



(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
15.10.2014 Bulletin 2014/42

(51) Int Cl.:
B41J 2/01 (2006.01) B41J 29/377 (2006.01)

(21) Application number: **12855481.3**

(86) International application number:
PCT/JP2012/081710

(22) Date of filing: **06.12.2012**

(87) International publication number:
WO 2013/085013 (13.06.2013 Gazette 2013/24)

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

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(30) Priority: **07.12.2011 JP 2011268410**

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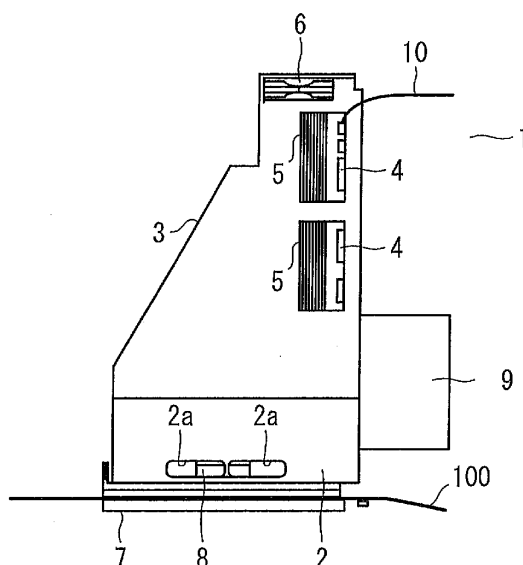
(54) **INK-JET DEVICE**

(57) [Problem] Cooling in a carriage is performed more efficiently.

[Means for Resolution] An ink jet apparatus 1 includes a carriage 2, a cover 3, a head driver integrated circuit 4 and a heat sink 5, the cover 3 covers a head 8,

the head driver integrated circuit 4 and the heat sink 5, a fan 6 for taking air for cooling the heat sink 5 and a vent 2a for discharging the air are provided in the cover 3, and the heat sink 5 is disposed between the fan 6 and the vent 2a.

Figure 1



Description

Technical Field

[0001] The present invention relates to an ink jet apparatus.

Background Art

[0002] Patent Document 1 describes an ink jet recording apparatus equipped with a radiator for radiating heat generated by a drive circuit.

Citation List

Patent Literature

[0003] PTL 1: JP-A-2005-14469 (Date of Publication of Unexamined Patent Application: January 20, 2005)

Summary of Invention

Technical Problem

[0004] When a carriage for mounting a head driver integrated circuit is a closed system by its own structure or by attaching a cover, it is considered that, even when air is taken from the outside for cooling, air warmed by the heat generated by the head driver integrated circuit is accumulated therein, and cooling efficiency is lowered.

[0005] The present invention was made in the light of the circumstances as described above, and it is an object of the present invention to provide an ink jet apparatus capable of performing cooling in the carriage more efficiently.

Solution to Problem

[0006] An ink jet apparatus according to the present invention is characterized by including a carriage for mounting a head for discharging ink to a recording medium, a cover portion that is provided as part of the carriage or provided separately from the carriage, a head driver integrated circuit for driving the head, and a heat radiating portion for radiating heat generated by the head driver integrated circuit, wherein the cover portion covers the head mounted on the carriage, the head driver integrated circuit and the heat radiating portion, an air introduction portion for taking, in a region covered by the cover portion, air for cooling the heat radiating portion from the outside of the region, and a discharge portion for discharging air from the inside of the region to the outside of the region are provided in the carriage when the cover portion is the part of the carriage, or in at least one of the cover portion and the carriage when the cover portion is separated from the carriage, and the heat radiating portion is disposed between the air introduction portion and the discharge portion.

[0007] After the heat radiating portion is cooled with air that is taken from the air introduction portion, warmed air can be discharged from the discharge portion. Thus, cooling in the carriage can be performed more efficiently.

[0008] In the ink jet apparatus according to the present invention, more preferably, the discharge portion is disposed on the side of the head with respect to the heat radiating portion.

[0009] The air warmed by the heat radiating portion is discharged from the portion closer to the head, thus, the air can contribute to the drying of the recording medium on which ink is landed.

[0010] In the ink jet apparatus according to the present invention, more preferably, a line for transmitting data to the head driver integrated circuit is an optical fiber.

