protuberance is enhanced.

[0085] Specifically, if a rib made of a single piece of thin-walled plate, such as the positioning rib 58 of the related-art ink cartridge 3 shown in Fig. 11, is merely formed into a thick-walled plate in order to enhance the rigidity strength of the rib, dimensional accuracy of the rib becomes difficult to maintain upon occurrence of molding defects such as sink marks.

[0086] For this reason, the positioning protuberance 87 of the present embodiment enables improvement in rigidity strength and maintenance of dimensional accuracy, by integrally molding the positioning protuberance 87 into a bag structure whose inside is hollowed by a relief remaining in mutual communication with the ink storage chamber 33 at the time of formation of the cartridge main body 71.

[0087] In the positioning protuberance 87, the pair of plate-like sections 87a, 87b which oppose each other with the hollow section therebetween function as a pair of ribs to fit into the positioning groove 85 of the carriage 6. An outer surface of the one plate-like section 87a is set as a positioning surface which comes into contact with the positioning surface 85b of the positioning groove 85.

[0088] Although the positioning protuberance 87 of the present embodiment is formed into a bag structure for enhancing rigidity strength, a different structure may also be adopted, so long as required rigidity strength can be achieved.

[0089] For instance, as shown in Fig. 9, the joint bottom wall 87d, which couples the lower edges of the pair of plate-like sections 87a, 87b is omitted, and a partition 87e is interposed between the ink storage chambers 33. In place of the relief remaining in mutual communication with the ink storage chambers, a structure equipped with a relief remaining in mutual communication with the outside of cartridges can also be employed.

[0090] The carriage 6 of the inkjet printer of the present embodiment is provided with a pair of guide protrusions 89, 89, wherein the pair of guide protrusions 89, 89 are provided on the carriage main body 61 opposing the recessed sections 83 formed on the front wall 73 of the cartridge main body 71 and which come into slidable contact with and insert to guide exterior surfaces 83a of the recessed sections 83 when the ink cartridge 7 is attached to the carriage 6.

[0091] Specifically, as shown in Fig. 7, the pair of guide protrusions 89, 89 of the present embodiment are arranged such that both side surfaces of the recorder mount section 81, which is imparted with a raised shape by the exterior surfaces 83a of the recessed sections 83 formed on both sides of the recorder mount section 81, are sandwiched between the exterior surfaces. The entirety of the recorder mount section 81 is formed as an engagement protrusion section which is to fit between the pair of guide protrusions 89, 89.

[0092] According to the ink cartridge 7 of the above-described embodiment, the positioning protrusion 87 is formed by coupling the pair of mutually-opposing plate-like sections 87a, 87b to the extremity joint wall 87c and the joint bottom wall 87d. Even when the plate-like sections 87a, 87b correspond to pieces of thin-walled plate sections, higher rigidity strength can be achieved as compared with a case where the singlepiece of thin-walled plate-like section, such as the positioning rib 58 in the related-art ink cartridge 3 shown in Fig. 11, is solely used for positioning.

[0093] Accordingly, when the ink cartridge 7 is attached to the carriage 6 of the printer, high positioning accuracy can be maintained by the positioning protrusion 87 having high rigidity strength.

[0094] The pair of plate-like sections 87a, 87b, the extremity joint wall 87c, and the joint bottom wall 87d, all of which constitute the positioning protrusion 87, require only a structure where individual sections have a small wall thickness. Hence, molding defects, such as sink-marks, tend not to arise, and dimensional accuracy can be expected.

[0095] The data recorder 51—which is equipped with the connection terminal 51a electrically connected to the carriage-side connection terminal 53 provided in the cartridge mount section 63 of the carriage 6—is attached to the front wall 73 of the cartridge main body 71 of the ink cartridge 7 of the present embodiment. The connection terminal 51a of the data recorder 51 is matched with the carriage-side connection terminal 53 provided on the cartridge mount section 63 by the above-mentioned positioning protrusion 87 with high accuracy. Hence, operation reliability of the data recorder 51 can be enhanced.

[0096] According to the printer equipped with the ink cartridge 7 having the above-described configuration, positioning accuracy required when the ink cartridge 7 is attached to the carriage 6 can be maintained, thereby facilitating mounting of the ink cartridge 7.

