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RECORDING APPARATUS WITH IMPROVED
HEAD INSTALLATION MECHANISM

The present invention relates to a recording apparatus having a mechanism for mounting a head as means for forming an image on a recording medium by
 5 ejecting an ink. More specifically, the invention relates to a recording apparatus having a head installation mechanism which is improved both in installation of a signal transmitting portion for transmitting a recording signal to a head and in
 10 installation of the head per se.

One of recording systems recently attracting attentions is an ink-jet recording system. The ink-jet recording system is a non-impact type recording
 15 system and records input information, such as characters, images or so forth, by directly adhering ink (forming dot) on a recording medium (paper, cloth, plastic sheet and so forth).

The recording apparatus having such ink-jet type
 20 recording head (ink-jet recording head) is attracting attention as the recording system which satisfies demands for high speed recording, high resolution, high image quality, low noise and so forth. The ink-jet type recording apparatus has

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thus been employed as printers for copy machines, facsimiles, printers, word processors, output terminals of work stations and so forth, handy or portable printers to be employed in personal
5 computers, host computers, optical disk systems, video systems and so forth.

Particularly, in the recent years, from viewpoint of down-sizing, capability of full-color printing and effective use of disposable material, there have
10 been proposed a recording apparatus having a construction, in which a recording head and an ink tank storing ink to be supplied to the recording head are mounted on a carriage.

For example, when an ink-jet cartridge, in which
15 the recording head and the ink tank are integrally constructed is installed on the carriage, it becomes necessary to achieve both of positioning (contact) of a signal transmitting portion for transmitting a recording signal to the recording head and accurate
20 positioning of the ink-jet cartridge per se.

One example of installation structure of ink-jet cartridge on the carriage has been disclosed in U. S. Patent No. 4,907,018. In the above-identified U. S. Patent, there is disclosed a construction
25 permitting positioning of the ink-jet cartridge per se and establishing contact of the signal transmitting portion, simultaneously in one action, by utilizing engagement between a pair of the ink-jet cartridge in the vicinity of the recording head
30 and a part of carriage, serving as a fulcrum.

However, in the construction where positioning of the ink-jet cartridge and establishing contact of the signal transmitting portion are performed simultaneously, it is possible to make the contact
35 at the signal transmitting portion insufficient due to restriction by the positioning of the ink-jet cartridge, or vis-a-vis. Therefore, quite high



accuracy in positioning of both is required.

Therefore, there has also been proposed a construction to perform positioning of the ink-jet cartridge and establishing of contact of the signal transmitting portion separately. However, at the position where both of the ink-jet cartridge and the signal transmitting portion are positioned, the acting forces may interface to each other to cause degradation of reliability particularly on the contact of the signal transmitting portion.

Solution for the problems set forth above has been proposed in U. S. Patent No. 5,138,342. In the disclosed invention, when the positioning of the ink-jet cartridge is to be performed following establishing of contact of the signal transmitting portion, a supporting condition of the signal transmitting portion at the apparatus side is made free with maintaining contact condition at the signal transmitting portion to prevent mutual interface of the acting force to be exerted for positioning of the ink-jet cartridge.

As set forth above, the foregoing positioning structure is applied for the ink-jet cartridge, in which the recording head and the ink tank are integrated. However, in the recent years, there has been proposed a construction to make the ink tank exchangeable with respect to the recording head. In the cartridge which permits exchanging of the ink tank with respect to the recording head, a force may act on the recording head which is positioned and fixed in place upon removal and/or installation of the ink tank during exchanging operation. By the force generated upon exchanging of the ink tank may affect to the position of the recording head and/or the contacting condition of the signal transmitting portion to potentially cause degradation of printing performance.

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It is an object of the present invention to provide a mounting structure which can avoid influence of the force for a positioning of a recording head and/or contacting condition of a signal transmitting portion upon exchanging operation of an ink tank.

Another object of the invention is to provide a mounting structure which permits exchanging operation of the ink tank to be performed easily and certainly by avoiding influence of the force for a positioning of a recording head and/or contacting condition of a signal transmitting portion upon exchanging operation of an ink tank.

A further object of the invention is to provide an ink-jet recording apparatus which can achieve high precision in positioning and whereby permit formation of high quality image.

According to one aspect of the present invention, an ink-jet recording apparatus having a carriage detachably mounting a recording head for recording input image information on a recording medium by ejecting ink through an ejection orifice and an ink tank for supplying the ink to the recording head and a main body portion including a drive mechanism for driving the recording head and the carriage, comprises:

a positioning device for positioning the recording head on the carriage; and
an electrically connecting device for electrically connecting the recording head and the main body portion,

the positioning device and the electrically connecting device being provided on the carriage independently of each other.

According to another aspect of the invention, an information processing system having an input



device, a processing device for processing information input by the input device, and an output device for outputting information processed by the processing device, comprises:

5 a carriage detachably mounting a recording head for recording input image information on a recording medium by ejecting ink through an ejection orifice and an ink tank for supplying the ink to the recording head and a main body portion including
10 drive means for driving the recording head and the carriage;

 a positioning device for positioning the recording head on the carriage; and

 an electrically connecting device for
15 electrically connecting the recording head and the main body portion,

 the positioning device and the electrically connecting device being provided on the carriage independently of each other.

20 The above and other objects, effects, features and advantages of the present invention will become more apparent from the following description of embodiments thereof taken in conjunction with the accompanying drawings.

25 The present invention will be understood more fully from the detailed description given herebelow and from the accompanying drawings of the preferred embodiment of the present invention, which, however,
30 should not be taken to be limitative to the invention, but are for explanation and understanding only.

 In the drawings:

 Fig. 1 is a perspective view of the preferred
35 embodiment of an ink-jet recording apparatus of the present invention;

 Fig. 2 is a perspective view of a carriage



portion employed in the recording apparatus illustrated in Fig. 1;

Fig. 3 is a perspective view of a recording head portion and an ink tank to be installed in the carriage portion shown in Fig. 2;

Fig. 4 is an explanatory perspective view showing the carriage portion shown in Fig. 2;

Fig. 5 is a perspective view showing a construction carriage flexible cable electrically connected to the recording head portion via the carriage portion and a device for connection;

Fig. 6 is a perspective view of the carriage portion shown in Fig. 2 and a timing belt driving the carriage;

Fig. 7 is an explanatory perspective view diagrammatically illustrating the construction of members associated with positioning of the recording head portion with respect to the carriage portion;

Fig. 8 is an explanatory section diagrammatically illustrating construction of the carriage portion, the recording head portion and a recording head fixing member;

Fig. 9 is an explanatory section diagrammatically illustrating the construction of the recording head portion and the recording head fixing device;

Fig. 10 is an explanatory section diagrammatically illustrating the construction of the recording head and the recording head fixing member upon operation;

Fig. 11 is a sectional side elevation of the carriage portion arranged with connection between the recording head and the ink tank; and

Fig. 12 is a perspective view of an absorbing body.

The preferred embodiment of an ink-jet recording



apparatus according to the present invention will be discussed hereinafter in detail with reference to the accompanying drawings. In the following description, numerous specific details are set forth
5 in order to provide a through understanding of the present invention. It will be obvious, however, to those skilled in the art that the present invention may be practiced without these specific details. In
10 other instance, well-known structures are not shown in detail in order to unnecessary obscure the present invention.

Fig. 1 is a perspective view showing the construction of the preferred embodiment of an ink-jet recording apparatus according to the present
15 invention. The ink-jet recording apparatus includes a paper feeder portion 1, a carriage portion 2, a purge portion 3, and a casing portion 4 supporting a printer portion constituted of the paper feeder
20 portion, the cartridge portion and the purge portion.

As shown in Fig. 1, the paper feeder portion 1 includes a platen roller 106, onto which a pinch roller 107 is depressed for feeding a recording medium. The platen roller 106 is driven by a
25 transporting motor (not shown) via a transmission mechanism constituted of a transporting roller gear 108 and a transporting roller idler gear (not shown).

As shown in Fig. 1, the carriage portion 2
30 includes a carriage base 201 supported for movement along a guide shaft 102 and a support shaft 103. The carriage base 201 is held for preventing rotation. Associated with revolution in forward or reverse direction of a carriage motor 104, a pulley
35 1041 rotates to move a timing belt 105 fixed to the carriage portion 2 in a direction shown by arrow a or b. As a result, the carriage portion 2 is



reciprocally driven in the directions of the arrows a and b. On the other hand, by means of a HP sensor (not shown) secured on a chassis 101, the carriage portion 2 is certainly placed at a predetermined position (for example, home position) in non-recording state and so forth.

As shown in Fig. 4, the purge portion 3 is a unit for recovering operation by sucking ink from the recording head 8 when the recording head 8 is blocked by foreign matter, such as dust or so forth and becomes impossible to eject ink.

The casing portion 4 is adapted to support the printer portion. The casing portion 4 has a disposed ink tank 401 for accumulating disposed ink sucked by the purge portion 3.

In Fig. 4, the reference numeral 8 denotes a recording head unit. In the shown embodiment, the recording head unit 8 includes four ink-jet recording heads in integral fashion for mainly performing color printing. The recording head unit 8 is adapted to be detachably mounted on the carriage so that it may be replaced with new recording head unit 8 when the lift of the ink-jet recording head is end or failure is caused in some reason.

In Fig. 4, the reference numeral 9 denotes an ink tank for supplying respectively corresponding ink to the four ink-jet recording heads in the recording head unit 8. The ink tanks 9 are detachably mounted on an ink supply portion 803 provided in the recording head unit 8. In the shown embodiment of the ink-jet recording apparatus, the carriage portion 2 carrying the recording head unit 8 and the ink tanks 9, is coupled with a part of the timing belt 5 transmitting a driving force of the carriage motor 104, and mounted on mutually parallel guide shaft 102 and the support shaft 103 for



sliding movement therealong. By the driving force of the carriage portion 2, the recording head unit 8 reciprocally travels through entire width of a recording paper (recording medium) supplied from a not shown medium feeder device.

<Construction of Carriage>

Next, discussion will be given for the construction of the carriage portion 2 employed in the shown embodiment.

10 As shown in Fig. 2, the carriage portion 2 comprises the carriage base 201, a head lever 202 and an FPC holder 203. The carriage base 201 is of substantially box-shaped configuration with a bottom portion so that the recording head unit and the ink
15 tanks may arrange therein. The head lever 202 and the FPC holder 203 are pivotally engaged to the carriage base 201 at one end, the detail of which will be discussed with respect to Figs. 3 and 10, later. The head lever 202 is adapted to over the
20 opening portion of the carriage base 201 by pivoting as shown by arrow c. In the shown embodiment, as shown in Fig. 4, the recording head unit 8 is constituted of four integrated recording heads for ejecting inks of black (Bk), cyan (C), magenta (M)
25 and yellow (Y) and mounts four ink tanks 9 supplying inks of black, cyan, magenta and yellow to respectively corresponding recording heads.

<Positioning Device>

The recording head unit 8 is arranged at the
30 predetermined position on the carriage base 201 and depressed by the head lever 202 to be held at both ends and thus to be positioned at the predetermined position.

In the shown embodiment, as shown in Fig. 3 or
35 7, five bosses 201a to 201e for positioning the recording head unit 8 on the carriage base 201 are illustrated. In Fig. 7, in order to show the



direction of positioning, arrows A, B and C which are directed in perpendicular directions to each other. Positioning in the direction of arrow B is performed by engaging bosses (projecting portions) 2013d and 2013e (width a) and recess portions (recessed portion) 8011d and 8011e of the head base 801 (width a'). Positioning in the direction of arrow A is performed by abutting bosses 2013a, 2013b and 2013c on the carriage base 291 with bosses 8011a, 8011b and 8011c on the head base. Positioning in the direction of arrow C is performed by abutting bosses 2013d and 2013e on the carriage 201 and the recess portions 8011d and 8011e on the head base 801.

As shown in Fig. 3, the head lever shafts 2023 of the head lever 202 engages with head lever bearing portions 2017, 2017 of the carriage base 201 for permitting pivotal movement of the head lever 202. On the other hand, in order to open the head lever 202 for facilitating installation and removal of the recording head unit 8, the head lever positioning boss 2025 for positioning and securing the head lever 202 at the open position is engaged to the head lever positioning hole 2018 of the carriage base 201.

At left side and right side of the head lever 202, head tension springs 209 are installed. Also, head tensions 210 are installed at both lateral sides of the head lever 202. The head tensions 210 are engaged to the head lever 202 so as not to loose away.

By installing the recording head unit 8 on the carriage base 201 and pivoting the head lever 202, the head tensions 210 depresses a tapered portion of a head tension receptacle 8012 as shown in Fig. 8 to position the recording head unit 8 and the carriage base 201 at a relationship illustrated in Fig. 7.



On the other hand, to head lever fixing portions 2012 of the carriage base 201, engaging portions 2024 of the head lever 202 are engaged to fix the head lever. When the head lever 202 is released from the carriage base 201, a head release portion 2027 is depressed to displace the head lever fixing bosses 2024 outwardly away from the head lever fixing portions 2012. Then, the head lever 202 is permitted pivotal movement relative to the carriage base 201. In Fig. 3, carriage ink tank guide rib portions 2011 on the carriage base 201 and carriage ink tank guide rib portions 2021 of the head lever 202 are provided respectively for serving as guides for installation of ink tanks 9 on the carriage portion 2.

<Electrical Connection Device>

As shown in Fig. 5, a carriage flexible cable 207 is designed for supplying a image signal and a drive signal to the recording head unit 8. The carriage flexible cable 207 is mounted on the head lever 202 of the carriage portion via the FPC holder 203. Contact positioning bosses 2032b of the FPC holder 203 positions the carriage flexible cable 207 on the FPC holder 203 via a rubber pad 206. Furthermore, the carriage flexible cable 207 is snap fitted onto the FPC holder 203 by means of a FPC retainer 208. At the longitudinal both ends of the FPC holder 203, head hooks 205 are pivotally provided. These head hooks 205 are engage with shafts 2032 for pivoting thereabout. On the other hand, the head hooks 205 are biased inwardly by FPC spring 204 and thus fixed at the predetermined position by not shown stopper portions of the FPC holder 203. The FPC holder 203 has FPC holder bearing portion 2033 shown in Fig. 10 engaged with a FPC holder shaft 2022 of the head lever 202 for pivoting thereabout. An opening of the FPC holder



bearing portion 2033 is formed to be greater relative to the holder shaft 2022 to have a sufficient play in the engaged condition. The image signal and the drive signal supplied from the carriage flexible cable 207 is supplied to the ink-jet recording unit 8 from a contact portion 8022 of a contact portion 8022 shown in Fig. 4 to perform ink-jet printing.