[0011] Although a head driver integrated circuit is provided in the present invention, it is desirable that the heat radiating portion is smaller. However, a heat radiation effect is reduced if the heat radiating portion is made smaller. Therefore, by adopting the optical fiber to transmit data to the head driver integrated circuit, it is possible to suppress the reduction in the heat radiation effect. This is because, the optical fiber can transmit a lot of data in a small space, thus, a wide flow path of the air introduced from the air introduction portion can be provided as compared with the case in which a flexible flat cable or the like that requires a large area in the planar direction is used. Note that the optical fiber also contributes to noise reduction.

Advantageous Effect of Invention

[0012] According to the present invention, there is an effect that the inside of the carriage can be cooled more efficiently. Brief Description of Drawings

[0013] [Fig. 1] Fig. 1 is a diagram showing an outline of a configuration of an ink jet apparatus 1 according to an embodiment of the present invention.

Description of Embodiments

[0014] Hereafter, an embodiment of the present invention will be described in detail with reference to Fig. 1. Fig. 1 is a diagram showing an outline of a configuration of an ink jet apparatus 1. Fig. 1 is a perspective view showing the inside of a cover 3.

[0015] The ink jet apparatus 1 includes a carriage 2, the cover (cover portion) 3, a platen 7, a guide mechanism 9 and an optical fiber 10. The ink jet apparatus 1 is an apparatus for discharging ink to a medium (recording medium) 100 placed on the platen 7 for drawing.

[0016] The carriage 2 is intended for mounting a head 8. The carriage 2 on which the head 8 is mounted causes the head 8 to discharge ink, while reciprocating in a direction defined by the guide mechanism 9 to scan the medium 100. The direction is the reciprocating direction from the front side to the back side and from the back side to the front side with respect to Fig. 1.

[0017] A vent (discharge portion) 2a is provided in the side wall of the carriage 2. The vent 2a is an opening for discharging air (gas) introduced into the carriage 2 to the outside the carriage 2. The discharge portion of the ink jet apparatus according to the present invention is not limited to the opening as in the present embodiment, and may be constituted by an air blower such as a fan, for example.

[0018] The vent 2a is provided on the side of the head 8 with respect to a heat sink (heat radiating portion) 5 which will be described later. In other words, it may also be said that the vent 2a is provided on the side near the platen 7 with respect to the heat sink 5. Thus, air warmed by cooling the heat sink 5 is discharged at a position close to the medium 100. The air discharged in the vicinity of the medium 100 contributes to the drying of ink landed on the medium 100. That is, according to the present embodiment, it is possible to further improve the drying efficiency of the medium 100.

[0019] The upper surface of the carriage 2 is opened, and is continuous with space covered by the cover 3.

[0020] The cover 3 is intended for covering the space above the carriage 2, and covers the head 8, a head driver integrated circuit 4 and the heat sink 5.

[0021] Although, in the present embodiment, the carriage 2 and the cover 3 are provided separately and connected to each other, the cover portion according to the present invention is not limited to such form. The cover portion may be provided as part of the carriage. That is, a closed structure in which the carriage covers the head, the head driver integrated circuit and the heat radiating portion may be possible.

[0022] The cover 3 is intended for protecting the head driver integrated circuit 4 or the like covered by the cover 3 from the contamination caused by ink mist. In the ink jet printing, a problem may occur that the ink mist generated at the time of discharging ink from the head contaminates the device itself. For example, the head driver integrated circuit may be contaminated with ink mist. A problem such as malfunction occurs when the head driver integrated circuit is contaminated with ink mist. Therefore, the cover portion is provided to prevent contamination caused by ink mist in the present invention.

[0023] The head driver integrated circuit 4 is an integrated circuit for generating a signal to drive the head 8 based on information to be received such as characters and pictures to be drawn, and causing the head 8 to drive to perform drawing based on the information.

[0024] The heat sink 5 is intended for radiating the heat generated by the head driver integrated circuit 4 to lower the temperature of the head driver integrated circuit 4.

[0025] A fan (air introduction portion) 6 is provided above the cover 3.

[0026] The fan 6 is intended for feeding air into a region covered by the cover 3 from the outside of the region.

[0027] The heat sink 5 is disposed between the fan 6 and the vent 2a. With this placement, the air introduced by the fan 6 cools the heat sink 5.

