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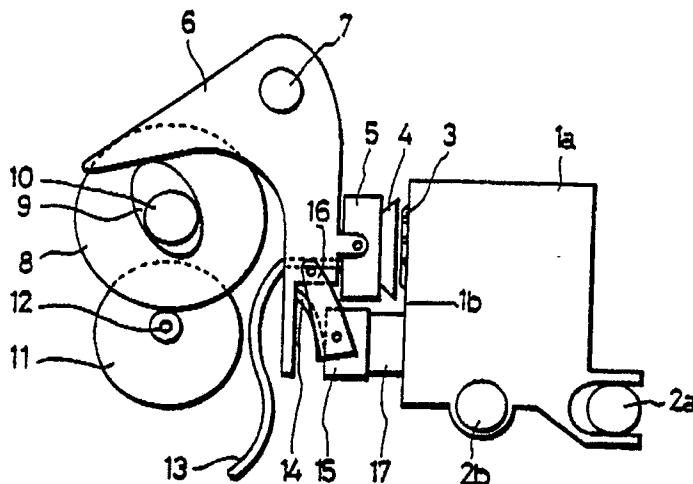
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(54) **Apparatus for use in an ink jet printer.**

(57) Apparatus for use in an ink jet printer comprising an ink jet head (1a) having an ink jet nozzle means (3) disposed on or adjacent to a surface (1b) of the ink jet head (1a); a cap (4) movable into and out of a capping position in which it caps the nozzle means (3); and cap movement means (6-12) for moving the cap (4) into and out of the capping position characterised in that there is an ink absorber (17) which is

arranged to be moved in timed relationship with movement of the cap (4) so that movement of the latter into and out of the capping position is associated with movement of the ink absorber (17) into and out of contact with a portion of the said surface (1b) onto which may fall droplets of ink from the nozzle means (3).

FIG. 1



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APPARATUS FOR USE IN AN INK JET PRINTER

The present invention relates to apparatus for use in an ink jet printer.

A printer known to the Applicants is shown in Figure 2 and, in contrast to the apparatus according to the present invention shown in Figure 1, does not include an ink absorber 17; a holder 15 for holding the ink absorber 17, an arm 16 for supporting the holder 15 of the ink absorber 17 and a resilient member 14 for applying pressure to the ink absorber 17. When effecting cleaning of an ink jet nozzle member 3 in the printer of Figure 2, capping is carried out by applying a rubber cap 4 against an ink jet nozzle member 3 of an ink jet head carriage 1a which stays in the capping position and then cleaning is carried out by the suction operation of an ink suction pump (not shown) through a discharge tube 13 connected to a rubber cap 4.

When starting printing, the rotational torque of a cap driving motor 11 is applied through a gear 8 and cap driving cam 9 to a cap supporting arm 6 to effect pivoting movement thereof around a shaft 7 to thereby open the cap 4. At this time, there may be left an ink droplet or droplets which could not be sucked away by the ink suction pump etc. and which therefore remain attached to a head surface 1b of the ink jet head carriage 1a. The or each left ink droplet flows downwardly due to its own weight to a lower section of the ink jet head carriage 1a.

In the apparatus shown in Figure 2, the ink jet head carriage 1a is displaced, as shown in Figure 3, into its printing position such that a print paper sheet 18 is opposite to the ink jet nozzle member 3 in order to effect printing. At this time, the head surface 1b is shown as being stained by an ink droplet 21 which could not flow downwardly. Such a droplet may contact the paper sheet 18 so as to stain the latter.

According, therefore, to the present invention, there is provided apparatus for use in an ink jet printer comprising an ink jet head having ink jet nozzle means disposed on or adjacent to a surface of the ink jet head; a cap movable into and out of a capping position in which it caps the nozzle means; and cap movement means for moving the cap into and out of the capping position characterised in that there is an ink absorber which is arranged to be moved in timed relationship with movement of the cap so that movement of the latter into and out of the capping position is associated with movement of the ink absorber into and out of contact with a portion of the said surface onto which may fall droplets of ink from the nozzle means.