[0097] According to the ink cartridge 7 of the present embodiment, the interior surface 73a of the front wall 73 is caused to protrude inside the ink storage chambers 31, 32, and 33 by means of the recessed sections 83 provided on both sides of the front wall 73 of the cartridge main body 71 on which the elastic-body retaining ribs 75 are projectingly provided. The projecting height T of the elastic-body retaining ribs 75 with reference to the interior surface 73a of the front wall 73 can be reduced by the amount corresponding to the extent to which the interior surface 73a projects inside.

[0098] When the porous elastic body 37 is made compact, the space 77—which is formed between the interior surface 73a of the front wall 73 of the cartridge main body 71 on which the elastic-body retaining ribs 75 are projectingly provided and the one end face 37a of the porous elastic body 37 pressed by the elastic-body retaining ribs 75—is suppressed to a minimum-required space. As a result, pressure fluctuations, which would otherwise arise during negative suction of an ink fluid, can be prevented, thereby diminishing the amount of ink remaining during replacement of the cartridge.

[0099] The recessed sections 83—which cause the interior surface 73a of the front wall 73 to protrude inside the ink storage chambers 31, 32, and 33—are limited solely to the range where the elastic-body retaining ribs 75 are projectingly provided. The outer dimension of the recorder mount section 81 and that of an upper side of the interior surface 73a, other than the recessed sections 83, can be made the same as the outer dimensions of counterpart sections of the related-art ink cartridge 3 such as those shown in Fig. 11. The outer dimension of the principal section of the ink cartridge 7, which pertains to the first cartridge mount section 61 of the carriage 6 of the printer, can be maintained to a related-art dimension.

[0100] Therefore, modifications in the metal mold associated with miniaturization of the porous elastic body 37, or the like, are limited solely to the metal mold for the cartridge main body 71. A known metal mold can also be used, in its present form, for the metal mold for the carriage 6. Even when modifications are made, the modifications can be minimized. Hence, development cost incurred by modifications in the metal mold, and the like, can be reduced.

[0101] In the ink cartridge 7 of the present embodiment, the front wall 73 stands at an inclination θ with reference to the normal line on the bottom wall of the cartridge main body 71. The space 77 formed between the interior surface 73a of the front wall 73 and the one end face 37a of the porous elastic body 37 gradually increases in size upward from the bottom wall of the cartridge main body 71. The ink remaining in the space 77 is guided to the porous elastic body 37 by the interior surface 73a of the inclined front wall 73, so that the amount of ink remaining in the space 77 can be reduced to a great extent.

[0102] In the inkjet printer where the ink cartridge 7 is attached to the carriage 6, the recorder mount section 81 formed from the recessed sections 83 formed on both sides of the front wall 73 of the cartridge main body 71 is formed as an engagement protrusion section which fits between the pair of guide protrusions 89, 89 which oppose the recorder mount section 81 and are projectingly provided on the carriage main body 61. Accordingly, operability required when the ink cartridge 7 is mounted to the carriage 6 can be enhanced.

[0103] The configuration of the ink storage chamber, that of the cartridge main body, that of the ink supply port, that of the positioning protrusions, that of the cartridge mount section, that of the positioning groove, that of the upper portion of the plate, that of the joint section, and those of other sections, all these sections belonging to the ink cartridge and the printer of the present invention, are not limited to the configurations of the embodiment. As a matter of course, various modes can be adopted on the basis of the gist of the present invention.

Claims

1. An ink cartridge comprising:

   a cartridge main body forming an ink storage chamber;
   an ink supply port formed in a bottom section of the ink storage chamber for supplying an ink fluid stored in the ink storage chamber to a print head mounted on a carriage of a printer; and
   a positioning protrusion projecting from a wall of the cartridge main body, the positioning protrusion being adapted to fit into a positioning groove of the carriage so that the cartridge main body is positioned at a cartridge mount section of the carriage, wherein
   the positioning protrusion has a pair of plate-like sections opposing each other with a space therebetween, and a joint section which joins the plate-like members together; and
   an outer surface of one of the plate-like sections is set as a positioning surface which comes into contact with the positioning groove.

2. The ink cartridge according to claim 1, wherein the positioning protrusion includes the pair of plate-like sections and the joint section, and is formed integrally into a bag structure whose inside is hollowed by a relief which is in mutual communication with the ink storage chamber.

3. The ink cartridge according to claim 1, further comprising:

   a data recorder having a connection terminal for electrical connection to a carriage-side connection terminal provided on the cartridge mount section of the carriage, the data recorder being mounted on the wall of the cartridge main body.