The carriage portion 2 constructed as set forth above is fixed to the timing belt 105. The timing belt 105 is set on a belt stopper 211 which is, in turn, secured on the carriage base 201. The carriage flexible cable 207 is fixed to the carriage base 201 by a carriage PCB 213 and CRPCB cover 214, A linear encoder 212 serves as a sensor for controlling position of the carriage 2 and is secured on the carriage base 201.

A head lever label 202 showing manner of installation of the recording head unit 8, the ink tanks 9 to the carriage portion is stuck on the head lever 202. Alternatively, it may be possible to punch the operation manner in the head lever 202. <Connection of Recording head Unit and Carriage Flexible Cable>

Fig. 9 is a section showing a condition where the recording head unit 8 and the carriage flexible cable 207 are connected.

By pivoting the head lever 202 in closing direction, the FPC holder 203 pivots in the closing direction, simultaneously. During pivotal motion, a pair of contact positioning bosses 2031a and 2031b of the FPC holder 2092 engages with contact positioning holes 8021a and 8021b respectively to achieve positioning. By further pivotal movement of the head lever 202, the head hook 205 engages with a head hook receptacle portion 8012 provided in the recording head unit 8 to establish the condition



illustrated in Fig. 9.

It should be noted that the contact positioning bosses 2031a and 2031b also serves for positioning of rubber pads 206 and carriage flexible cable 207.

5 At the condition where positioning is achieved, the rubber pads 206 are crushed so that electrical connection between the carriage flexible cable and the recording head unit 8 can be established by depressing the carriage flexible cable 207. For
10 releasing from the installed condition, the head lever 202 is pivoted in the opposite direction. Then, release claws 2026a and 2026b of the head lever 202 causes pivotal motion in the arrow F of the head hooks 205 to release away from the head
15 hook receptacle portions 8012a and 8012b. Also, by disconnecting the contacts of the carriage flexible cable 207 and the recording head unit 8, the power source supplied from the main body portion to the recording head unit is shut off.

20 As shown in Fig. 9, in the state where the recording head unit 8 is installed, the carriage flexible cable 207 is depressed onto the contact 8022 provided on the upper surface of the recording head unit 8, and accurately positioned by contact
25 positioning bosses 2031a and 2031b. The FPC holder 203 forms integrated engagement with the recording head unit 8 by engaging the head hook 205 to the head hook receptacle portion 8012 of the recording head unit 8.

30 On the other hand, the FPC holder bearing portion 2033 of the FPC holder 203 is constructed to have greater diameter than the diameter of the holder shaft 2022, as shown in Fig. 10. Therefore, the FPC holder 203 is mounted on the holder shaft
35 2022 with a play.

Then, by further pivoting the head lever in the closing direction, the tapered position of the head



tension receptacle portion 8012 provided at both sides of the recording head unit 8 is resiliently depressed onto the head tension 204 provided on the head lever 202 to achieve positioning of the recording head unit 8 with respect to the carriage base 201, as shown in Fig. 7 or 8.

As set forth above, the recording head unit 8, for which electrical connection is completed, can be positioned on the carriage base 201 with maintaining an appropriate play. Therefore, electrical connection and positioning of the recording head unit 8 can be performed completely independent of each other so that the recording head unit can be positioned without any influence of the force for establishing the electrical connection.

Accordingly, as shown in Fig. 4, even when the force for detaching and attaching the ink tanks 9 to the recording head unit 8 is exerted on the recording head unit, since the recording head unit is resiliently positioned by the head tension 210 to cause slight movement by the force, it can be restored at the predetermined position after completion of detaching and attaching operation of the ink tanks 9. Furthermore, since the electrically connecting portion is fixed independent of the positioning of the recording head unit 8, the force generated in detaching and attaching the ink tanks 9 will never affect for the electrically connecting portion.

Therefore, even when detaching and attaching of the ink tanks 9 is performed repeatedly, the recording head unit 8 can be stably maintained at the predetermined position. Also, the electrically connecting portion does not subject the force, electrical connection can be maintained in quite stable condition. Therefore, it becomes possible to provide the ink-jet recording apparatus having the



construction of the installing portion achieving high accuracy positioning and high quality image formation.

Fig. 10 is a section showing a engaging
5 condition between the recording head unit 8 and the FPC holder 203.

The FPC holder bearing portion 203 of the FPC holder 203 and the FPC holder shaft 2022 of the head lever 202 are pivotally engaged with maintaining a
10 certain play. The contact positioning boss 2031 of the FPC holder 203 is in a configuration cutting a cylindrical shape along an oblique plane as shown, it may engage the contact positioning holes 8021. The FPC holder 203 is formed as separate member to
15 the head lever 202 and coupled with a play as set forth above. Therefore, even when the recording head unit 8 is electrically connected to the main body portion, it may not interfere positioning of the recording head unit 8 on the carriage base 201.

20 <Installation of Ink Tank>

Fig. 11 is a section showing a condition where the recording head unit 8 and the ink tanks 9 are installed on the carriage portion 2.

The ink tank 9 is of the type including an
25 absorbing body 902 and a raw ink and adapted to supply ink to the ink-jet recording head of the recording head unit 8. When the ink tank is installed on the recording head unit 8, the ink supply portion 803 of the recording head unit 8
30 squeeze the absorbing body 902 to depress the ink tank 9 in the direction shown by arrow I. Then, the ink tank 9 is fixed by a stopper 2015 of the carriage base 201. The ink tank 9 can be smoothly installed in the recording head unit 8 in the aid of
35 a guide portion 204 of the carriage base 201. Upon removal of the ink tank 9, the ink tank can be detached by pushing up a handle 9015 in the



direction shown by the arrow J. Disposed ink from the ink supply portion 803 of the recording head unit 8 and the supply opening 9011 of the ink tank 9 is supplied to the purge unit 3 at the lower portion
5 by an ink disposing portion 2016. Also, it is possible to provide an absorbing body as illustrated in Fig. 12.

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CLAIMS:

1. An ink-jet recording apparatus having a carriage detachably mounting a recording head for recording
5 input image information on a recording medium by ejecting ink through an ejection orifice and an ink tank for supplying said ink to said recording head and a main body portion including a drive mechanism for driving said recording head and said carriage,
10 characterized by comprising:
a positioning device for positioning said recording head on said carriage; and
an electrically connecting device for electrically connecting said recording head and said
15 main body portion,
said positioning device and said electrically connecting device being provided on said carriage independently of each other.
- 20 2. An ink-jet recording apparatus as claimed in claim 1, characterized in that said positioning device detachably fix said recording head on said carriage by depressing a predetermined portion of said recording head.
- 25 3. An ink-jet recording apparatus as claimed in claim 1, characterized in that said electrically connecting device is detachably fixed at the predetermined position of said recording head.
- 30 4. An ink-jet recording apparatus as claimed in claim 1, characterized in that said electrically connecting device performs operation for establishing electrical connection between said
35 recording head and said main body associating with positioning operation for said recording head on said carriage by said positioning device.

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5. An ink-jet recording apparatus as claimed in claim 1, characterized in that said electrically connecting device is movable relative to said positioning device.
6. An ink-jet recording apparatus as claimed in claim 1, characterized in that said recording head is movable relative to said positioning device in the condition where electrical connection for said recording head by said electrically connecting device is completed.
7. An ink-jet recording apparatus as claimed in claim 1, characterized in that said recording head is resiliently positioned to said carriage.
8. An ink-jet recording apparatus as claimed in claim 1, characterized in that said ink tank incorporates an absorbing body, and said ink tank is fixed to said carriage by said absorbing body.
9. An ink-jet recording apparatus as claimed in claim 1, characterized in that said carriage is provided a tapered portion in the vicinity of coupling portion between said recording head and said ink tank.
10. An ink-jet recording apparatus as claimed in claim 9, characterized in that an absorbing body is provided in said tapered portion.
11. An ink-jet recording apparatus as claimed in claim 1, wherein said positioning device is provided with a guide portion for said ink tank.
12. An ink-jet recording apparatus as claimed in





claim 1, characterized in that said positioning device is provided with a display portion showing a manner of installation of said recording head and said ink tank on said carriage.

5

13. An ink-jet recording apparatus as claimed in claim 1, characterized in that said recording head employs an electrothermal transducer ejecting ink drop through ejection orifice utilizing nucleate
10 boiling caused in the ink by thermal energy, as means for generating energy for ejecting ink.

14. An information processing system having an input device, a processing device for processing
15 information input by said input means, and an output device for outputting information processed by said processing device, characterized by comprising:

20 a carriage detachably mounting a recording head for recording input image information on a recording medium by ejecting ink through an ejection orifice and an ink tank for supplying said ink to said recording head and a main body portion including drive device for driving said recording head and said carriage;

25 a positioning device for positioning said recording head on said carriage; and

an electrically connecting device for electrically connecting said recording head and said main body portion,

30 said positioning device and said electrically connecting device being provided on said carriage independently of each other.

15. An information processing system as claimed in
35 claim 14, characterized in that said positioning device detachably fix said recording head on said carriage by depressing a predetermined portion of





said recording head.

16. An information processing system as claimed in
claim 14, characterized in that said electrically
5 connecting device is detachably fixed at the
predetermined position of said recording head.

17. An information processing system as claimed in
claim 14, characterized in that said electrically
10 connecting device performs operation for
establishing electrical connection between said
recording head and said main body associating with
positioning operation for said recording head on
said carriage by said positioning device.

18. An information processing system as claimed in
claim 14, characterized in that said electrically
connecting device is movable relative to said
positioning device.

19. An information processing system as claimed in
claim 14, characterized in that said recording head
is movable relative to said positioning device in
the condition where electrical connection for said
25 recording head by said electrically connecting
device is completed.

20. An information processing system as claimed in
claim 14, characterized in that said recording head
30 is resiliently positioned to said carriage.

21. An information processing system as claimed in
claim 14, characterized in that said ink tank
incorporates an absorbing body , and said ink tank
35 is fixed to said carriage by said absorbing body.

22. An information processing system as claimed in





claim 14, characterized in that said carriage is provided a tapered portion in the vicinity of coupling portion between said recording head and said ink tank.

5

23. An information processing system as claimed in claim 22, characterized in that an absorbing body is provided in said tapered portion.

10 24. An information processing system as claimed in claim 14, characterized in that said positioning device is provided with a guide portion for said ink tank.

15 25. An information processing system as claimed in claim 14, characterized in that said positioning device is provided with a display portion showing a manner of installation of said recording head and said ink tank on said carriage.

20

26. An information processing system as claimed in claim 14, characterized in that said recording head employs an electrothermal transducer ejecting ink drop through ejection orifice utilizing nucleate
25 boiling caused in the ink by thermal energy, as means for generating energy for ejecting ink.

27. An information processing system as claimed in claim 14, which system is selected from a group
30 including a copy machine, a facsimile, printer, word-processor, personal computer and a textile printer.

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ABSTRACT

RECORDING APPARATUS WITH IMPROVED
HEAD INSTALLATION MECHANISM

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An ink-jet recording apparatus includes a positioning device for positioning a recording head (8) on a carriage (2) and an electrically connecting device for establishing electrical connection
10 between the recording head (8) and a main body portion. The positioning device and the electrically connecting device are provided on the carriage independently of each other. Therefore, recording head (8) and an ink tank (9) can be
15 certainly and simply installed on the recording apparatus. Also, an information processing system employs such recording apparatus to output input information, such as characters, image or so forth on a recording medium.

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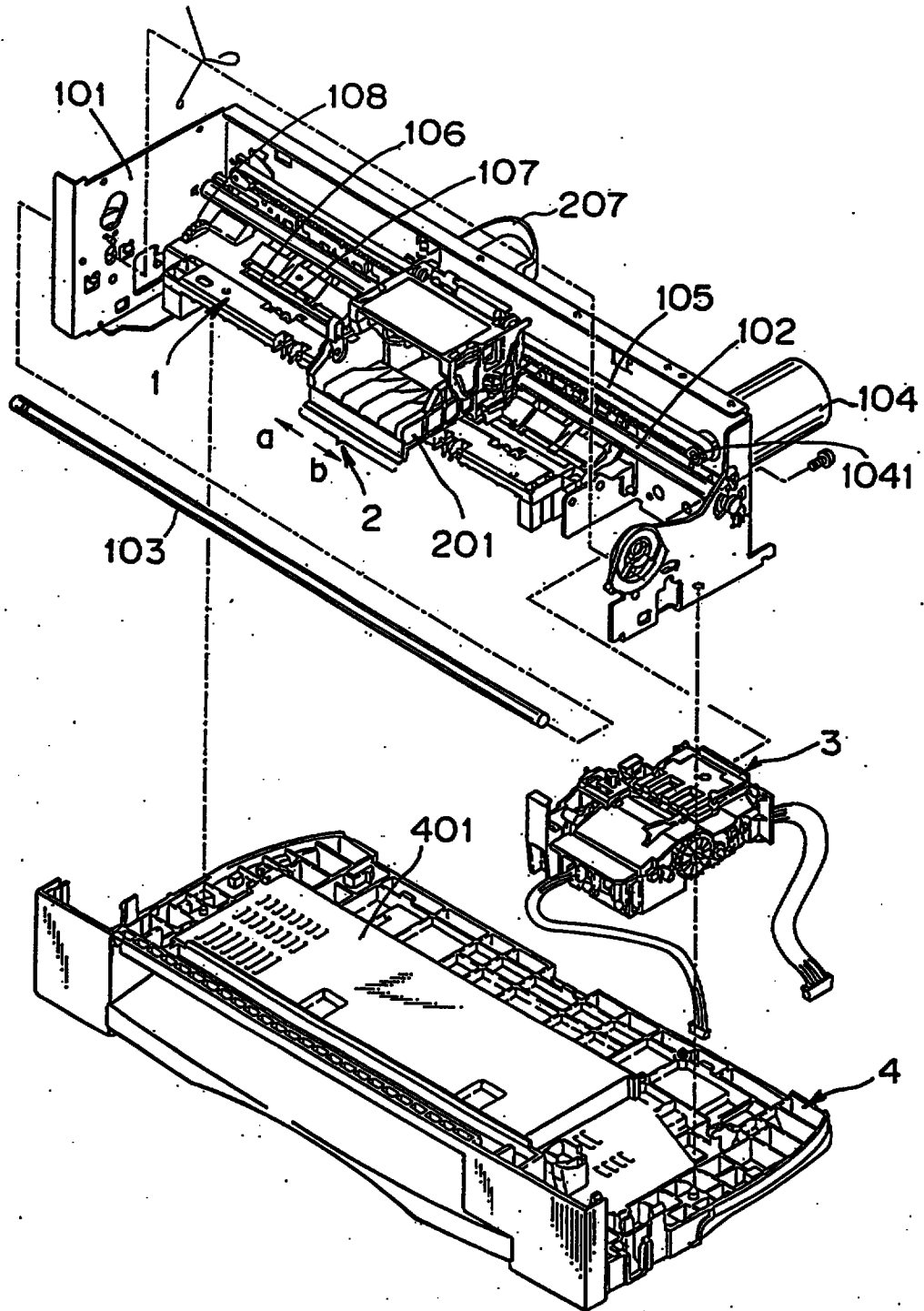