Preferably, the ink absorber is arranged to be moved into contact with the said surface before the

cap has moved towards, or has moved fully into, the capping position.

The ink absorber is also preferably arranged to be moved out of contact with the said surface after the cap has moved out of, or has started to move out of, the capping position.

The ink absorber is preferably connected to the cap movement means for movement thereby into and out of said contact.

A resilient member may be provided between the ink absorber and a part of the cap movement means, the resilient member urging the ink absorber away from said part and towards the said surface.

Thus, in the case of the present invention, during the capping operation, the ink absorber may be arranged to contact the head surface prior to the contact of the cap with the ink jet nozzle means. When releasing the capping, the ink absorber may be removed from the head surface after the cap is released from the ink jet nozzle means so as to produce a time lag which will enable the ink absorber to absorb an ink droplet flowing downwardly from the ink jet nozzle means. By reason of such a construction, the ink droplet can be efficiently absorbed from the head surface.

The invention is illustrated, merely by way of example, in the accompanying drawings, in which:-

Figure 1 is a schematic view showing an embodiment of an apparatus for use in an ink jet printer according to the present invention;

Figure 2 is a schematic view of an apparatus known to the Applicants;

Figure 3 is a schematic view showing the initial state of printing in the case of the apparatus of Figure 2;

Figure 4 is a schematic view showing the capping state of the apparatus shown in Figure 1 and

Figure 5 is a diagrammatic view showing the cap release state of the apparatus shown in Figure 1.

Referring to Figure 1, an ink jet head carriage 1a, which includes an ink jet head, is supported by a pair of ink jet head shafts 2a and 2b. The carriage 1a may be displaced between a printing position and a capping position, such displacement being in the widthwise direction of a paper sheet in the ink jet printer.

In the printing position, an ink jet nozzle member 3, which is provided with a plurality of nozzles and which is disposed on or adjacent to a surface 1b of the ink jet head carriage 1a, is disposed opposite to the printing paper sheet. When cleaning the ink jet nozzle member 3 mounted on the

ink jet head carriage 1a, the ink jet head carriage 1a is displaced to the capping position. Then, the rotational torque of a cap driving motor 11 is transmitted from a motor gear 12 to a gear 8 and to a cap driving cam 9 which is coaxially supported relative to the gear 8 on a shaft 10, so as to effect pivoting movement of a cap supporting arm 6 around a shaft 7 and thereby effect movement of a cap holding member 5 so as to cause opening and closing of a rubber cap 4.

As shown in Figure 4, the cap supporting arm 6 is provided at one end thereof with the cap 4 which is shaped such as to enclose and seal the ink jet nozzle member 3 from the atmosphere in the capping state. An ink absorber 17 is disposed below the cap 4 so as to be movable into and out of contact with a lower part of the head surface 1b on or adjacent to which the ink jet nozzle member 3 is mounted. A holder 15 is provided to hold the ink absorber 17. A supporting arm 16 is provided to undergo free pivotal movement relative to the cap supporting arm 6 so that there will be a time lag between the timing of the contacting and removal of the ink absorber 17 to and from the head surface 1b during the opening and closing of the cap 4 and in association with the timing of the contacting and releasing of the cap 4 with respect to the ink jet nozzle member 3. A resilient member 14 is provided to press the ink absorber 17 against the ink head surface 1b even while the cap supporting arm 6 carries out the releasing operation of the cap 4. As shown in Figure 5, the resilient member 14 is designed so that the ink absorber 17 can be removed from the head surface 1b after the opening operation of the cap 4 is finished. Thus the resilient member 14, which is provided between the ink absorber 17 and the cap supporting arm 6, urges the ink absorber 17 away from the cap supporting arm 6 and towards the surface 1b.

The cleaning of the ink jet nozzle member 3 can be effected by means of a discharge tube 13 through the suction force of an ink suction pump (not shown) after contacting the rubber cap 4 with the ink jet nozzle member 3.