4. A printer having the ink cartridge defined in any one of claims 1 to 3.

5. An ink cartridge comprising:

   a cartridge main body forming an ink storage chamber;
   a porous elastic body retained in the ink storage chamber and impregnated with an ink fluid;
   an ink supply port formed in a bottom section of the ink storage chamber for supplying the ink fluid stored in the ink storage chamber to a print head of the printer;
   an elastic-body retaining rib projecting from an interior surface of a wall of the cartridge main body and retaining the porous elastic body in a compressed state;
   a recessed section which causes the interior surface of the wall, from which the elastic-body retaining rib projects, to protrude toward the inside of the ink storage chamber so that a projecting height of the elastic-body retaining rib with reference to the interior surface of the wall becomes smaller.

6. The ink cartridge according to claim 5, wherein the wall of the cartridge main body stands at an inclination with reference to a bottom wall of the cartridge main body such that a space formed between the interior surface of the wall of the cartridge main body, from which the elastic-body retaining rib projects, and one end face of the porous elastic body pressed by the elastic-body retaining rib becomes gradually larger in size upward from the bottom wall of the cartridge main body.

7. A printer, in which the ink cartridge defined in claim 5 or 6 is attached to a carriage with a print head mounted thereon, the printer comprising:

   a guide protrusion which is disposed on a carriage main body of the carriage to oppose the recessed section, and which comes into slidable contact with an exterior surface of the recessed sections to guide the ink cartridge when the ink cartridge is inserted into and attached to the carriage.

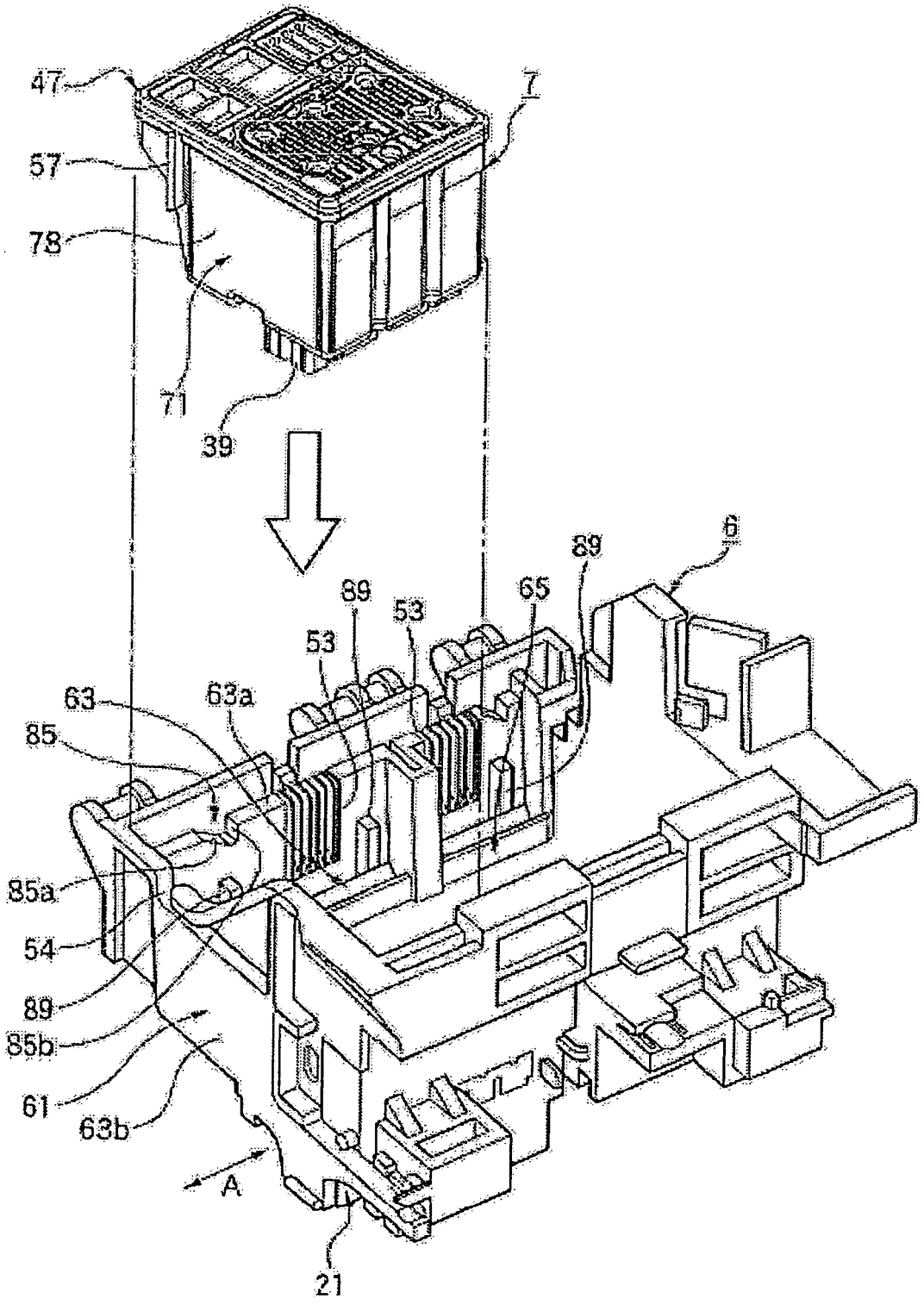
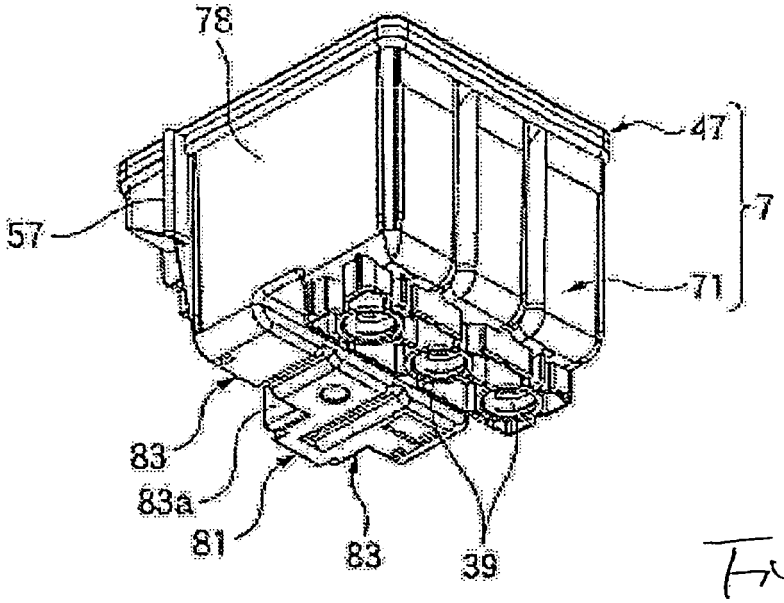