FIG. 1

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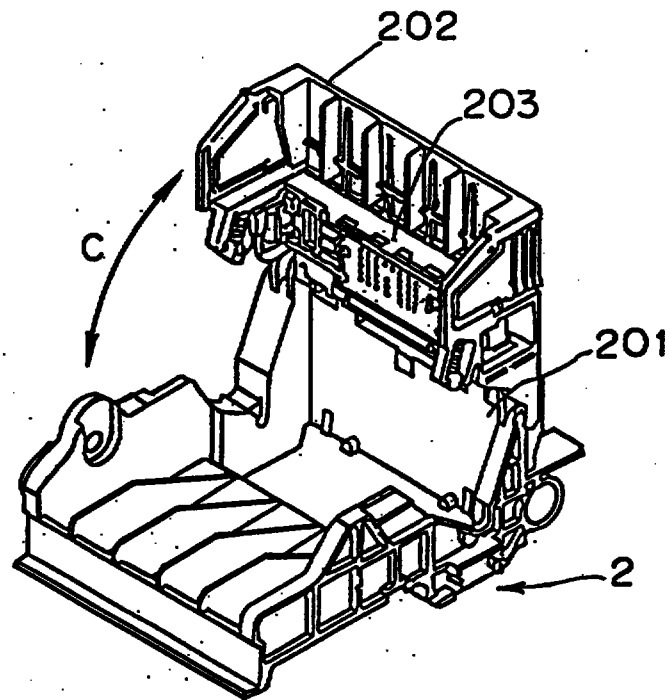


FIG.2

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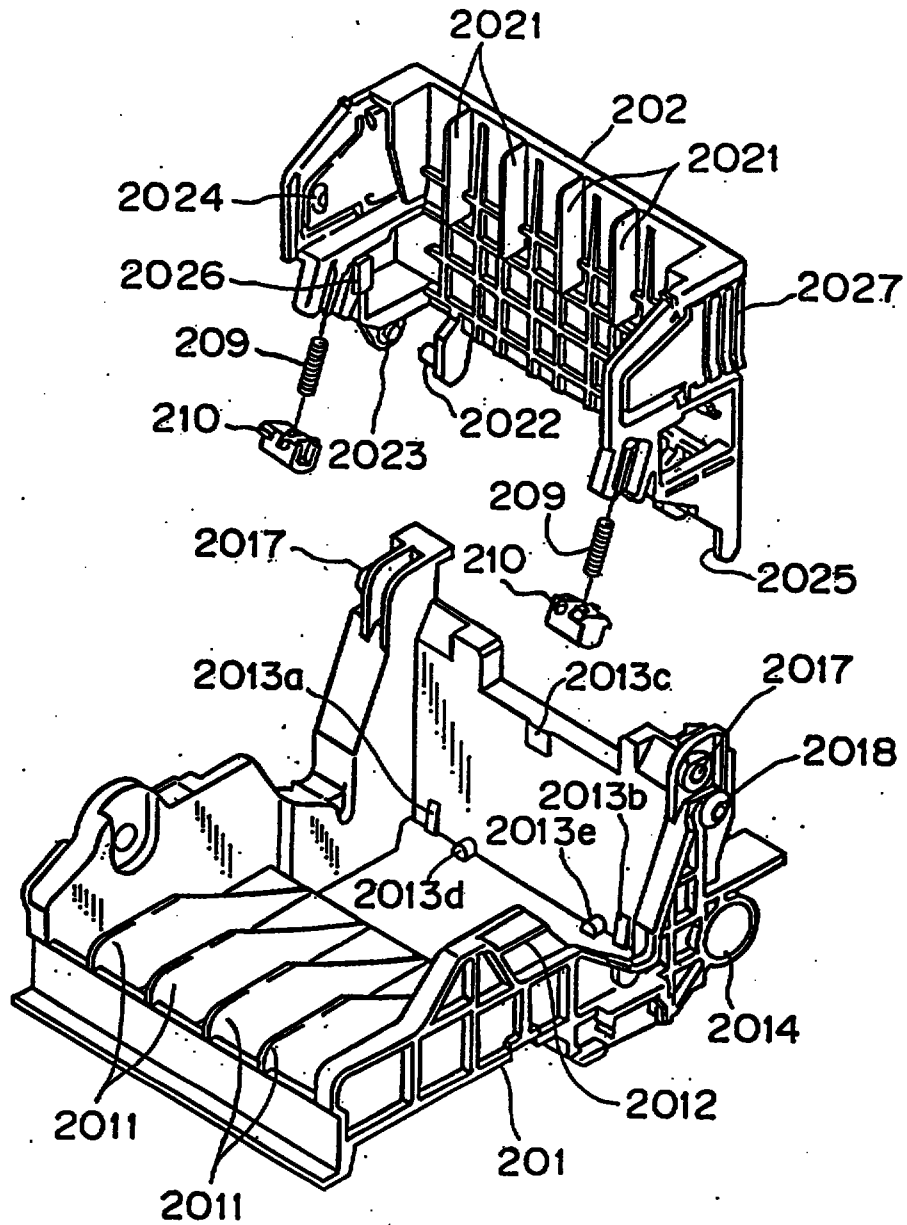
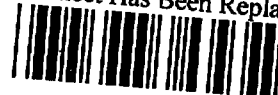


FIG. 3

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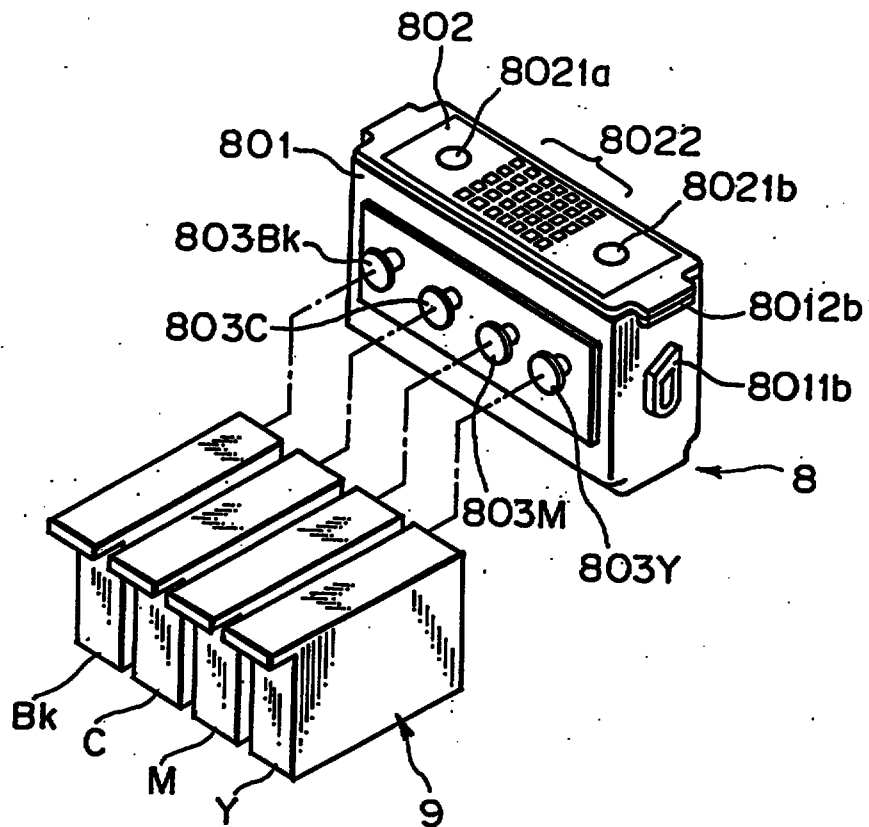


FIG. 4

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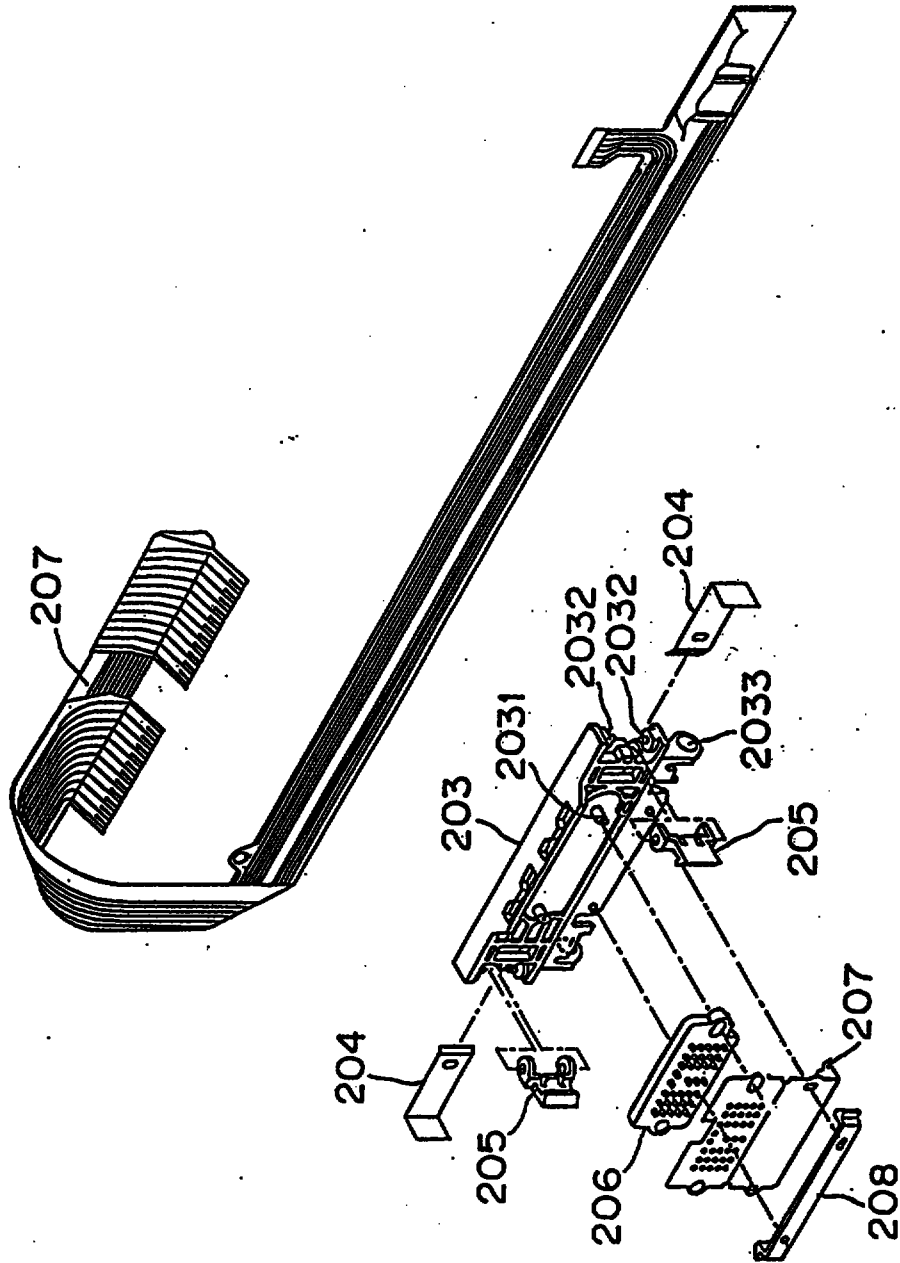


FIG. 5

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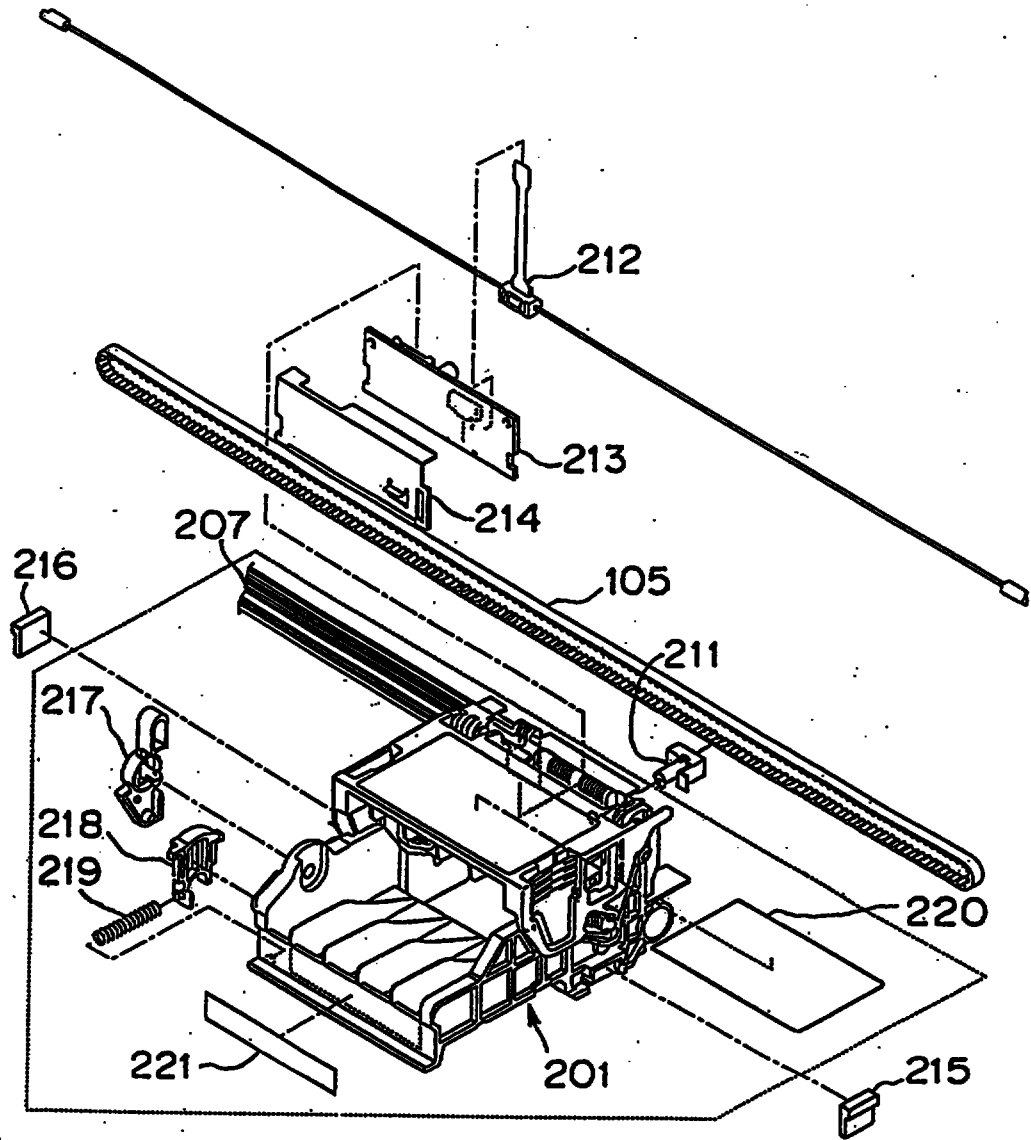