The opening of the cap 4 is sequentially carried out as follows from the capping state shown in Figure 4. As shown in Figure 1, the cap driving cam 9 acts on the cap supporting arm 6 so that the cap supporting arm 6 receives a rotational force in the clockwise direction around the shaft 7 so as to retain the ink absorber 17 in contact with the lower section of the head surface 1b while the rubber cap 4 is slightly spaced away from the ink jet nozzle member 3. Lastly in the state of Figure 5 where both the rubber cap 4 and the ink absorber 17 are removed from the ink jet nozzle member 3 and the head surface 1b, respectively, the releasing operation of the cap is completed. This sequential series

of steps can be advantageously prolonged depending on the physical nature of ink.

The ink absorber 17 can be composed of porous and flexible material or of a polyomer absorbing sheet such as that used in a commercial paper diaper.

As described above, in order to effect printing after the cleaning, the ink absorber 17 disposed below the ink jet nozzle member 3 can receive an ink droplet 21 which could not be collected by suction means such as a pump etc. and which is deposited on the head surface 1b after the removal of the rubber cap 4 from the ink jet nozzle member 3, thereby preventing staining of the printing paper sheet 18 which would be caused by the ink droplet 21 deposited on the head surface 1b.

Claims

1. Apparatus for use in an ink jet printer comprising an ink jet head (1a) having ink jet nozzle means (3) disposed on or adjacent to a surface (1b) of the ink jet head (1a); a cap (4) movable into and out of a capping position in which it caps the nozzle means (3); and cap movement means (6-12) for moving the cap (4) into and out of the capping position characterised in that there is an ink absorber (17) which is arranged to be moved in timed relationship with movement of the cap (4) so that movement of the latter into and out of the capping position is associated with movement of the ink absorber (17) into and out of contact with a portion of the said surface (1b) onto which may fall droplets of ink from the nozzle means (3).
2. Apparatus as claimed in claim 1 characterised in that the ink absorber (17) is arranged to be moved into contact with the said surface (1b) before the cap (4) has moved towards, or has moved fully into, the capping position.
3. Apparatus as claimed in claim 1 or 2 characterised in that the ink absorber (17) is arranged to be moved out of contact with the said surface (1b) after the cap (4) has moved out of, or has started to move out of, the capping position.
4. Apparatus as claimed in any preceding claim characterised in that the ink absorber (17) is connected to the cap movement means (6-12) for movement thereby into and out of said contact.
5. Apparatus as claimed in claim 4 characterised in that a resilient member (14) is provided between the ink absorber (17) and a part (6) of the cap movement means (6-12), the resilient member (14) urging the ink absorber (17) away from said part (6) and towards the said surface (1b).
6. An ink jet capping device having a cap rubber (4) provided in an ink jet printer for cleaning an ink jet nozzle (3) of an ink jet head and for preventing

dust from penetrating the ink jet nozzle of the ink jet head during non-use thereof, wherein the improvement comprises an ink absorber (17) for absorbing ink droplet dropped from the ink jet nozzle (3) and deposited on a face (1b) of the ink jet head (1a); and means (11) for engaging and releasing the ink absorber (17) to and from the face (1b) of the ink jet head (1a) in linked relation to capping operation of the cap rubber relative to the ink jet nozzle.

