



(51) International Patent Classification:
B41J 2/165 (2006.01) *B41J 2/175* (2006.01)

(21) International Application Number:
PCT/US2010/033104

(22) International Filing Date:
30 April 2010 (30.04.2010)

(25) Filing Language: English

(26) Publication Language: English

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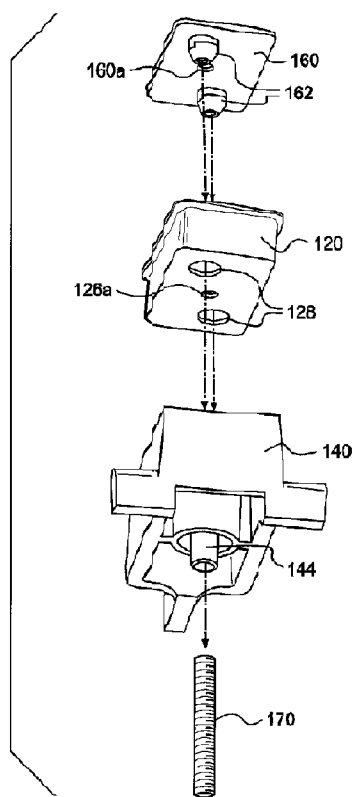
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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD,

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(54) Title: CAPPING FOR INKJET PRINTERS

FIG. 6



(57) Abstract: A device for an inkjet printer includes a compliant cap, which in turn includes a floor and flexible walls extending upwardly from the floor, and a lip formed on the walls. The floor, walls and lip define an open interior volume sized to accommodate a print head assembly of the inkjet printer. The device further includes a cap post that accommodates the compliant cap and supports the floor.



SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

- (84) Designated States** (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

- *as to the identity of the inventor (Rule 4.17(i))*
- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

Published:

- *with international search report (Art. 21(3))*

CAPPING FOR INKJET PRINTERS

Background

Inkjet printers typically use one or more print head assemblies that include an ink supply and means for directing fine droplets of ink through an interface on to a print medium. These print head assemblies can experience problems with respect to the desired application of the ink, including accumulation and drying out of the ink at the interface. The typical interface is an orifice plate having hundreds of orifices through which the ink flows. To solve or at least minimize the ink accumulation and drying problem, the print head assemblies may be housed, or docked, in a "cap" when the inkjet printer is not printing. The cap is intended to create a humid environment in which the interface is kept free of dried-out ink. Cap design then becomes an important element in the overall design of an inkjet printer.

Description of the Drawings

The Detailed Description will refer to the following drawings, in which like numbers refer to like objects, and in which:

Figure 1A illustrates, in block diagram form, an embodiment of an inkjet printer in which the disclosed low force capping may be implemented;

Figure 1B illustrates an embodiment of a cap sled that employs example embodiment caps for capping print head assemblies;

Figures 2 – 4 are views of embodiments of a cap and a cap post used with the cap sled of Figure 1B;

Figure 5 is a perspective view of an embodiment of a cap clip used with the cap and cap post of Figures 2 – 4;

Figure 6 is an exploded view of embodiments of a spring, cap post, cap, and cap clip;

Figure 7A is a perspective view of an alternative embodiment of a cap;

Figure 7B is a bottom view of the alternative cap embodiment of Figure
5 7A;

Figure 7C is a simplified cutaway view of the alternative cap embodiment of Figure 7A when a compressive force is applied; and

Figure 8 illustrates an embodiment of a cap sled that accommodates the alternative cap embodiment of Figure 7A.

10 Detailed Description

Inkjet printers use one or more print head assemblies that include an ink supply and means for directing fine droplets of ink on to a print medium (e.g., paper). The means for directing the ink on to the print medium includes an orifice plate having hundreds of very small orifices. This arrangement of
15 the print head assemblies can cause problems to occur with respect to the desired application of the ink, including drying out of the ink at the orifice plate area. To solve or at least minimize the drying problem, the print head assemblies may be housed, or docked, in a "cap" when the inkjet printer is not printing. The cap is intended to sufficiently seal the cap to create a humid
20 environment in which the orifice plate area is kept free of dried-out ink. Cap design then becomes an important element in the overall design of an inkjet printer. To provide a desired seal by the cap, some amount of force may be applied to the cap so as to conform it to the topology of the orifice plate area.

The desired seal may require a large force, which can be created, for example, by a combination of springs and driving motors to be applied to the cap.