FIG. 6

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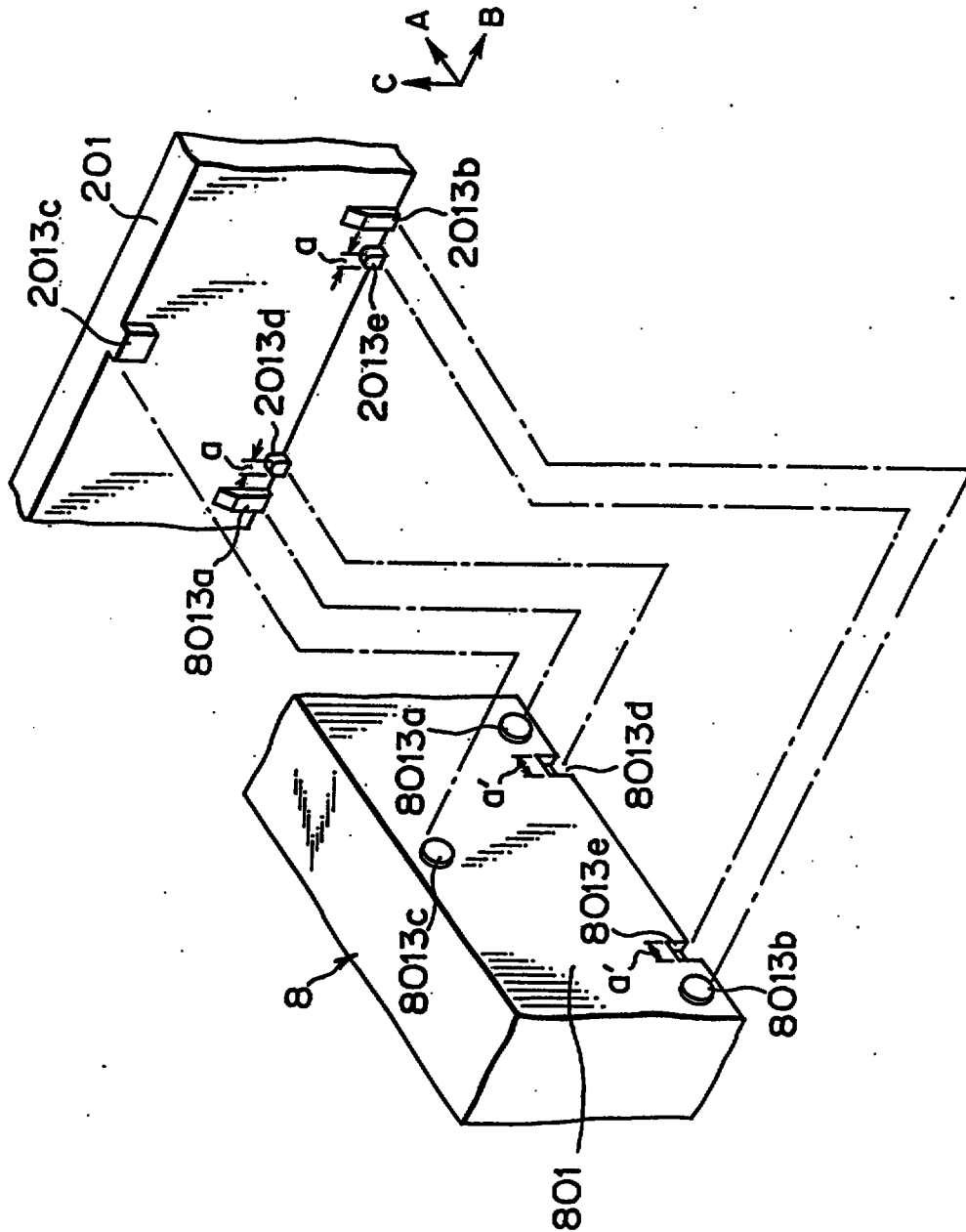


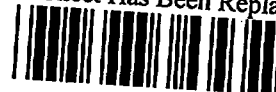
FIG. 7

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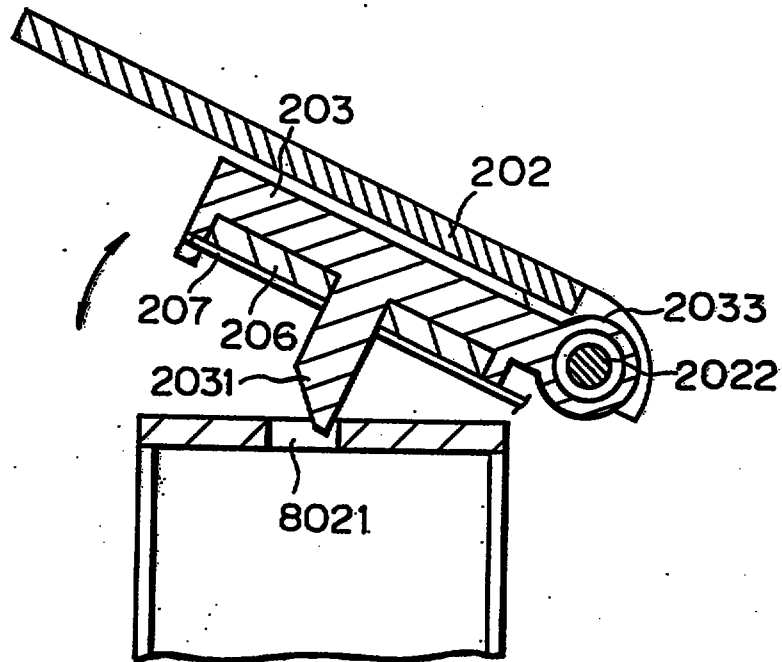


FIG. 10



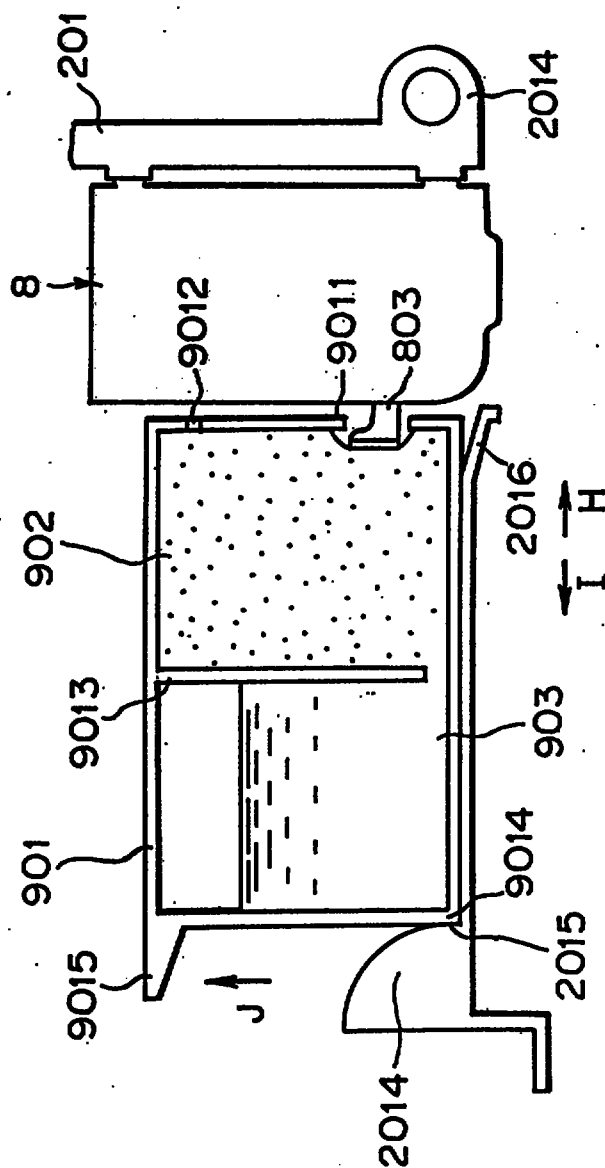


FIG. 11

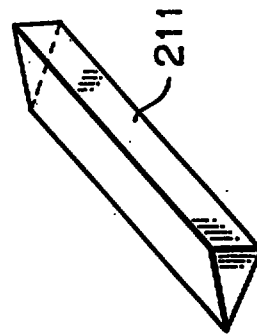


FIG. 12

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RECORDING APPARATUS AND INFORMATION PROCESSING SYSTEM

The present invention relates to a recording apparatus according to the preamble of claim 1 and an information processing system according to the preamble of claim 2. Such

a recording apparatus has a mechanism for mounting a head as means for forming an image on a recording medium by ejecting an ink. More specifically, the invention relates to a recording apparatus having a head installation mechanism which is improved both in installation of a signal transmitting portion for transmitting a recording signal to a head and in installation of the head per se.

One of recording systems recently attracting attentions is an ink-jet recording system. The ink-jet recording system is a non-impact type recording system and records input information, such as characters, images or so forth, by directly adhering ink (forming dot) on a recording medium (paper, cloth, plastic sheet and so forth).

The recording apparatus having such ink-jet type recording head (ink-jet recording head) is attracting attention as the recording system which satisfies demands for high speed recording, high resolution, high image quality, low noise and so forth. The ink-jet type recording apparatus has

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thus been employed as printers for copy machines, facsimiles, printers, word processors, output terminals of work stations and so forth, handy or portable printers to be employed in personal computers, host computers, optical disk systems, video systems and so forth.

Particularly, in the recent years, in viewpoint of down-sizing, capability of full-color printing and effective use of disposable material, there have been proposed a recording apparatus having a construction, in which a recording head and an ink tank storing ink to be supplied to the recording head are mounted on a carriage.

For example, when an ink-jet cartridge, in which the recording head and the ink tank are integrally constructed, is installed on the carriage, it becomes necessary to achieve both of positioning (contact) of a signal transmitting portion for transmitting a recording signal to the recording head and accurate positioning of the ink-jet cartridge per se.

One example of installation structure of ink-jet cartridge on the carriage has been disclosed in

US-A-4,907,018.

In the above-identified

US-A-4,907,018, there is disclosed a construction permitting positioning of the ink-jet cartridge per se and establishing contact of the signal transmitting portion, simultaneously in one action, by utilizing engagement between a pair of the ink-jet cartridge in the vicinity of the recording head and a part of carriage, serving as a fulcrum.

However, in the construction where positioning of the ink-jet cartridge and establishing contact of the signal transmitting portion are performed simultaneously, it is possible to make the contact at the signal transmitting portion insufficient due to restriction by the positioning of the ink-jet cartridge, or vice versa. Therefore, quite high

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accuracy in positioning of both is required.

Therefore, there has also been proposed a construction to perform positioning of the ink-jet cartridge and establishing of contact of the signal transmitting portion separately. However, at the position where both of the ink-jet cartridge and the signal transmitting portion are positioned, the acting forces may interfere each other to cause degradation of reliability particularly on the contact of the signal transmitting portion.

Solution for the problems set forth above has been proposed in US-A-5,138,342. In the disclosed invention, when the positioning of the ink-jet cartridge is to be performed following establishing of contact of the signal transmitting portion, a supporting condition of the signal transmitting portion at the apparatus side is made free while maintaining a contact condition at the signal transmitting portion to prevent mutual interference of the acting force to be exerted for positioning of the ink-jet cartridge.

As set forth above, the foregoing positioning structure is applied for the ink-jet cartridge, in which the recording head and the ink tank are integrated. However, in the recent years, there has been proposed a construction to make the ink tank exchangeable with respect to the recording head. In the cartridge which permits exchanging of the ink tank with respect to the recording head, a force may act on the recording head which is positioned and fixed in place upon removal and/or installation of the ink tank during exchanging operation. The force generated upon exchanging of the ink tank may affect to the position of the recording head and/or the contacting condition of the signal transmitting portion to potentially cause degradation of printing performance.

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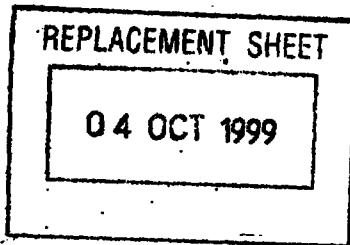
A generic ink jet recording apparatus and a generic information processing system are known from EP-A-0 313 205. A recording head detachably mounted on a carriage is positioned on the carriage by a positioning device and electrically connected to a main body portion by an electrically connecting device. Both the positioning device and the electrically connecting device are provided on the carriage. The electrically connecting device performs an operation for establishing an electrical connection associated with a positioning operation of the recording head. Positioning and electrically coupling thus take place simultaneously.

According to EP-A-0 379 151, positioning and electrically connecting are performed in dependence on each other. The arrangement of a lever mechanism is such that both the electrical connection between the recording head and a carriage and the positioning of the recording head are achieved by one operation of this lever structure.

EP-A-0 622 234, which is prior art under Art. 54 (3) EPC, shows that the electrical connection of the recording head and the positioning thereof are performed simultaneously by one single operation.