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FIG. 1

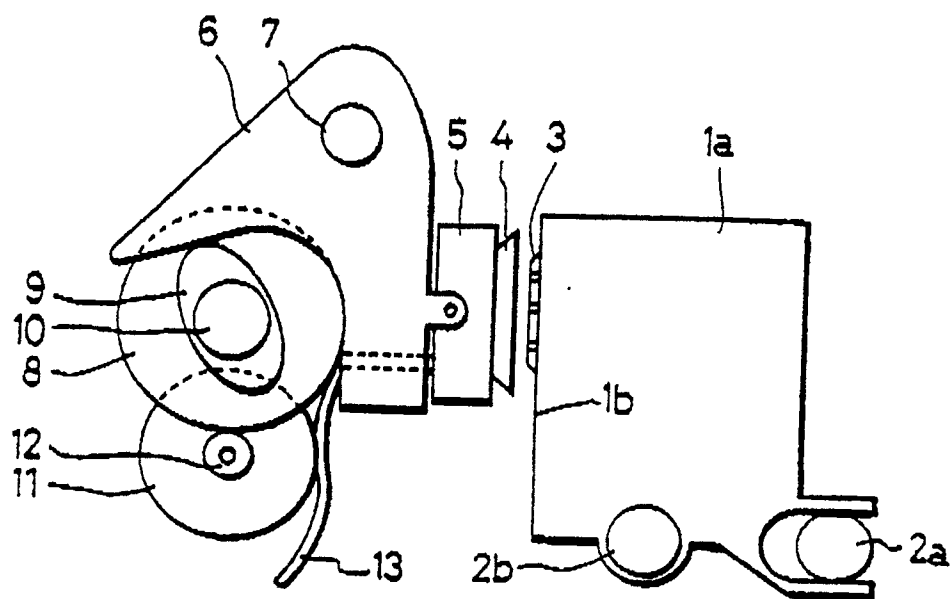
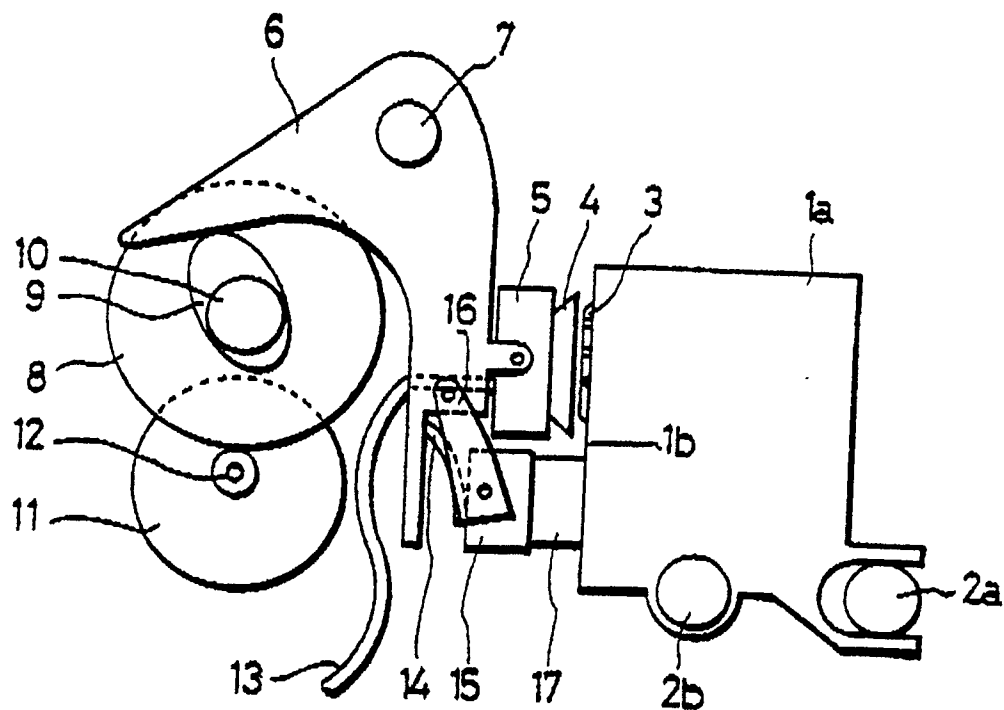