An improvement in cap design over that in previous inkjet printers is disclosed, with the improved cap design resulting in low force capping and thereby permitting construction of a less expensive inkjet printer. The improved cap design may include use of highly compliant materials to form the cap, means to control deformation of cap elements, and means to position the cap with respect to the orifice plate areas. The improved cap design establishes a humid environment that keeps corresponding print head assemblies in an optimum condition, even during long periods of inactivity. The improved cap design permits an inkjet printer to use lower power motors and circuits, and smaller springs or even no springs, to cap the print head assemblies. This reduction in spring size or elimination of springs altogether, can result in a smaller vertical dimension of the overall inkjet printer.

An improved cap may be used as a component of a low-force capping system. The low-force capping system includes, in addition to the cap, components that retain and locate the cap, an engagement mechanism that causes the cap to engage the orifice plate area of a print head assembly, and a driving mechanism (motor) that provides power to seal the orifice plate area.

An embodiment of an inkjet printer using a low-force capping system contains two print head assemblies: one for black-ink, and one for color-ink printing. Each print head assembly includes an orifice plate in which are formed hundreds of orifices through which ink is injected onto a print medium.

The print head assemblies are carried in a carriage that may translate along the +X/-X axis to inject ink onto the print medium, with the print medium advancing along the +Y/-Y axis. When not in use (i.e., when the inkjet printer is not executing any print commands), the print head assemblies, and
5 primarily the orifice plate areas, are placed "in cap." In an embodiment, each cap is carried on a cap post, and the cap posts are carried on a cap sled. In this embodiment, the cap posts are able to move in the +Z/-Z directions relative to the cap sled. In another embodiment, a movable cap post is not used, and any +Z/-Z movement relative to the cap sled is accommodated by
10 the cap only.

Figure 1A shows, in block diagram form, an embodiment of an inkjet printer in which disclosed low force capping embodiments of a wiper may be implemented. In Figure 1A, inkjet printer 10 includes a print cartridge 12, a carriage 14, a print media transport mechanism 16, an input/output device 18,
15 and a printer controller 20 connected to each of the operative components of printer 10. Print cartridge 12 includes one or more ink holding chambers 22 and one or more print head assemblies 24. A print cartridge is sometimes also referred to as an ink pen or an ink cartridge. Print head assembly 24 represents generally a small electromechanical part that contains an array of
20 miniature thermal resistors or piezoelectric devices that are energized to eject small droplets of ink out of an associated array of orifices. A typical thermal inkjet print head assembly, for example, includes an orifice plate arrayed with ink ejection orifices and firing resistors formed on an integrated circuit chip. Each print head assembly is electrically connected to the printer controller 20

through external electrical contacts. In operation, the printer controller 20 selectively energizes the firing resistors through the electrical contacts to eject a drop of ink through an orifice on to the print media 26.

Print cartridge 12 may include a series of stationary cartridges or
5 print head assemblies that span the width of the print media 26. Alternatively, the cartridge 12 may include one or more cartridges that scan back and forth on the carriage 14 across the width of the print media 26. Other cartridge or print head assembly configurations are possible. A movable carriage 14 may include a holder for the print cartridge 12, a guide along which the holder
10 moves, a drive motor, and a belt and pulley system that moves the holder along the guide. Media transport 16 advances the print media 26 lengthwise past the print cartridge 12 and the print head assembly 24. For a stationary cartridge 12, the media transport 16 may advance the print media 26 continuously past the print head assembly 24. For a scanning cartridge 12,
15 the media transport 16 may advance the print media 26 incrementally past the print head assembly 24, stopping as each swath is printed and then advancing the print media 26 for printing the next swath. Controller 20 may communicate with external devices through the input/output device 18, including receiving print jobs from a computer or other host device. Controller
20 20 controls the movement of the carriage 14 and the media transport 16. By coordinating the relative position of the print cartridge 12 and the print head assembly 24 with the print media 26 and the ejection of ink drops, the controller 20 produces the desired image on the print media 26.

Specific components of an embodiment for improved low-force capping of a print head assembly orifice plate in an inkjet printer include a compliant cap having a floor and flexible walls extending upwardly from the floor. In one specific embodiment, the compliant cap may include a curved lip portion
5 extending upwardly and outwardly from the walls. The floor, walls, and curved lip portion define an open interior volume sized to accommodate the orifice plate. The improved low-force capping components also include a cap sled for carrying the compliant cap, means for coupling the compliant cap to the cap sled, and means for applying a compressive force to the compliant
10 cap. In this system, the walls and curved lip portion deform to create a sealed environment in the open interior volume.