Fig. 1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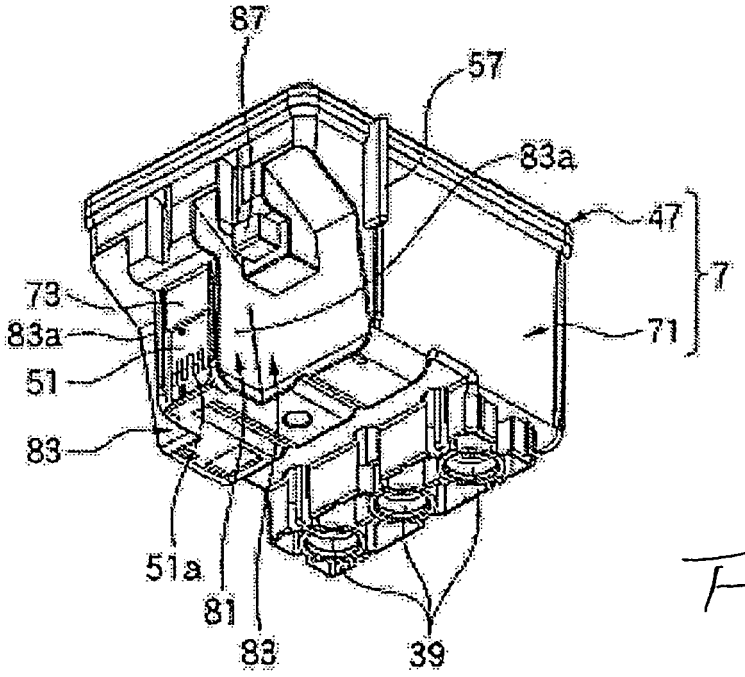
39

Fig. 2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83
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81
83
39