[0028] The air warmed by cooling the heat sink 5 is pushed by new air introduced from the fan 6 and moves in the direction of the medium 100. Then, the air is discharged to the outside of the carriage 2 from the vents 2a. This contributes to the drying of ink landed on the medium 100 as described above.

[0029] The optical fiber 10 is a line for transmitting data to the head driver integrated circuit 4 from a control portion such as a computer (not shown).

[0030] The control portion transmits information to the head driver integrated circuit 4 via the optical fiber 10, the information representative of patterns to be drawn. The head driver integrated circuit 4 generates a signal for driving the head 8 based on the information.

[0031] By using an optical fiber as the transmission line of data, it is possible to further improve the cooling efficiency of the heat sink 5 by air introduced from the fan 6. This is because, the optical fiber can transmit a lot of data in a small space, thus, a wide flow path of the air introduced from the fan 6 can be provided as compared with the case of using a flexible flat cable or the like that requires a large area in the planar direction. Thus, there is an additional advantage that the size of the heat sink 5 can be reduced. An optical fiber is more preferable because it contributes to noise reduction.

[0032] Note that although the line of data to be adopted in the ink jet apparatus according to the present invention as described above is more preferably an optical fiber, the present invention is not limited thereto. Further, even in using an optical fiber for a transmission/reception line of information representative of patterns and the like to be drawn, the transmission/reception line for the information representative of the status of the ink jet apparatus 1 may be a flexible flat cable.

[0033] Although, in the present embodiment, the vent 2a is provided in the carriage 2, and the fan 6 is provided in the cover 3, the present invention is not limited to such form. That is, the air introduction portion may be provided in at least one of the cover portion and the carriage, and the discharge portion may also be provided in at least one of the cover portion and the carriage in the present invention.

<Supplementary Information>

[0034] As described above, the ink jet apparatus 1 is an ink jet apparatus including the carriage 2 for mounting the head 8 for discharging ink to the medium 100, and the cover 3 which is provided separately from the carriage 2, the carriage 2 includes the head driver integrated circuit 4 for driving the head 8, and the heat sink 5 for radiating heat generated by the head driver integrated circuit 4, the cover 3 covers the head 8 mounted on the carriage 2, the head driver integrated circuit 4 and the heat sink 5, the fan 6 for taking, in a region covered by the cover 3, air for cooling the heat sink 5 from the outside of the region is provided on the cover 3, the vent 2a for discharging air from the inside of the region to the outside

of the region is provided in the carriage 2, and the heat sink 5 is disposed between the fan 6 and the vent 2a.

[0035] After the heat sink 5 is cooled with air that is taken from the fan 6, warmed air can be discharged from the vent 2a. Thus, cooling in the carriage 2 can be performed more efficiently.

[0036] In the ink jet apparatus 1, more preferably, the vent 2a is disposed on the side of the head 8 with respect to the heat sink 5.

[0037] The air warmed by the heat sink 5 is discharged from the portion closer to the head 8, thus, the air can contribute to the drying of the medium 100 on which ink is landed.

[0038] In the ink jet apparatus 1, more preferably, a line for transmitting data to the head driver integrated circuit 4 is the optical fiber 10.

[0039] Although the head driver integrated circuit 4 is provided in this embodiment, it is desirable that the heat sink 5 is smaller. However, a heat radiation effect is reduced if the heat sink 5 is made smaller. Therefore, by adopting the optical fiber 10 to transmit data to the head driver integrated circuit 4, it is possible to suppress the reduction in the heat radiation effect. This is because, the optical fiber 10 can transmit a lot of data in a small space, thus, a wide flow path of the air introduced from the fan 6 can be provided as compared with the case in which a flexible flat cable or the like that requires a large area in the planar direction is used. Note that the optical fiber 10 also contributes to noise reduction.

[0040] The present invention is not limited to each embodiment described above, various modifications may be made within the scope of the claims, and embodiments obtained by combining technical means disclosed in respective different embodiments are also included in the technical scope of the present invention.

Industrial Applicability

[0041] The present invention may be utilized in ink jet printing.