In one embodiment of this system, the floor has formed therein one or more location holes and the means for coupling the compliant cap to the cap sled includes a cap clip having clip location elements for insertion through the
15 one or more location holes. A cap post accommodates the compliant cap and has recesses for insertion of the location elements so as to locate and secure the compliant cap to the cap post, with the cap post supporting the floor. In this embodiment, the cap post includes a spring post that accommodates a spring, the spring coupling the cap post to the cap sled and resisting
20 downward forces on the compliant cap and cap post, and location prongs to locate the cap post in the cap sled in an X-Y plane. The cap sled has formed therein location receptacles to accommodate the location prongs and to limit travel of the cap post. The combination of the spring, the location prongs, and the location receptacles allow a gimbaling motion of the cap post.

In another low force capping embodiment, the cap sled has formed thereon a compliant cap location tab, and the means for coupling the compliant cap to the cap sled includes a flexible compression member extending downwardly from the floor and having formed therein a slot that
5 accommodates the compliant cap location tab. In addition, the floor is not supported by a cap post and so is free to flex. During capping, the compression member applies an upward force that causes flexion of the floor, the flexion causing deformation of the walls and curved lip portion to seal the print head assembly. In addition, because the compression member is
10 flexible, this embodiment of the compliant cap can gimbal about a center point of the compression member.

Figure 1B illustrates an embodiment of a structure that employs low force capping of print head assemblies of an inkjet printer. In Figure 1B, an inkjet printer (see Figure 1A) uses an embodiment of a cap sled, which may
15 be a molded plastic structure, to cap the print head assemblies. In an embodiment, cap sled 100 is molded from an ABS plastic reinforced with about 20 percent glass fibers. The cap sled 100 primarily moves along the +X/-X axis, and to a more limited degree, along the +Z/-Z axis, using, in an embodiment, a ramp (not shown) so that when capping of print head
20 assemblies is desired, the entire cap sled 100 moves up the ramp (i.e., in the +Z-direction). Caps 110 and 120 are pressed against their respective print head assemblies, deform, and thus create a desired humid environment around the print head assembly orifice plate areas.

In an alternative embodiment, instead of a ramp, a planar linkage mechanism may be used. A specific example of a planar linkage mechanism is a four-bar linkage mechanism. Such a four-bar linkage mechanism can translate X-direction motion of the cap sled into Z-direction motion without rotation of the cap sled. When a four-bar linkage mechanism is used, the mechanism is coupled to the cap sled 100 by support pins 115 (two of four shown in Figure 1B). Other mechanisms may be used to translate X-direction motion into Z-direction motion of the cap sled 100.

The caps 110 and 120 are carried by cap posts 130 and 140, respectively. The cap posts 130 and 140 are permitted some movement along the +Z/-Z axis relative to the cap sled 100, as will be described later, but movement in the X or Y directions relative to the cap sled 100 generally is constrained to that permitted by manufacturing and installation tolerances and gimballing action, as will be apparent from Figures 2 – 4 and their accompanying description. In an embodiment, springs 170 (see Figure 6) connecting undersides of the cap posts 130 and 140 to the cap sled 100, create a spring force that pushes up (+Z-direction) on the cap posts 130 and 140.

Adjacent to the cap posts 130 and 140 are, respectively, blotters 103 and 101.

The caps 110 and 120 differ primarily in their size. In an embodiment, the smaller cap 110 is used with a color-ink print head assembly and the larger cap 120 is used with a black-ink print head assembly.

To provide the desired +X/-X movement of the cap sled 100, a carriage assembly (not shown) that houses the print head assemblies contacts the cap sled 100 by way of cap sled pin 150. As the carriage assembly pushes against the pin 150, the cap sled 100, in an embodiment, is driven up a short, shallow ramp to create +Z-direction travel of the caps 110/120. Once driven completely up the ramp, the cap sled 100 is in its capping position, and the caps 110 and 120 are pressed against their respective print heads so as to prevent or limit ink dry out. As noted above, other mechanisms may be used to translate X-direction motion of the cap sled into Z-direction motion.

Figures 2 – 4 are views of embodiments of a cap and a cap post used with the cap sled 100 of Figure 1B. Figure 2 is a top perspective view of cap 120 being carried by cap post 140. Cap post 140 includes three protrusions or location prongs 142 that mate with location receptacles (not shown) of the cap sled to locate the cap post 140 within the cap sled 100 and that limit cap post travel.

Also shown in Figure 2 is cap clip 160. Vent hole 160a is located in the cap clip 160. Vent terminus 140a connects to the vent hole 160a and a corresponding vent hole in the cap 120 to relieve pressure spikes that might occur when a print head assembly is capped. The cap clip 160 will be described in detail with respect to Figures 5 and 6.