It is an object of the present invention to further develop an ink jet recording apparatus according to the preamble of claim 1 and an information processing system according to the preamble of claim 2 such that an exchange of an ink tank coupled to the recording head can be performed easily and reliably without leading to failures in positioning or electrically connecting the recording head.

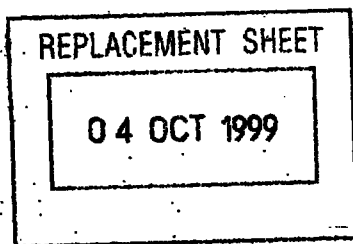
This object is achieved by the features of claim 1 with respect to the ink jet recording apparatus and by the features of claim 2 with respect to the information processing system.



According to the present invention, a mounting structure can avoid influence of the force for a positioning of a recording head and/or contacting condition of a signal transmitting portion upon exchanging operation of an ink tank.

Furthermore, according to the invention, a mounting structure permits exchanging operation of the ink tank to be performed easily and certainly by avoiding influence of the force for a positioning of a recording head and/or contacting condition of a signal transmitting portion upon exchanging operation of an ink tank.

According to the invention, an ink-jet recording apparatus can achieve high precision in positioning and whereby permit formation of high quality image.



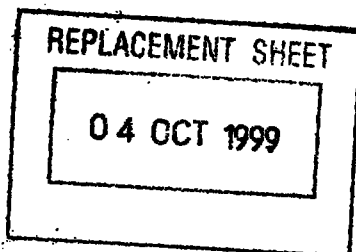
The above object as well other effects, features and advantages of the present invention will become more apparent from the following description of embodiments thereof taken in conjunction with the accompanying drawings.

The present invention will be understood more fully from the detailed description given herebelow and from the accompanying drawings of the preferred embodiment of the present invention, which, however, should not be taken to be limitative to the invention, but are for explanation and understanding only.

In the drawings:

Fig. 1 is a perspective view of the preferred embodiment of an ink-jet recording apparatus of the present invention;

Fig. 2 is a perspective view of a carriage



portion employed in the recording apparatus illustrated in Fig. 1;

Fig. 3 is a perspective view of a recording head portion and an ink tank to be installed in the carriage portion shown in Fig. 2;

Fig. 4 is an explanatory perspective view showing the carriage portion shown in Fig. 2;

Fig. 5 is a perspective view showing a construction of a carriage flexible cable electrically connected to the recording head portion via the carriage portion and a device for connection;

Fig. 6 is a perspective view of the carriage portion shown in Fig. 2 and a timing belt driving the carriage;

Fig. 7 is an explanatory perspective view diagrammatically illustrating the construction of members associated with positioning of the recording head portion with respect to the carriage portion;

Fig. 8 is an explanatory section diagrammatically illustrating construction of the carriage portion, the recording head portion and a recording head fixing member;

Fig. 9 is an explanatory section diagrammatically illustrating the construction of the recording head portion and the recording head fixing device;

Fig. 10 is an explanatory section diagrammatically illustrating the construction of the recording head and the recording head fixing member upon operation;

Fig. 11 is a sectional side elevation of the carriage portion arranged with connection between the recording head and the ink tank; and

Fig. 12 is a perspective view of an absorbing body.

The preferred embodiment of an ink-jet recording

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apparatus according to the present invention will be discussed hereinafter in detail with reference to the accompanying drawings. In the following description, numerous specific details are set forth in order to provide a through understanding of the present invention. It will be obvious, however, to those skilled in the art that the present invention may be practiced without these specific details. In other instance, well-known structures are not shown in detail in order to unnecessary obscure the present invention.

Fig. 1 is a perspective view showing the construction of the preferred embodiment of an ink-jet recording apparatus according to the present invention. The ink-jet recording apparatus includes a paper feed portion 1, a carriage portion 2, a purge portion 3, and a casing portion 4 supporting a printer portion constituted of the paper feed portion, the cartridge portion and the purge portion.

As shown in Fig. 1, the paper feed portion 1 includes a platen roller 106, onto which a pinch roller 107 is depressed for feeding a recording medium. The platen roller 106 is driven by a transporting motor (not shown) via a transmission mechanism constituted of a transporting roller gear 108 and a transporting roller idler gear (not shown).

As shown in Fig. 1, the carriage portion 2 includes a carriage base 201 supported for movement along a guide shaft 102 and a support shaft 103. The carriage base 201 is held for preventing rotation. Associated with revolutions in forward or reverse direction of a carriage motor 104, a pulley 1041 rotates to move a timing belt 105 fixed to the carriage portion 2 in a direction shown by arrow a or b. As a result, the carriage portion 2 is

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reciprocally driven in the directions of the arrows a and b. On the other hand, by means of a HP sensor (not shown) secured on a chassis 101, the carriage portion 2 is certainly placed at a predetermined position (for example, home position) in a non-recording state and so forth.

As shown in Fig. 4, the purge portion 3 is a unit for recovering operation by sucking ink from the recording head 8 when the recording head 8 is blocked by foreign matter, such as dust or so forth and it becomes impossible to eject ink.

The casing portion 4 is adapted to support the printer portion. The casing portion 4 has a disposed ink tank 401 for accumulating disposed ink sucked by the purge portion 3.

In Fig. 4, the reference numeral 8 denotes a recording head unit. In the shown embodiment, the recording head unit 8 includes four ink-jet recording heads in integral fashion for mainly performing color printing. The recording head unit 8 is adapted to be detachably mounted on the carriage so that it may be replaced with new recording head unit 8 when the life of the ink-jet recording head is over or failure is caused for some reason.

In Fig. 4, the reference numeral 9 denotes an ink tank for supplying respectively corresponding ink to the four ink-jet recording heads in the recording head unit 8. The ink tanks 9 are detachably mounted on an ink supply portion 803 provided in the recording head unit 8. In the shown embodiment of the ink-jet recording apparatus, the carriage portion 2 carrying the recording head unit 8 and the ink tanks 9, is coupled with a part of a timing belt 105 transmitting a driving force of the carriage motor 104, and mounted on mutually parallel guide shaft 102 and the support shaft 103 for

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sliding movement therealong. By the driving force of the carriage portion 2, the recording head unit 8 reciprocally travels through entire width of a recording paper (recording medium) supplied from a not shown medium feeder device.

<Construction of Carriage>

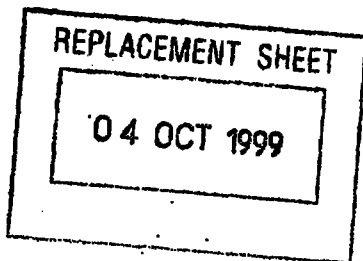
Next, discussion will be given for the construction of the carriage portion 2 employed in the shown embodiment.

As shown in Fig. 2, the carriage portion 2 comprises the carriage base 201, a head lever 202 and an FPC holder 203. The carriage base 201 is of substantially box-shaped configuration with a bottom portion so that the recording head unit and the ink tanks may be arranged therein. The head lever 202 and the FPC holder 203 are pivotally engaged to the carriage base 201 at one end, the detail of which will be discussed with respect to Figs. 3 and 10, later. The head lever 202 is adapted to open the opening portion of the carriage base 201 by pivoting as shown by arrow c. In the shown embodiment, as shown in Fig. 4, the recording head unit 8 is constituted of four integrated recording heads for ejecting inks of black (Bk), cyan (C), magenta (M) and yellow (Y) and mounts four ink tanks 9 supplying inks of black, cyan, magenta and yellow to respectively corresponding recording heads.

<Positioning Device>

The recording head unit 8 is arranged at the predetermined position on the carriage base 201 and depressed by the head lever 202 to be held at both ends and thus to be positioned at the predetermined position.

In the shown embodiment, as shown in Fig. 3 or 7, five bosses 2013a to 2013e for positioning the recording head unit 8 on the carriage base 201 are illustrated. In Fig. 7, in order to show the

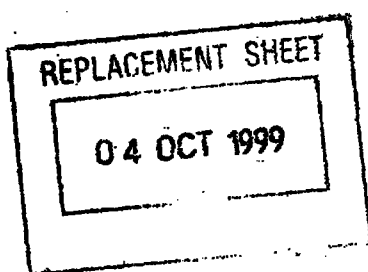


direction of positioning, arrows A, B and C which are directed in perpendicular directions to each other. Positioning in the direction of arrow B is performed by engaging bosses (projecting portions) 2013d and 2013e (width a) and recess portions (recessed portion) 8013d and 8013e of the head base 801 (width a'). Positioning in the direction of arrow A is performed by abutting bosses 2013a, 2013b and 2013c on the carriage base 201 with bosses 8013a, 8013b and 8013c on the head base 801. Positioning in the direction of arrow C is performed by abutting bosses 2013d and 2013e on the carriage 201 and the recess portions 8013d and 8013e on the head base 801.

As shown in Fig. 3, the head lever shafts 2023 of the head lever 202 engages with head lever bearing portions 2017, 2017 of the carriage base 201 for permitting pivotal movement of the head lever 202. On the other hand, in order to open the head lever 202 for facilitating installation and removal of the recording head unit 8, the head lever positioning boss 2025 for positioning and securing the head lever 202 at the open position is engaged to the head lever positioning hole 2018 of the carriage base 201.

At left side and right side of the head lever 202, head biasing springs 209 are installed. Also, head tensions 210 are installed at both lateral sides of the head lever 202. The head tensions 210 are engaged to the head lever 202 so as not to loose away.

By installing the recording head unit 8 on the carriage base 201 and pivoting the head lever 202, the head tensions 210 depresses a tapered portion of a head tension receptacle 8011b as shown in Fig. 8 to position the recording head unit 8 and the carriage base 201 at a relationship illustrated in Fig. 7.



On the other hand, to head lever fixing portions 2012 of the carriage base 201, engaging portions 2024 of the head lever 202 are engaged to fix the head lever. When the head lever 202 is released from the carriage base 201, a head release portion 2027 is depressed to displace the head lever fixing bosses 2024 outwardly away from the head lever fixing portions 2012. Then, the head lever 202 is permitted pivotal movement relative to the carriage base 201. In Fig. 3, carriage ink tank guide rib portions 2011 on the carriage base 201 and carriage ink tank guide rib portions 2021 of the head lever 202 are provided respectively for serving as guides for installation of ink tanks 9 on the carriage portion 2.

<Electrical Connection Device>

As shown in Fig. 5, a carriage flexible cable 207 is designed for supplying a image signal and a drive signal to the recording head unit 8. The carriage flexible cable 207 is mounted on the head lever 202 of the carriage portion via the FPC holder 203. Contact positioning bosses 2031 of the FPC holder 203 position the carriage flexible cable 207 on the FPC holder 203 via a rubber pad 206. Furthermore, the carriage flexible cable 207 is snap fitted onto the FPC holder 203 by means of a FPC retainer 208. At the longitudinal both ends of the FPC holder 203, head hooks 205 are pivotally provided. These head hooks 205 are engaged with shafts 2032 for pivoting thereabout. On the other hand, the head hooks 205 are biased inwardly by FPC spring 204 and thus fixed at the predetermined position by not shown stopper portions of the FPC holder 203. The FPC holder 203 has FPC holder bearing portion 2033 shown in Fig. 10 engaged with a FPC holder shaft 2022 of the head lever 202 for pivoting thereabout. An opening of the FPC holder

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bearing portion 2033 is formed to be greater relative to the holder shaft 2022 to have a sufficient play in the engaged condition. The image signal and the drive signal supplied from the carriage flexible cable 207 is supplied to the ink-jet recording unit 8 from a contact portion 8022 of a contact portion 8022 shown in Fig. 4 to perform ink-jet printing.

The carriage portion 2 constructed as set forth above is fixed to the timing belt 105. The timing belt 105 is set on a belt stopper 211 which is, in turn, secured on the carriage base 201. The carriage flexible cable 207 is fixed to the carriage base 201 by a carriage PCB 213 and CRPCB cover 214. A linear encoder 212 serves as a sensor for controlling position of the carriage 2 and is secured on the carriage base 201.

A head lever label showing manner of installation of the recording head unit 8 and the ink tanks 9 to the carriage portion is stuck on the head lever 202. Alternatively, it may be possible to punch the operation manner in the head lever 202. <Connection of Recording head Unit and Carriage Flexible Cable>

Fig. 9 is a section showing a condition where the recording head unit 8 and the carriage flexible cable 207 are connected.

By pivoting the head lever 202 in closing direction, the FPC holder 203 pivots in the closing direction, simultaneously. During pivotal motion, a pair of contact positioning bosses 2031a and 2031b of the FPC holder 203 engages with contact positioning holes 8021a and 8021b respectively to achieve positioning. By further pivotal movement of the head lever 202, the head hook 205 engages with a head hook receptacle portion 8012 provided in the recording head unit 8 to establish the condition

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illustrated in Fig. 9.

It should be noted that the contact positioning bosses 2031a and 2031b also serves for positioning of rubber pads 206 and carriage flexible cable 207. At the condition where positioning is achieved, the rubber pads 206 are crushed so that electrical connection between the carriage flexible cable and the recording head unit 8 can be established by depressing the carriage flexible cable 207. For releasing from the installed condition, the head lever 202 is pivoted in the opposite direction. Then, release claws 2026a and 2026b of the head lever 202 cause pivotal motion in the arrow F of the head hooks 205 to release away from the head hook receptacle portions 8012a and 8012b. Also, by disconnecting the contacts of the carriage flexible cable 207 and the recording head unit 8, the power source supplied from the main body portion to the recording head unit is shut off.

As shown in Fig. 9, in the state where the recording head unit 8 is installed, the carriage flexible cable 207 is depressed onto the contact 8022 provided on the upper surface of the recording head unit 8, and accurately positioned by contact positioning bosses 2031a and 2031b. The FPC holder 203 forms integrated engagement with the recording head unit 8 by engaging the head hook 205 to the head hook receptacle portion 8012 of the recording head unit 8.

On the other hand, the FPC holder bearing portion 2033 of the FPC holder 203 is constructed to have greater diameter than the diameter of the holder shaft 2022, as shown in Fig. 10. Therefore, the FPC holder 203 is mounted on the holder shaft 2022 with a play.

Then, by further pivoting the head lever in the closing direction, the tapered position of the head

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tension receptacle portion 8012 provided at both sides of the recording head unit 8 is resiliently depressed onto the head tension 204 provided on the head lever 202 to achieve positioning of the recording head unit 8 with respect to the carriage base 201, as shown in Fig. 7 or 8.