Reference Signs List

[0042]

- | | |
|---------------------------------------|----|
| 1: Ink jet apparatus | 45 |
| 2: Carriage | |
| 2a: Vent (Discharge portion) | |
| 3: Cover (Cover portion) | |
| 4: Head driver integrated circuit | 50 |
| 5: Heat sink (Heat radiating portion) | |
| 6: Fan (Air introduction portion) | |
| 8: Head | |
| 10: Optical fiber | |
| 100: Medium (Recording medium) | 55 |

Claims

1. An ink jet apparatus, **characterized by** comprising:

- | | |
|----|--|
| 5 | a carriage for mounting a head for discharging ink to a recording medium; |
| | a cover portion that is provided as part of the carriage or provided separately from the carriage; |
| 10 | a head driver integrated circuit for driving the head; and |
| | a heat radiating portion for radiating heat generated by the head driver integrated circuit, wherein |
| 15 | the cover portion covers the head, the head driver integrated circuit and the heat radiating portion, |
| | an air introduction portion for taking, in a region covered by the cover portion, air for cooling the heat radiating portion from the outside of the region, and a discharge portion for discharging air from the inside of the region to the outside of the region are provided in the carriage when the cover portion is the part of the carriage, or in at least one of the cover portion and the carriage when the cover portion is separated from the carriage, and |
| 20 | the heat radiating portion is disposed between the air introduction portion and the discharge portion. |
| 25 | |
| 30 | |

2. The ink jet apparatus according to claim 1, **characterized in that** the discharge portion is disposed on the side of the head with respect to the heat radiating portion.

3. The ink jet apparatus according to claim 1 or 2, **characterized in that** a line for transmitting data to the head driver integrated circuit is an optical fiber.

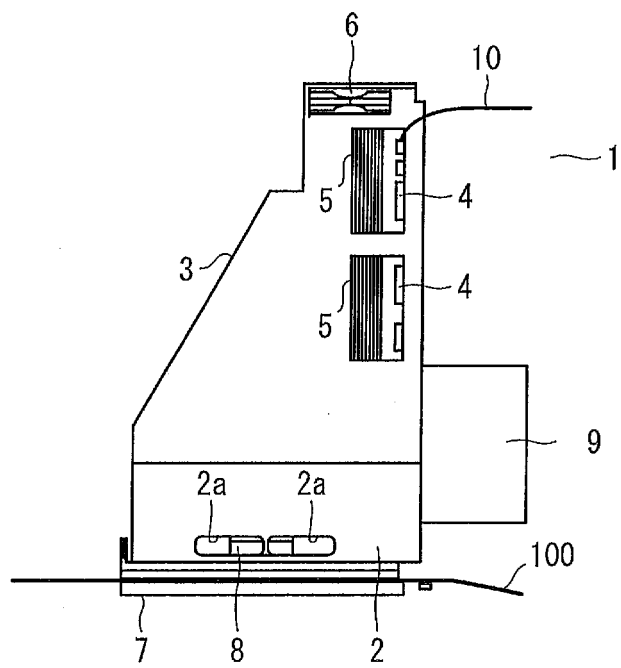
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Figure 1



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2012/081710

A. CLASSIFICATION OF SUBJECT MATTER

B41J2/01 (2006.01) i, B41J29/377 (2006.01) i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B41J2/01, B41J29/377

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho	1922-1996	Jitsuyo Shinan Toroku Koho	1996-2012
Kokai Jitsuyo Shinan Koho	1971-2012	Toroku Jitsuyo Shinan Koho	1994-2012

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 2011-212915 A (Brother Industries, Ltd.), 27 October 2011 (27.10.2011), paragraphs [0052] to [0058]; fig. 2 to 5 (Family: none)	1-3
Y	JP 2000-6388 A (Konica Corp.), 11 January 2000 (11.01.2000), paragraphs [0001] to [0003], [0040] to [0057]; fig. 4 (Family: none)	1-3
Y	JP 2000-52623 A (Ricoh Co., Ltd.), 22 February 2000 (22.02.2000), paragraphs [0009] to [0013], [0019]; fig. 1 (Family: none)	3

☐ Further documents are listed in the continuation of Box C.☐ See patent family annex.

* Special categories of cited documents:

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"&" document member of the same patent family

Date of the actual completion of the international search
26 December, 2012 (26.12.12)Date of mailing of the international search report
15 January, 2013 (15.01.13)Name and mailing address of the ISA/
Japanese Patent Office

Authorized officer

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Form PCT/ISA/210 (second sheet) (July 2009)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2005014469 A [0003]