Figure 3 is a bottom perspective view of the cap post 140. Cap post 140 is shown with spring post 144 extending downwardly at a center of the cap post 140. The spring post 144 is used to position the spring 170 that acts on the cap sled 140 in the +Z direction. Located in cap post 140 is a labyrinth

vent path (not shown) that connects the vent hole 160a and the vent terminus 140a.

The combination of the centrally-located engagement spring 170 and the location prongs 142 means that the cap post 140 is, to a limited degree, able to gimbal about the spring post 144. Ideally, a plane defined by the top-most extreme of the caps 110/120 would be co-planar with a plane defined by the orifice plate areas when the print head assemblies are uncapped. However, this gimbaling affect can be used to accommodate slight (non-planar) mis-alignments between the orifice plate areas and the caps 110/120. The gimbaling movement may induce some X or Y displacement of the cap post relative to the cap sled 100.

Figure 4 is a cutaway top perspective view of exemplary cap 120. Cap 110 is similar except for its size. The cap 120 includes thin, highly compliant walls 122 terminating in curled lip surface 124 and floor 126. The floor 126 includes location holes 128 (one of two shown) that, as will be explained later, are used to locate the cap 120 to the cap post 140. The floor 126 also includes vent hole 126a. The entire cap 120 is molded out of an elastomer material such as EPDM, for example. The thin, highly compliant walls 122 serve as beams that can buckle under pressure. The curled lip surface 124 enables the cap 120, when pressed against an uneven surface such as that of a print head assembly, to form a seal – the curled lip surface 124 conforming to the uneven topology of the orifice plate area. More specifically, as the curled lip surface 124 is brought into contact with the orifice plate area by the force created by the upward travel of the cap sled 100 and corresponding

compression of cap post spring 170, the curled lip surface 124 is able to comply with the various features of the orifice plate area. As more force is applied in the -Z-direction through +Z-direction travel of the cap sled 100, the walls 122 buckle to provide more compliance so that an adequate seal is
5 formed to create the desired humid environment which consequently ensures the orifices are not clogged with dried ink.

To maintain the as-molded shape of the cap 120 and to only comply with the topology of the print head assembly orifice plate area, a cap clip, an embodiment of which is shown a partial cutaway perspective view in Figure 5,
10 is used to fix the cap 120 to the cap post 140. That is, in an embodiment, the cap 120 is molded as a monolithic element so that the floor 126 would be subject to deformation if not supported by and fixed to the cap post 140. Referring to Figures 4 and 5, cap clip 160 is shown to have the approximate shape of the floor 126 of the cap 120. The cap clip 160 also includes
15 protruding clip location elements 162 that pass through the location holes 128 and engage corresponding holes (not shown) in the cap post 140 to provide for location and retention of the cap 120 on the cap post 140. When the cap 120 is assembled to the cap post 140, the cap post 140 allows spring force (spring 170) to push upwardly on the cap 120 without distortion of the floor
20 126, thereby ensuring that any distortion of the cap 120 when engaging the print head assembly orifice plate area is through the walls 122 and curled lip surface 124.

Figure 6 is an exploded view of embodiments of the cap post 140, cap 120, and cap clip 160, as well as engagement spring 170. As can be seen

from Figure 6, cap clip 160 is assembled into the cap 120 with the protruding clip elements 162 passing through location holes 128 to engage the cap post 140 and secure the cap 120 to the cap post 140. The spring 170 slides over the spring post 144. As also can be seen in Figure 6, vent holes 160a and 126a are aligned, and cooperate with the cap post vent path (not shown), which ends with vent terminus 140a (see Figure 2) to prevent pressure spikes in the cap volume.

As can be appreciated from Figures 2 – 6, one means for coupling the compliant cap 120 to the cap sled 100 includes cap clip 160 having location prongs 162 for insertion through the one or more location holes. The cap clip 160 fixes the cap 120 to the cap post 140, and the cap post 140 supports the floor 126 of the compliant cap 120. The cap post 140 includes a spring post 144 that accommodates a spring 170. The spring 170 couples the cap post 140 to the cap sled 100 and resists downward forces on the compliant cap 120 and cap post 140. The cap post 140 also includes location prongs 142 to locate the cap post 140 in the cap sled 100 in an X-Y plane, and the cap sled includes receptacles to accommodate the prongs 142 and to limit travel of the cap post 140. The spring, location prongs, and receptacles cooperate to allow a gimballing motion of the cap post 140.