As set forth above, the recording head unit 8, for which electrical connection is completed, can be positioned on the carriage base 201 with maintaining an appropriate play. Therefore, electrical connection and positioning of the recording head unit 8 can be performed completely independent of each other so that the recording head unit can be positioned without any influence of the force for establishing the electrical connection.

Accordingly, as shown in Fig. 4, even when the force for detaching and attaching the ink tanks 9 to the recording head unit 8 is exerted on the recording head unit, since the recording head unit is resiliently positioned by the head tension 210 to cause slight movement by the force, it can be restored at the predetermined position after completion of detaching and attaching operation of the ink tanks 9. Furthermore, since the electrically connecting portion is fixed independent of the positioning of the recording head unit 8, the force generated in detaching and attaching the ink tanks 9 will never affect for the electrically connecting portion.

Therefore, even when detaching and attaching of the ink tanks 9 is performed repeatedly, the recording head unit 8 can be stably maintained at the predetermined position. Also, the electrically connecting portion is not subjected to the force, so that electrical connection can be maintained in quite stable condition. Therefore, it becomes possible to provide the ink-jet recording apparatus having the

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construction of the installing portion achieving high accuracy positioning and high quality image formation.

Fig. 10 is a section showing a engaging condition between the recording head unit 8 and the FPC holder 203.

The FPC holder bearing portion 2033 of the FPC holder 203 and the FPC holder shaft 2022 of the head lever 202 are pivotally engaged with maintaining a certain play. The contact positioning boss 2031 of the FPC holder 203 is in a configuration cutting a cylindrical shape along an oblique plane as shown, it may engage the contact positioning holes 8021. The FPC holder 203 is formed as separate member to the head lever 202 and coupled with a play as set forth above. Therefore, even when the recording head unit 8 is electrically connected to the main body portion, it may not interfere positioning of the recording head unit 8 on the carriage base 201.

<Installation of Ink Tank>

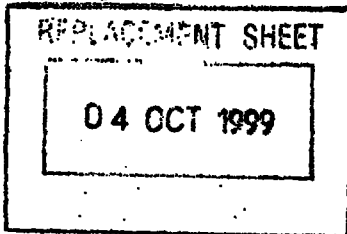
Fig. 11 is a section showing a condition where the recording head unit 8 and the ink tanks 9 are installed on the carriage portion 2.

The ink tank 9 is of the type including an absorbing body 902 and a raw ink and adapted to supply ink to the ink-jet recording head of the recording head unit 8. When the ink tank is installed on the recording head unit 8, the ink supply portion 803 of the recording head unit 8 squeeze the absorbing body 902 to depress the ink tank 9 in the direction shown by arrow I. Then, the ink tank 9 is fixed by a stopper 2015 of the carriage base 201. The ink tank 9 can be smoothly installed in the recording head unit 8 in the aid of a guide portion 204 of the carriage base 201. Upon removal of the ink tank 9, the ink tank can be detached by pushing up a handle 9015 in the

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direction shown by the arrow J. Disposed ink from the ink supply portion 803 of the recording head unit 8 and the supply opening 9011 of the ink tank 9 is supplied to the purge unit 3 at the lower portion by an ink disposing portion 2016. Also, it is possible to provide an absorbing body as illustrated in Fig. 12.

An ink-jet recording apparatus includes a positioning device for positioning a recording head (8) on a carriage (2) and an electrically connecting device for establishing electrical connection between the recording head (8) and a main body portion. The positioning device and the electrically connecting device are provided on the carriage independently of each other. Therefore, the recording head (8) and an ink tank (9) can be certainly and simply installed on the recording apparatus. Also, an information processing system employs such recording apparatus to output input information, such as characters, image or so forth on a recording medium.



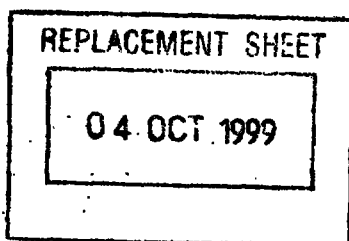
CLAIMS:

1. An ink-jet recording apparatus having a carriage (2) for detachably mounting a recording head (8) for recording input image information on a recording medium by ejecting ink through an ejection orifice

and a main body portion (4) including a drive mechanism for driving said recording head (8) and said carriage (2), comprising: a positioning device (201, 202, 2013, 8011, 8013) for positioning said recording head (8) on said carriage (2); and an electrically connecting device (203, 207, 8022) for electrically connecting said recording head (8) and said main body portion (4), said positioning device (201, 202, 2013, 8011, 8013) and said electrically connecting device (203, 207, 8022) being provided on said carriage (2), wherein said electrically connecting device (203, 207, 8022) is capable of performing an operation for establishing an electrical connection between said recording head (8) and said main body (4) associating with a positioning operation for said recording head (8) on said carriage (2) by said positioning device (201, 202, 2013, 8011, 8013).

characterized in that

said positioning device (201, 202, 2013, 8011, 8013) and said electrically connecting device (203, 207, 8022) are arranged such that the electrical connection and the positioning of the recording head (8) can be performed completely independently of each other.



2. An information processing system having an input device, a processing device for processing information input by said input means, and an output device for outputting information processed by said processing device, comprising:

a carriage (2) for detachably mounting a recording head (8) for recording input image information on a recording medium by ejecting ink through an ejection orifice

and a main body portion (4) including a drive device for driving said recording head (8) and said carriage (2);

a positioning device (201, 202, 2013, 8011, 8013) for positioning said recording head (8) on said carriage (2); and

an electrically connecting device (203, 207, 8022) for electrically connecting said recording head (8) and said main body portion (4),

said positioning device (201, 202, 2013, 8011, 8013) and said electrically connecting device (203, 207, 8022) being provided on said carriage (2), wherein said electrically connecting device (203, 207, 8022) is capable of performing an operation for establishing an electrical connection between said recording head (8) and said main body (4) associating with a positioning operation for said recording head (8) on said carriage (2) by said positioning device (201, 202, 2013, 8011, 8013),

characterized in that

said positioning device (201, 202, 2013, 8011, 8013) and said electrically connecting device (203, 207, 8022) are arranged such that the electrical connection and the positioning of the

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recording head (8) can be performed completely independently of each other.

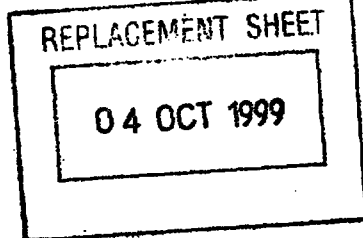
3. An ink-jet recording apparatus as claimed in claim 1 or an information processing system as claimed in claim 2, characterized in that said positioning device (201, 202, 2013, 8011, 8013) detachably fixes said recording head (8) on said carriage (2) by depressing a predetermined portion of said recording head (8).

4. An ink-jet recording apparatus as claimed in claim 1 or an information processing system as claimed in claim 2, characterized in that said electrically connecting device (203, 207, 8022) is detachably fixed at a predetermined position of said recording head (8).

5. An ink-jet recording apparatus as claimed in claim 1 or an information processing system as claimed in claim 2, characterized in that said positioning device (201, 202, 2013, 8011, 8013) supports said recording head (8) and said electrically connecting device (203, 207, 8022), which are integrally engaged with each other, in a state of allowing a displacement with respect to said carriage (2) when said recording head (8) is mounted on said carriage (2).

6. An ink-jet recording apparatus as claimed in claim 1 or an information processing system as claimed in claim 2, characterized in that said electrically connecting device (203, 207, 8022) is movable relative to said positioning device (201, 202, 2013, 8011, 8013).

7. An ink-jet recording apparatus as claimed in claim 1 or an information processing system as claimed in claim 2, characterized in that said recording head (8) is movable relative to said positioning device (201, 202, 2013, 8011, 8013) in the condition where electrical connection for said recording



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head (8) by said electrically connecting device (203, 207, 8022) is completed.

8. An ink-jet recording apparatus as claimed in claim 1 or an information processing system as claimed in claim 2, characterized in that said recording head (8) is resiliently positioned to said carriage (2).

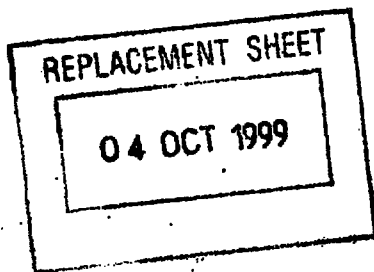
9. An ink-jet recording apparatus as claimed in claim 1 or an information processing system as claimed in claim 2, characterized in that an ink tank (9) is detachably mounted on carriage for supplying said ink to said recording head (8) and incorporates an absorbing body (902), where said ink tank is fixed to said recording head (8) at the portion of said ink tank (9) which incorporates said absorbing body (902).

10. An ink-jet recording apparatus as claimed in claim 1 or an information processing system as claimed in claim 2, characterized in that said carriage (2) is provided with a tapered portion (2016) in the vicinity of the coupling portion between said recording head (8) and an ink tank (9) being detachably mounted on carriage for supplying said ink to said recording head (8).

11. An ink-jet recording apparatus as claimed in claim 10 or an information processing system as claimed in claim 10, characterized in that an absorbing body (211) is provided in said tapered portion (2016).

12. An ink-jet recording apparatus as claimed in claim 1 or an information processing system as claimed in claim 2, wherein said positioning device (201, 202, 2013, 8011, 8013) is provided with a guide portion (2011, 2021) for an ink tank (9) being detachably mounted on carriage for supplying said ink to said recording head (8).

13. An ink-jet recording apparatus as claimed in claim 1 or an information processing system as claimed in claim 2, characterized in that said positioning device (201, 202, 2013, 8011, 8013) is provided with a display portion (220) showing a



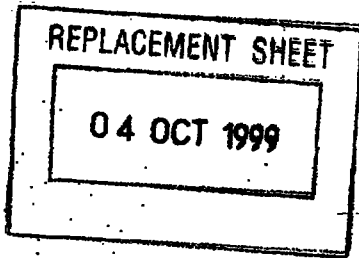
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manner of installation of said recording head (8) and an ink tank (9) being detachably mounted on carriage for supplying said ink to said recording head (8) on said carriage (2).

14. An ink-jet recording apparatus as claimed in claim 1 or an information processing system as claimed in claim 2, characterized in that said recording head (8) employs an electrothermal transducer ejecting ink drops through ejection orifices utilizing nucleate boiling caused in the ink by thermal energy, as means for generating energy for ejecting ink.

15. An information processing system as claimed in claim 14, which system is selected from a group including a copy machine, a facsimile, printer, word-processor, personal computer and a textile printer.



ABSTRACT

RECORDING APPARATUS AND INFORMATION PROCESSING
SYSTEM

An ink-jet recording apparatus includes a positioning device for positioning a recording head (8) on a carriage (2) and an electrically connecting device for establishing electrical connection between the recording head (8) and a main body portion. The positioning device and the electrically connecting device are provided on the carriage independently of each other. Therefore, recording head (8) and an ink tank (9) can be certainly and simply installed on the recording apparatus. Also, an information processing system employs such recording apparatus to output input information, such as characters, image or so forth on a recording medium.

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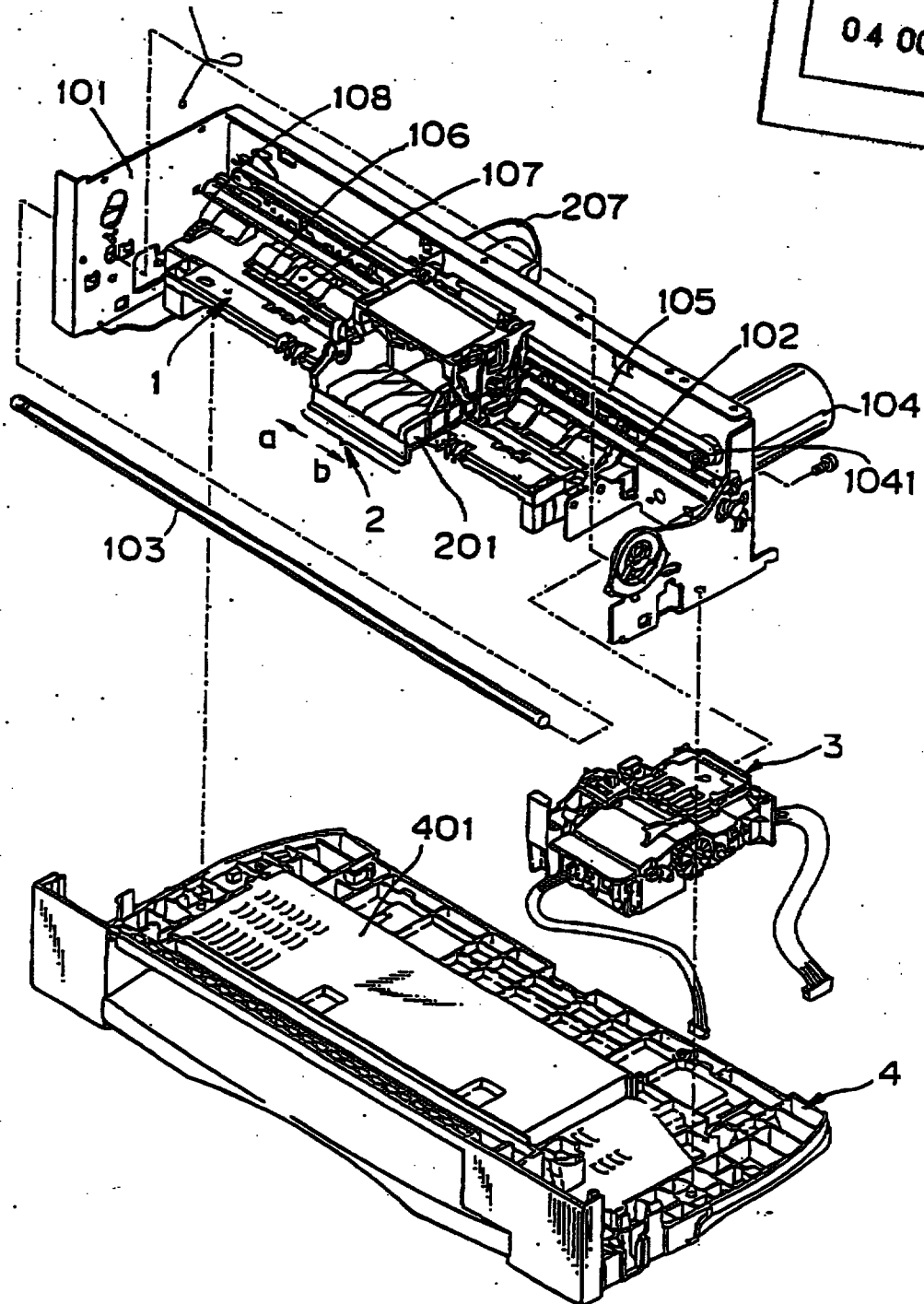