Fig. 3

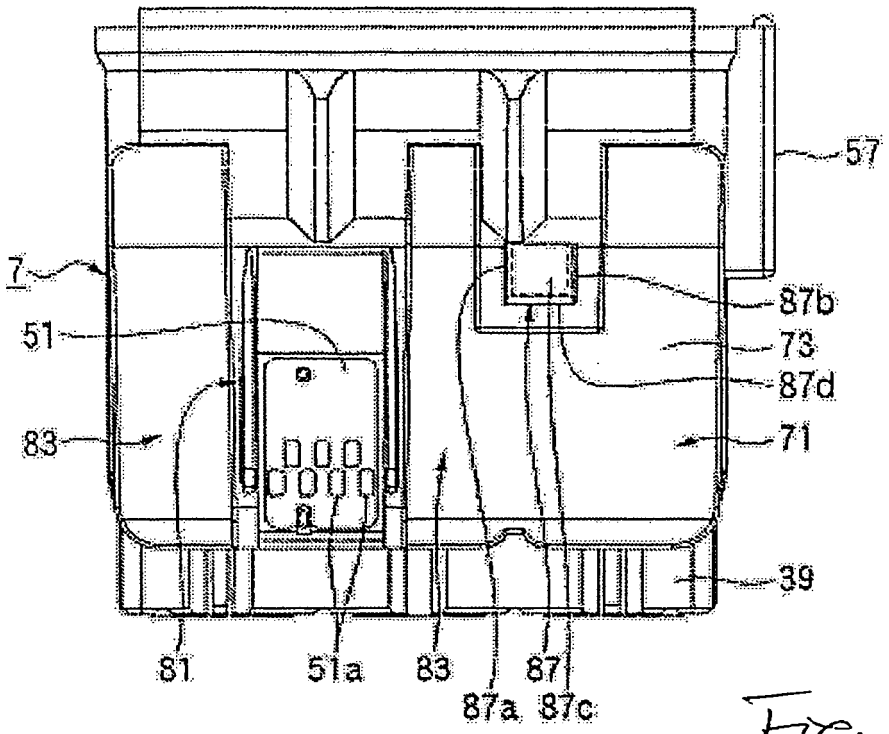

Fig. 4

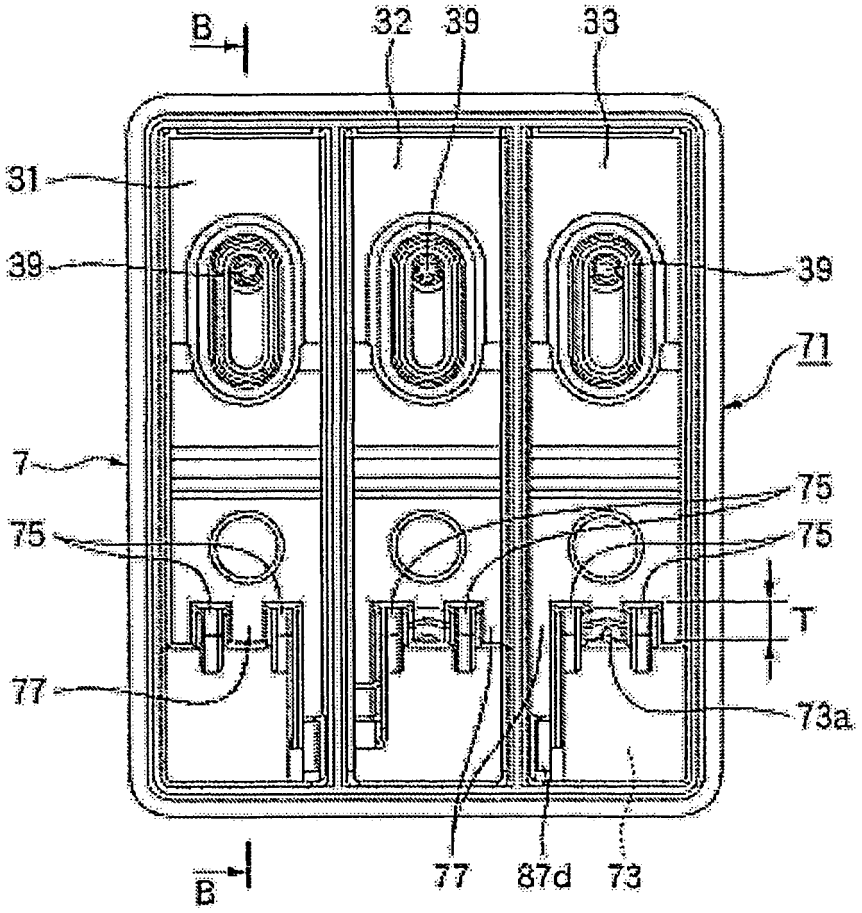

Fig. 5

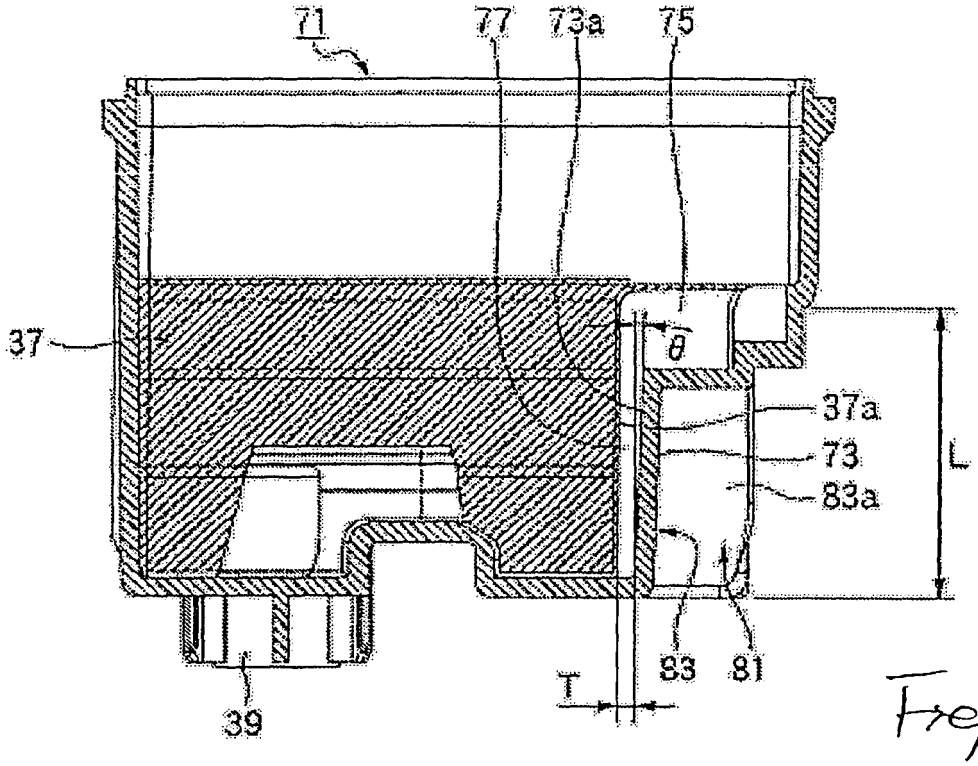
71
77
73a
75
37
θ
37a
73
83a
L
83
81
T
39

Fig. 6

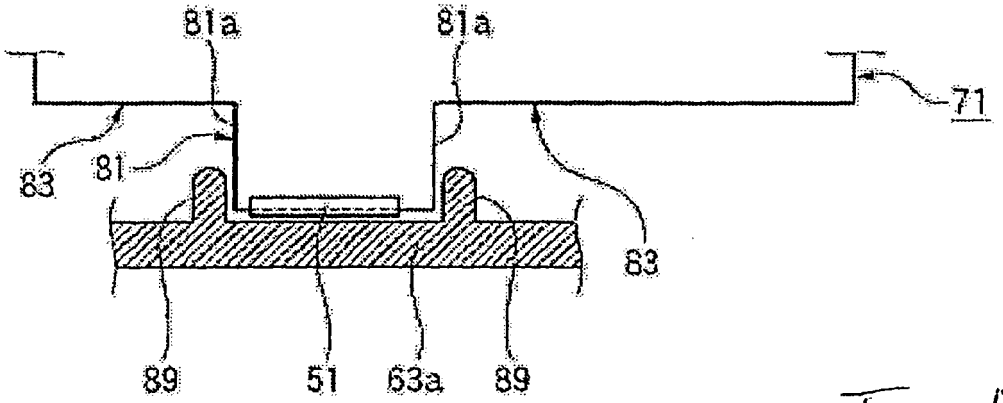