Figures 7A – 8 describe an alternate means for coupling a compliant cap to a cap sled. The alternate means includes a flexible compression member extending downwardly from a flexible floor. The compression member includes a slot that accommodates a corresponding compliant cap location tab formed on the cap sled. In a capping operation, the compression

member applies an upward force that causes flexion of the floor, the flexion causing deformation of the walls and a curved element, thereby creating a desired humid environment.

Figure 7A is a perspective view of an alternative cap embodiment. In
5 Figure 7A, cap 220 includes thin, highly compliant walls 222, at the top of which may, in an embodiment, be formed curved element 224, and flexible cap floor 226. However, instead of being placed on a spring-loaded cap post, the cap 220 is placed over a fixed tab (see Figure 8) in an alternate cap sled by way of location and compression member 228.

10 Figure 7B is a bottom view of the alternative exemplary cap 220 of Figure 7A showing the flexible compression member 228 in more detail. As can be seen, the flexible compression member 228 includes rectangular slot 229 that forms a tight fit with the fixed tab to locate and hold the cap 220 in the cap sled. Vent hole 227 is formed in the floor 226 to relieve pressure
15 spikes in the cap 220.

The cap 220 does not use springs to resist the downward force applied to the cap 220 when the cap sled moves to the capping location. Instead, the flexible floor 226 of the cap 220 deforms to transmit a force through the walls 222 and thus create a desired seal. Figure 7C is a simplified cutaway view of
20 the cap of Figure 7A when a compressive force is applied. Although the compression member 228 is flexible, it is stiffer than the flexible floor 226. Thus, when the flexible compression member 228 presses against it, the flexible floor 226 deforms to the position shown in dashed line, creating an

upward force that in turn is transmitted through the thin, highly compliant walls 222 to deform the walls 222 and thereby create the desired seal.

Figure 8 shows a cap sled embodiment that accommodates the cap 220 (and a second cap 210, which is similar to the cap 220). As can be seen, 5 the cap 220 is attached to cap sled 200 using flexible compression member 228 and a cap location tab 204 (shown in dashed line in Figure 8) formed on the cap sled 200. The cap 210 similarly is attached to the cap sled 200 using compression member 218 and tab 202. Because the compression member 228 is flexible, the cap 220 may gimbal in a manner similar to that of the cap 10 post 140 so as to accommodate non co-planar orientation of the cap 220 relative to the orifice plate area.

To provide the desired +X/-X movement of the cap sled 200, a carriage assembly (not shown) that houses the print head assemblies contacts the cap sled 200 by way of cap sled pin 250. As the carriage assembly pushes 15 against the pin 250, the cap sled 200 is driven in the -X direction. This -X-direction movement is then translated into some +Z-direction travel by, for example a ramp. Once the +Z-direction travel is completed, the cap sled 200 is in its capping position, and the caps 210 and 220 are pressed against their respective print heads so as to seal the print head assembly orifice plate 20 areas from the outside environment and limit any ink dry out problems.

The sealing ability of the caps 110/120 or the caps 210/220 potentially is affected by any mis-alignment of the cap with the orifice plate area. Such mis-alignment could occur in either the X- or the Y-directions. However, because of their compliance capacity and the gimbaling motion of the

corresponding cap post, the caps 110/120 can provide a desired seal with normally-encountered mis-alignment. Similarly, the compliance and gimballing feature of the caps 210/220 can accommodate normally-encountered mis-alignment.

We claim:

1. A device for an inkjet printer, comprising:

a compliant cap, comprising:

a floor,

5 flexible walls extending upwardly from the floor, and

a lip on the walls, wherein the floor, walls and lip define an open interior volume sized to accommodate an orifice plate area of a print head assembly of the inkjet printer; and

a cap post that supports the compliant cap.

10

2. The device of claim 1, further comprising:

a cap sled that carries the cap post, wherein the cap post further comprises a spring post that accommodates a spring, the spring coupling the cap post to the cap sled and resisting downward forces on the compliant cap

15 and cap post; and

a cap clip having elements to secure the cap to the cap post such that the cap floor is sandwiched between the cap clip and the cap post.

3. The device of claim 2, wherein the cap post further comprises location
20 prongs to locate the cap post in the cap sled in an X-Y plane.

4. The device of claim 3, wherein the cap sled comprises receptacles to accommodate the location prongs and to limit travel of the cap post, and wherein the spring, location prongs and location receptacles cooperate to allow a gimballing motion of the cap post.

5

5. The device of claim 3, wherein the cap sled comprises a cap pin upon which acts a lateral force to draw the cap sled into a capping position of the compliant cap, and further comprising a carriage motor that generates the lateral force.