FIG. 1

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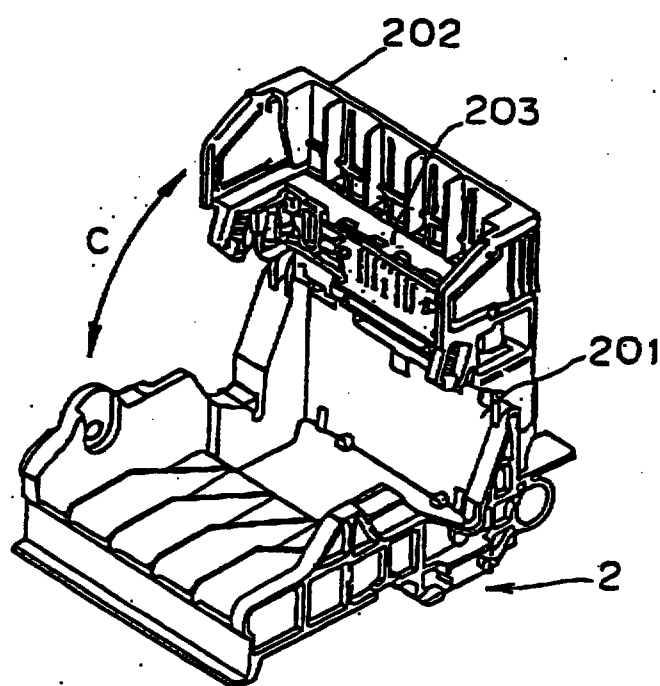
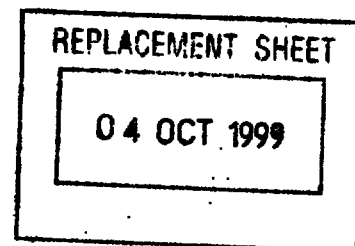


FIG.2

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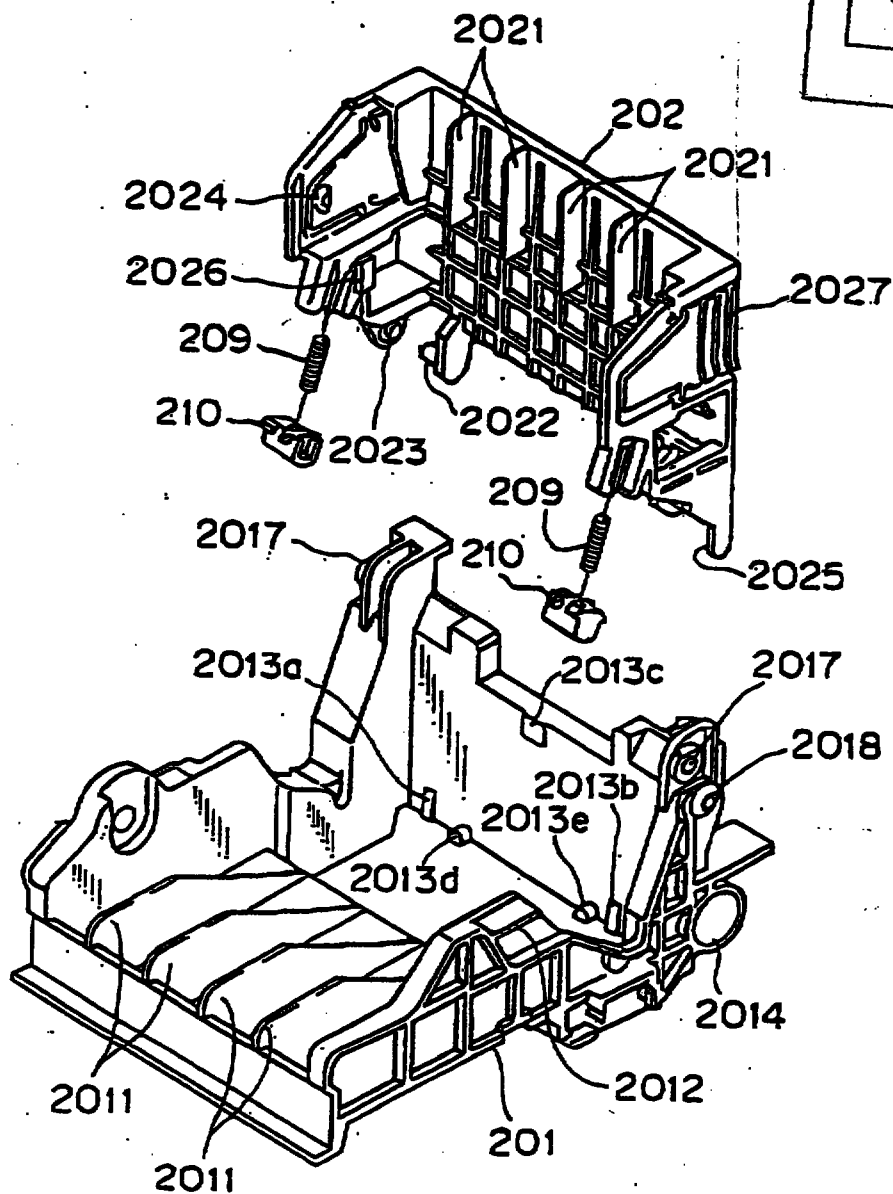
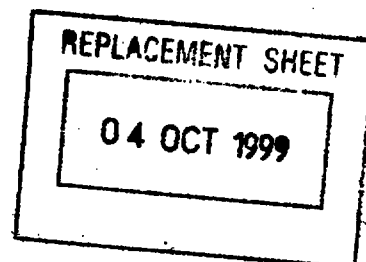


FIG. 3

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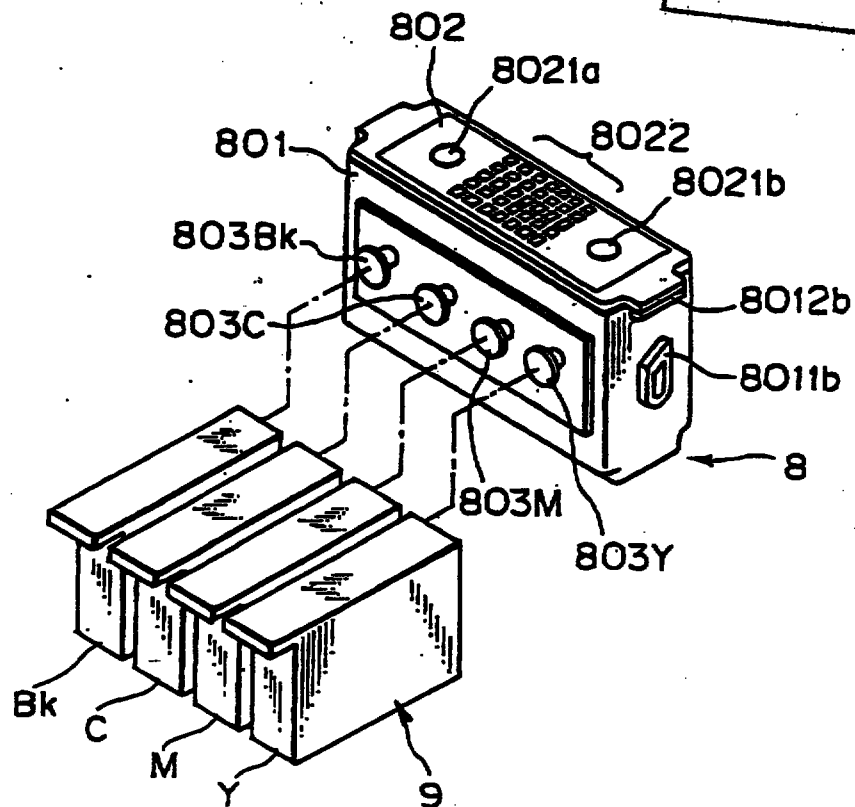
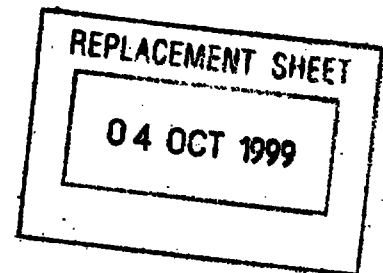


FIG. 4

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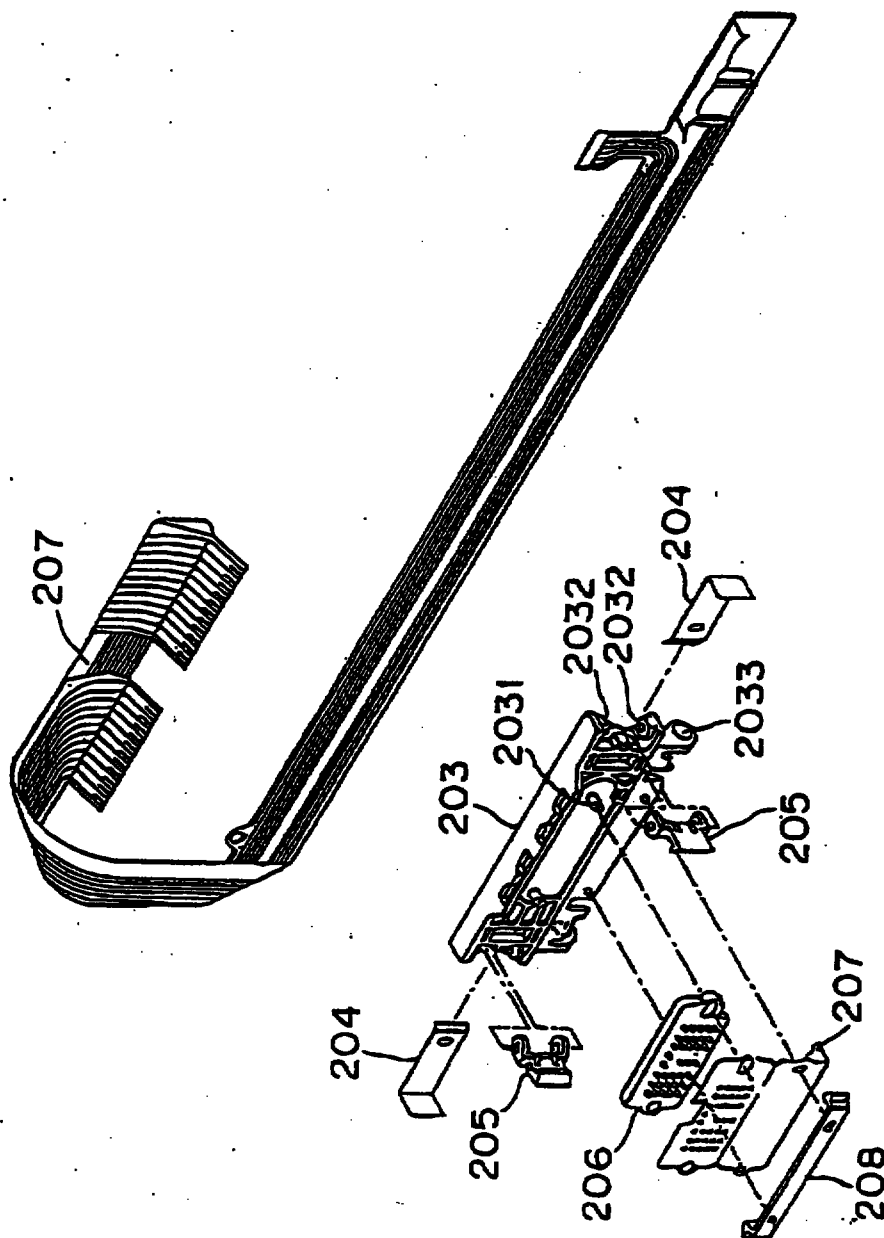
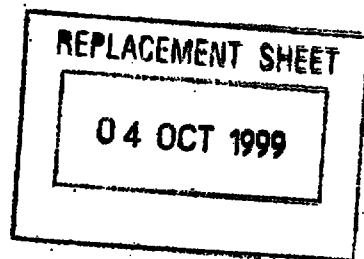