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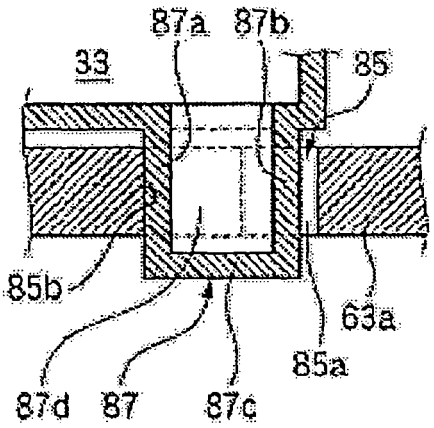
Fig. 7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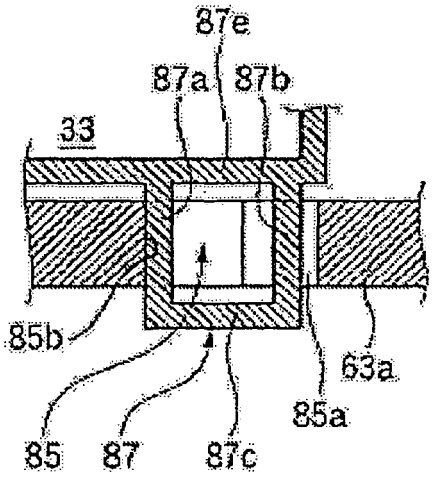
63a
85a
87d
87
87c