10

6. The device of claim 5, further comprising an X-Z direction translation mechanism, wherein the cap sled is driven to a capping position causing compression of the walls and lip, whereby a sealed environment is created.

15 7. The device claim 1, wherein the compliant cap is molded as a monolithic element.

8. A device for capping a print head in an inkjet printer, comprising:
a compliant cap, comprising:

20

a floor,

flexible walls extending upwardly from the floor, and

a flexible curved section located at an extremity of the flexible walls, wherein the floor, walls and curved section define a volume sized to accommodate the print head assembly;

a cap post that accommodates and supports the compliant cap; and

5 a cap clip that locates the compliant cap on the cap post.

9. The device of claim 8, further comprising a cap sled that carries the cap post, wherein the cap post comprises a spring post that accommodates a spring, the spring coupling the cap post to the cap sled and resisting
10 downward forces on the compliant cap and cap post.

10. The device of claim 9, wherein the cap post further comprises location prongs to locate the cap post in the cap sled in an X-Y plane, wherein the cap sled comprises receptacles to accommodate the location prongs and to limit
15 travel of the cap post, and wherein the spring, location prongs and receptacles cooperate to allow a gimballing motion of the cap post.

11. The device of claim 8, further comprising a ventilation path to limit pressure spikes in the compliant cap, and wherein the compliant cap is
20 molded as a monolithic element.

12. A device for capping a print head assembly in an inkjet printer, comprising:

a compliant cap, comprising:

a floor, and

5 walls extending upwardly from the floor, wherein the walls and floor define an open interior volume sized to accommodate the print head assembly;

a cap sled for carrying the compliant cap; and

means for coupling the compliant cap to the cap sled, wherein under a
10 compressive force the walls deform to create a sealed environment in the open interior volume.

13. The device of claim 12, wherein the floor comprises one or more location holes and wherein the means for coupling the compliant cap to the
15 cap sled, comprises:

a cap clip having location elements for insertion through the one or more location holes; and

a cap post that accommodates the compliant cap and having recesses for insertion of the location elements, wherein the compliant cap is located on
20 and secured to the cap post;

wherein the cap post further comprises:

a spring post that accommodates a spring, the spring coupling the cap post to the cap sled and resisting downward forces on the compliant cap and cap post, and

location prongs to locate the cap post in the cap sled in an X-Y
5 plane; and

wherein the cap sled comprises location receptacles to accommodate the location prongs and to limit travel of the cap post, and wherein the spring, and the location prongs and receptacles cooperate to allow a gimballing motion of the cap post.

10

14. The device of claim 12, wherein the floor is flexible, wherein the cap sled comprises a compliant cap location tab, and wherein the means for coupling the compliant cap to the cap sled, comprises:

a flexible compression member extending downwardly from the flexible
15 floor, comprising a slot that accommodates the compliant cap location tab, wherein the flexible compression member applies an upward force that causes flexion of the flexible floor, the flexion causing deformation of the walls, whereby the sealed environment is created, and wherein the flexible compression member permits a gimballing motion of the compliant cap.

20

15. The device of claim 14, wherein the cap sled is molded from an ABS plastic reinforced with about 20 percent glass fibers, and wherein the compliant cap and compression element are molded as a monolithic element.