FIG. 5

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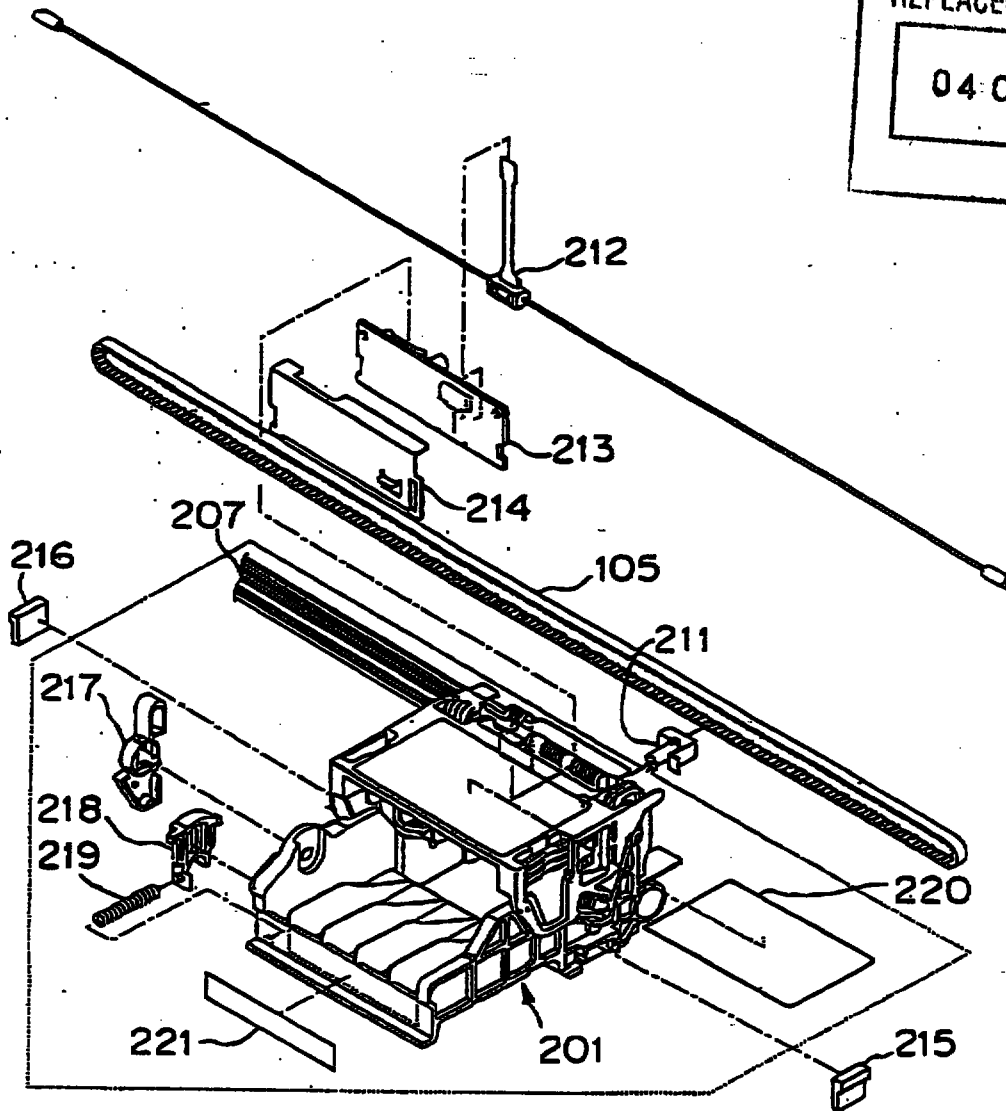
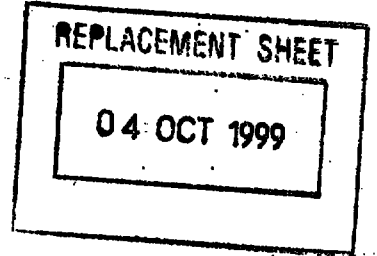
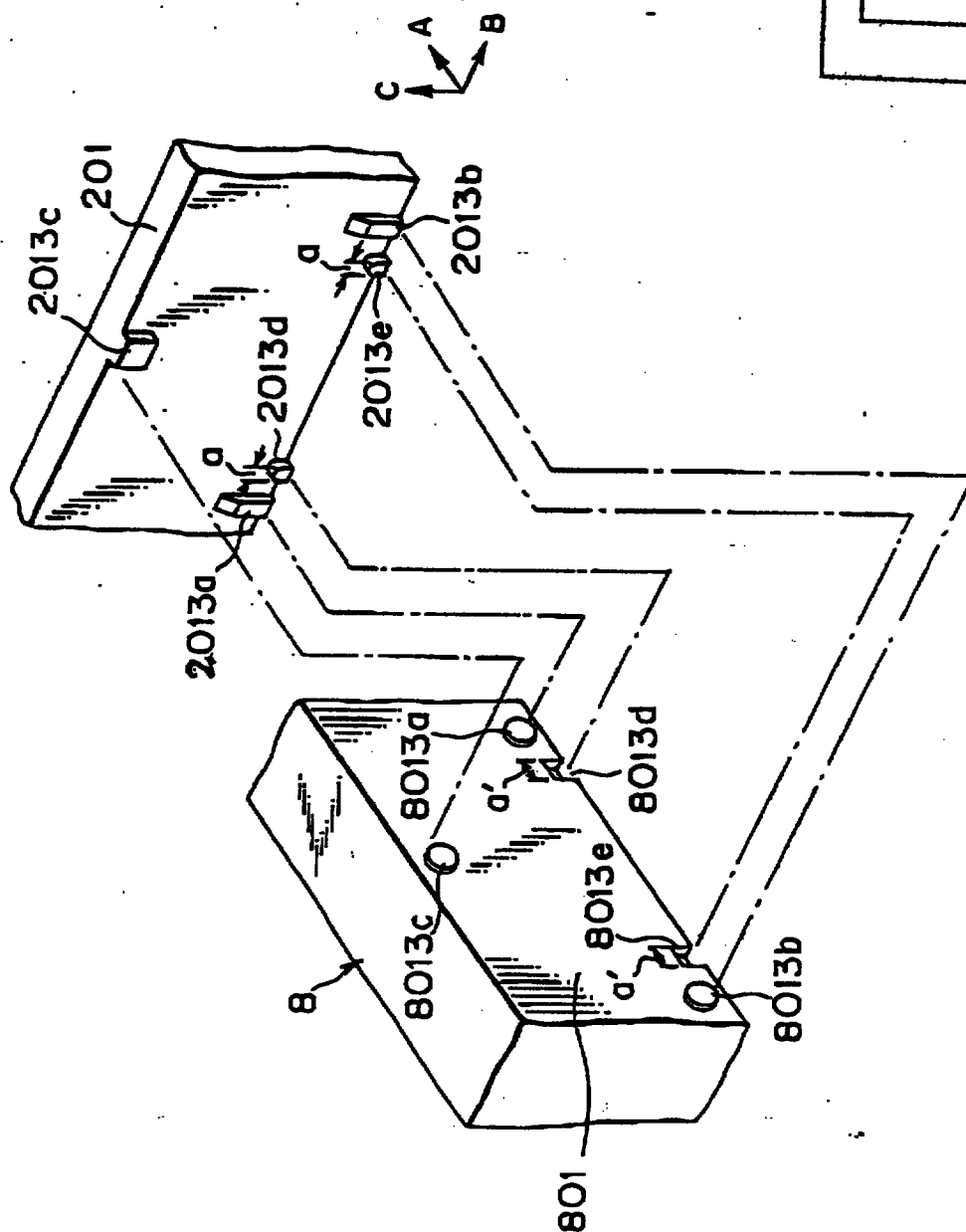
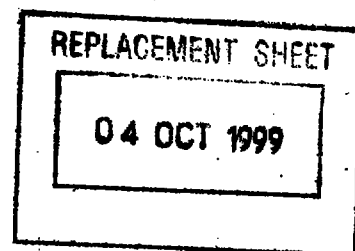


FIG. 6

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REPLACEMENT SHEET
04 OCT 1999

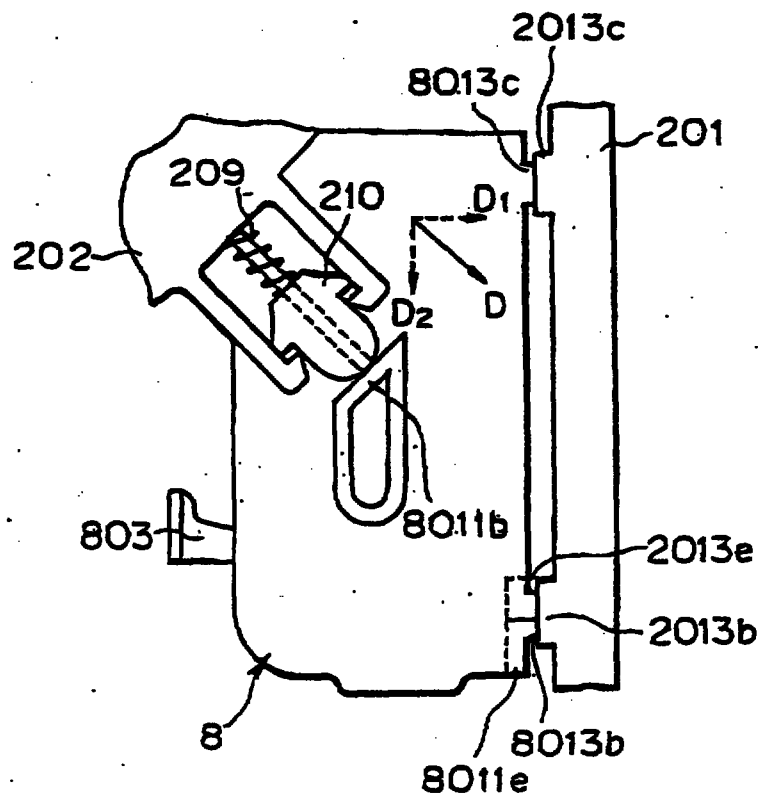


FIG. 8

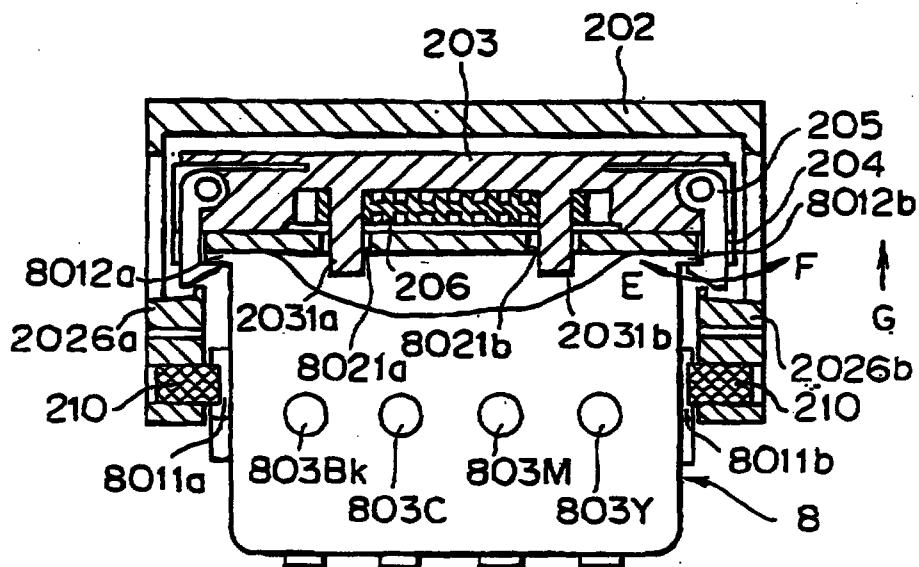


FIG. 9

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REPLACEMENT SHEET

04 OCT 1999

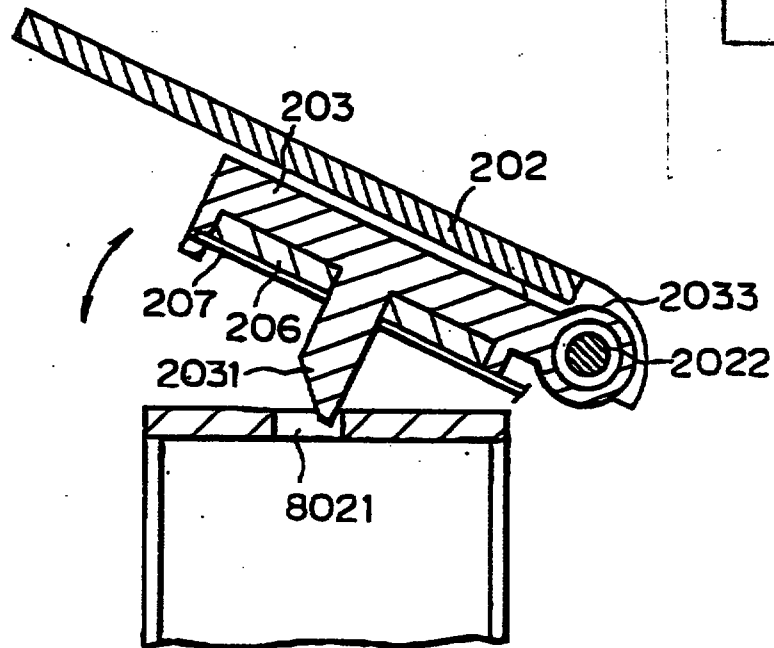


FIG. 10

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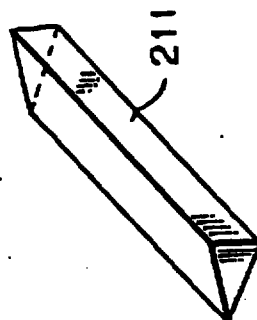
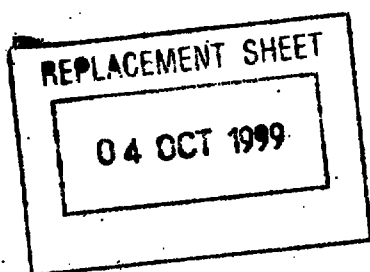


FIG. 12

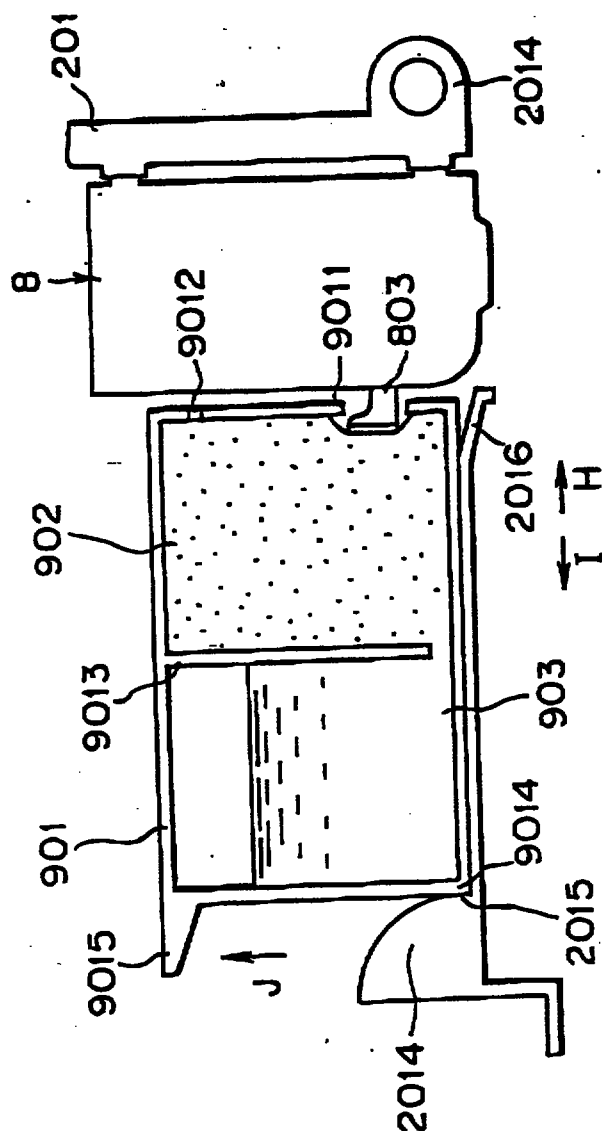


FIG. 11