Fig. 8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87b
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85a
85
87
87c

Fig. 9

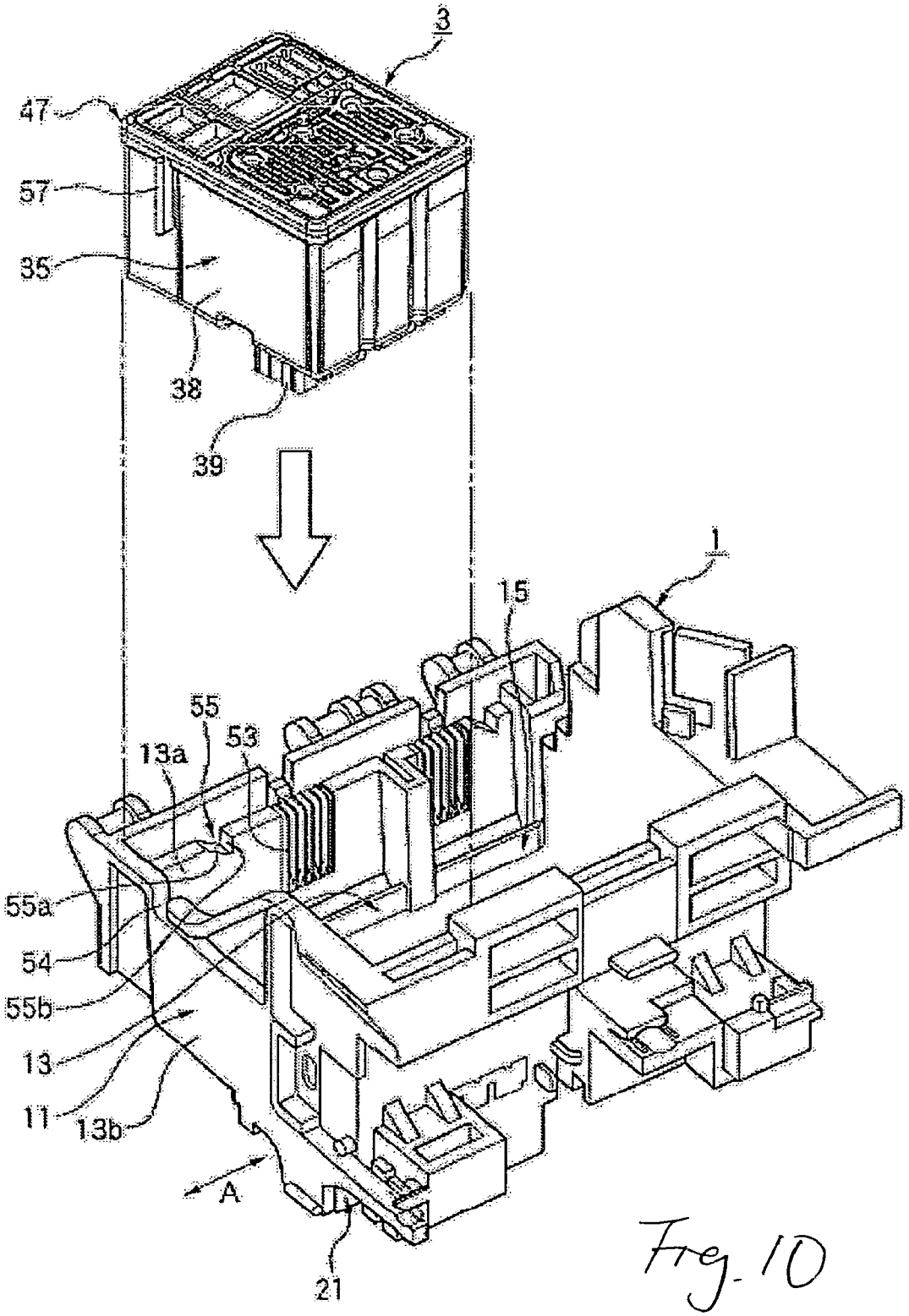

Fig. 10

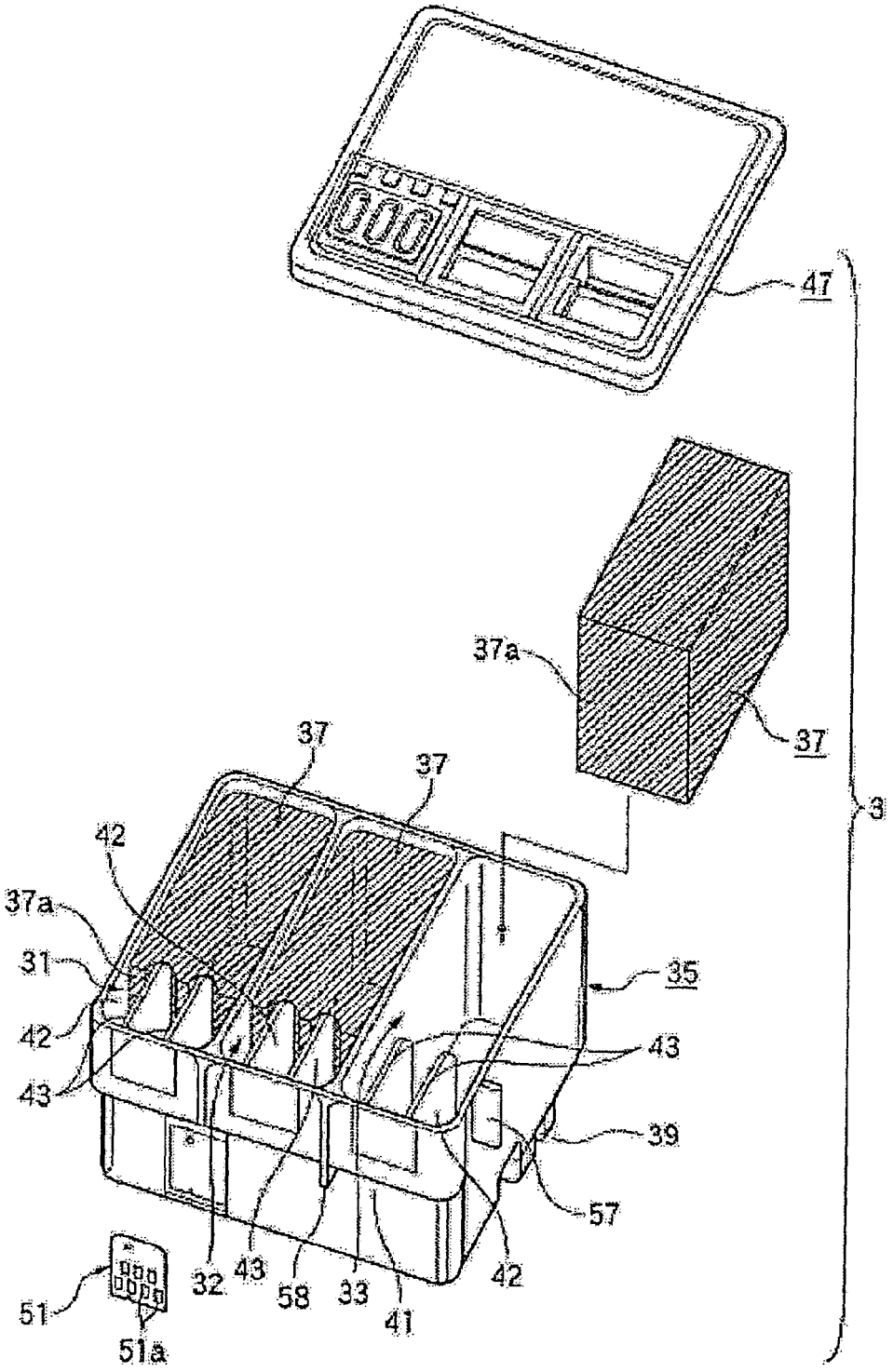

Fig. 11