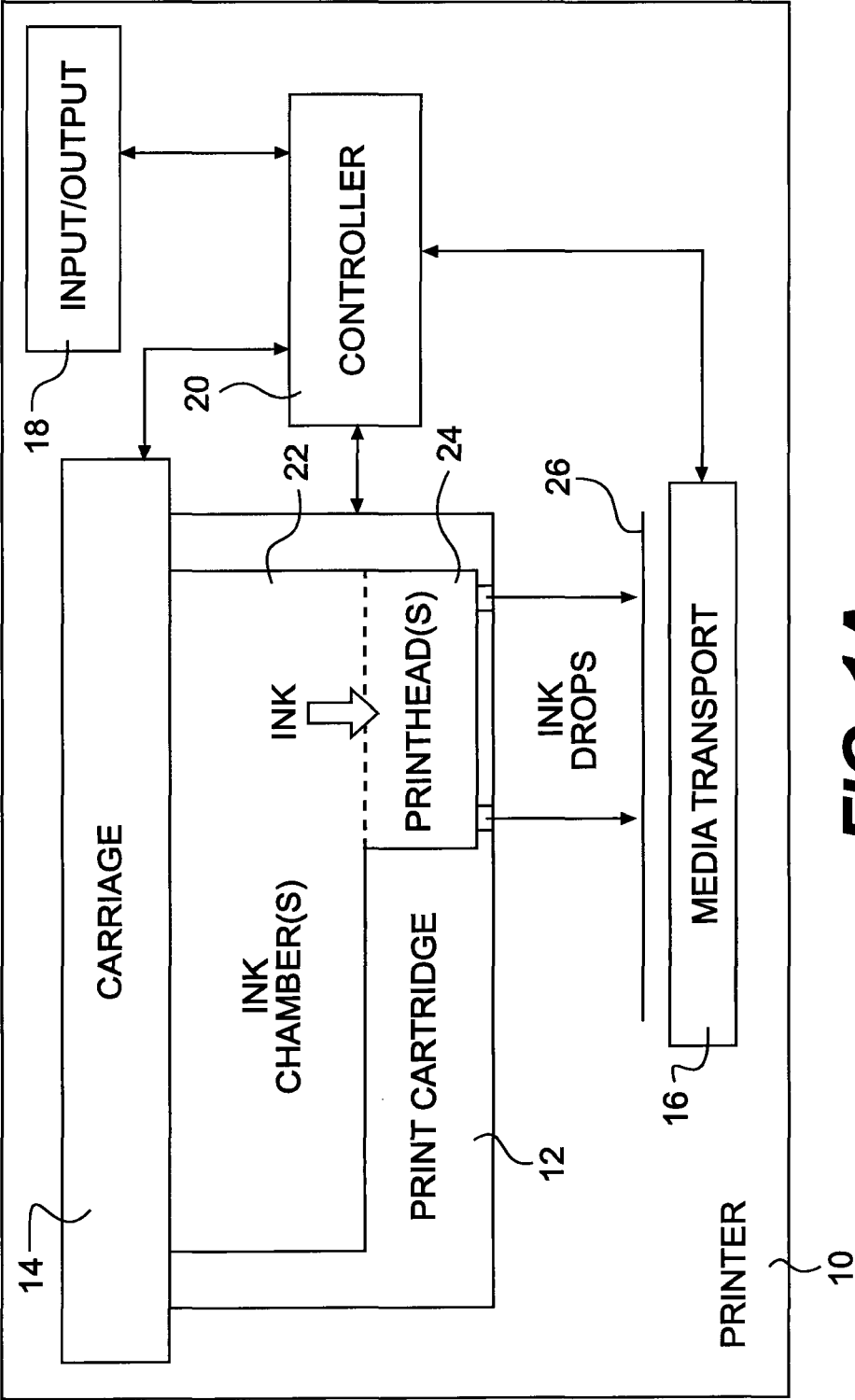
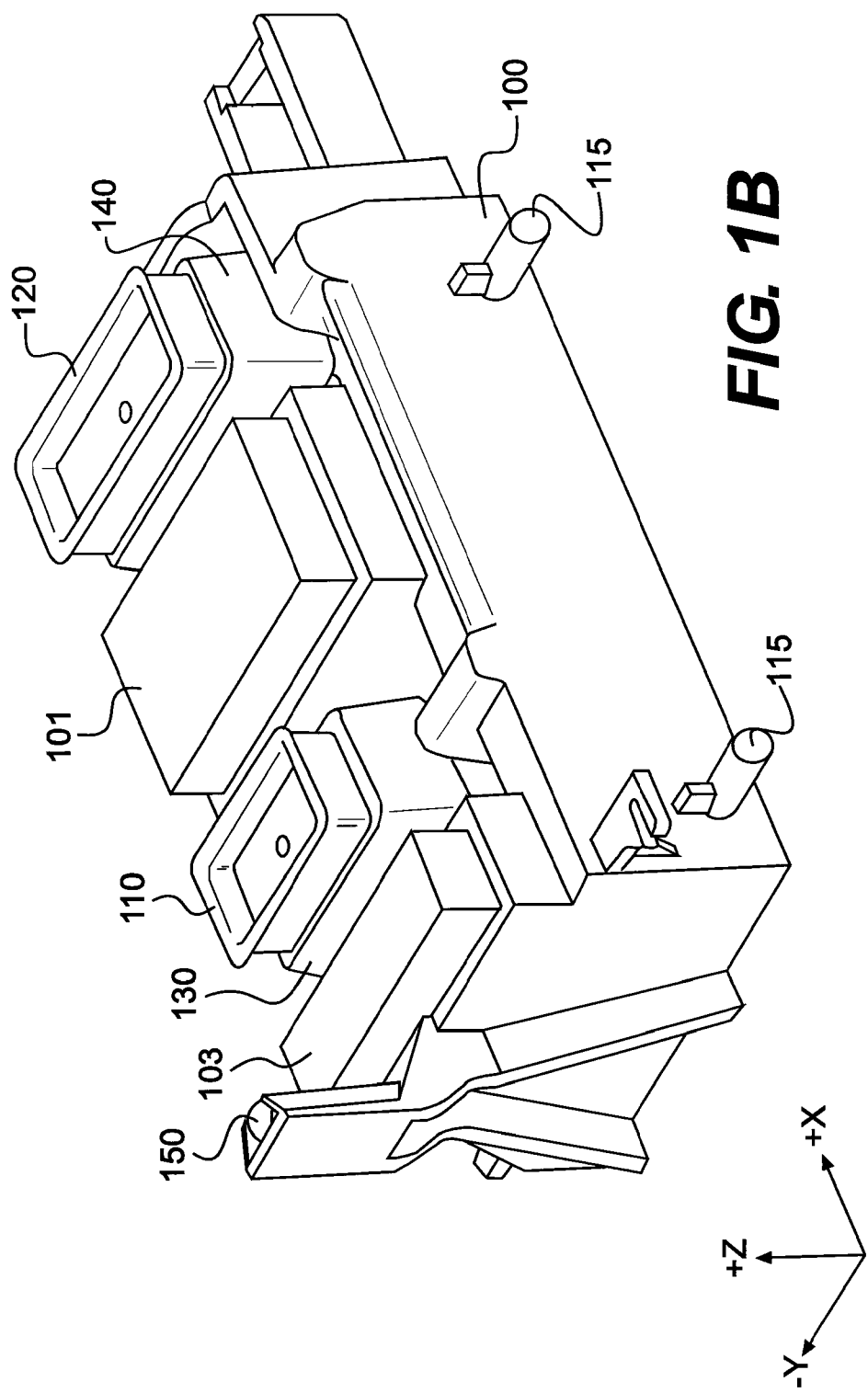