FIG. 2

FIG. 3

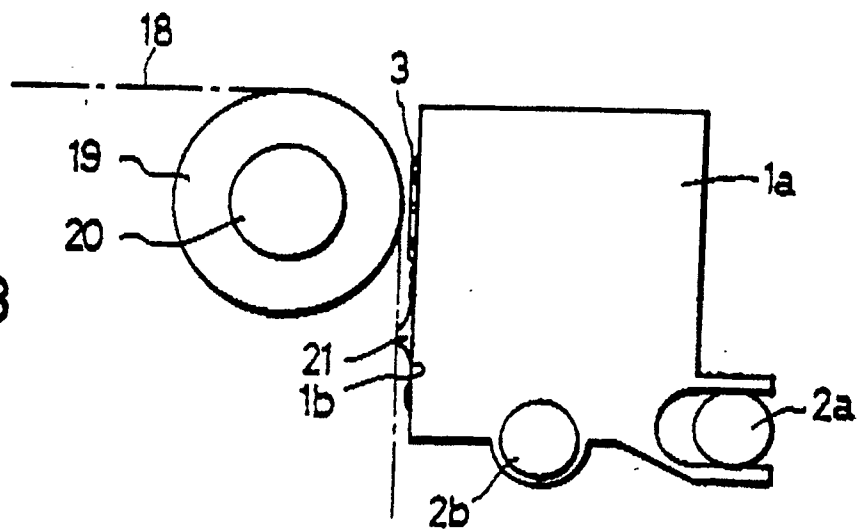


FIG. 4

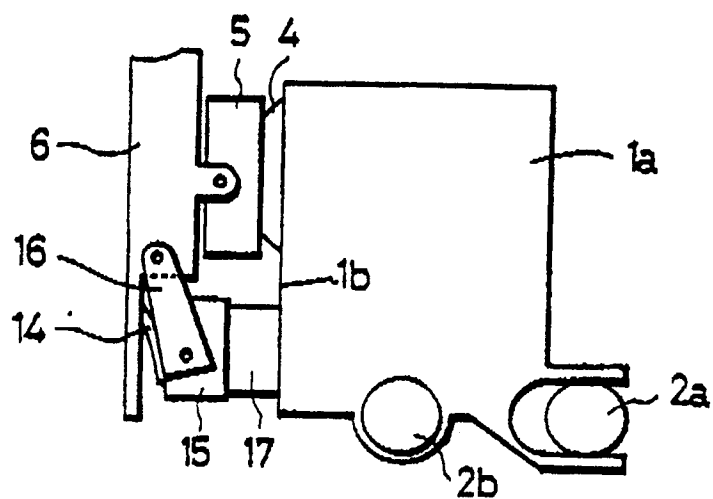
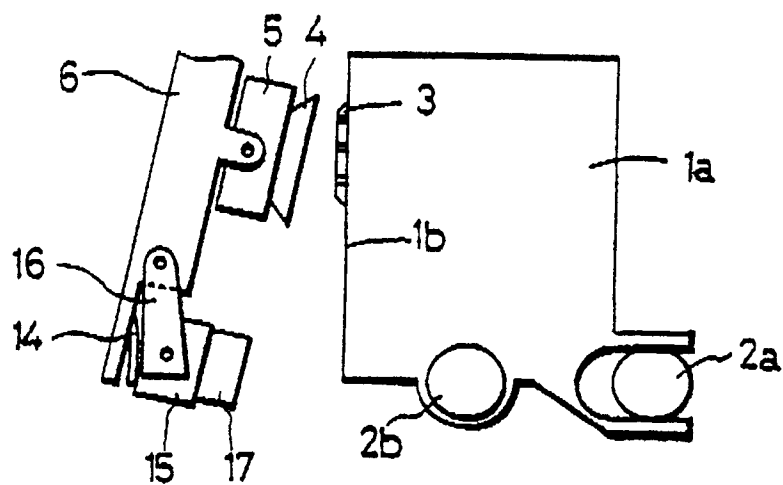


FIG. 5





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EUROPEAN SEARCH REPORT

Application Number

EP 90307799.8

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
X	<u>DE - A1 - 3 503 080</u> (CANON) * Totality * --	1,4,6	B 41 J 2/165
A	<u>DE - A1 - 3 339 031</u> (SHARP) * Totality * --	1,6	
A	<u>EP - A2 - 0 314 513</u> (CANON) -----		
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B 41 J G 01 D
Place of search VIENNA		Date of completion of the search 01-10-1990	Examiner WITTMANN
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