FIG. 1A



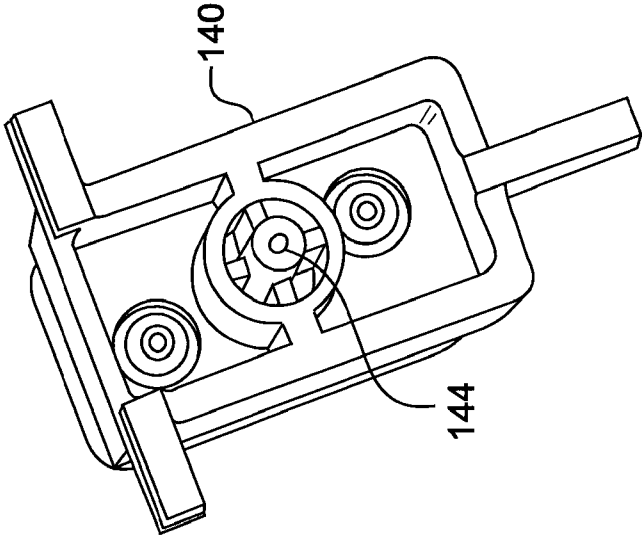


FIG. 3

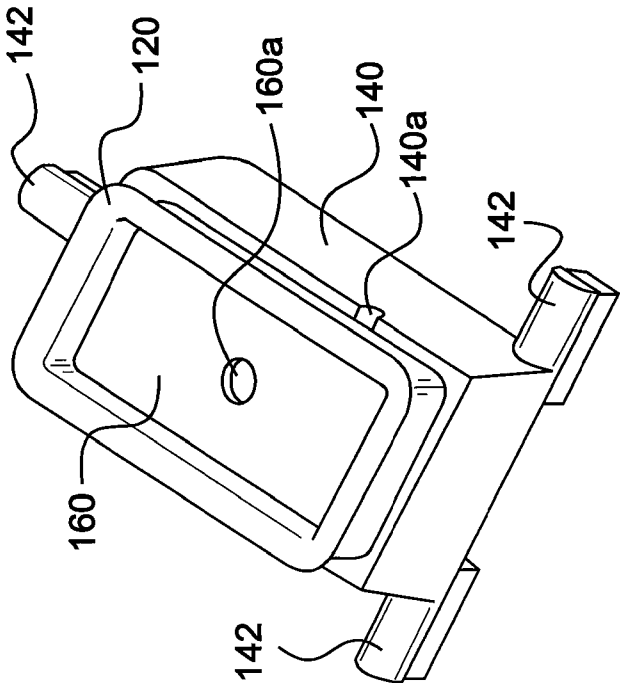


FIG. 2

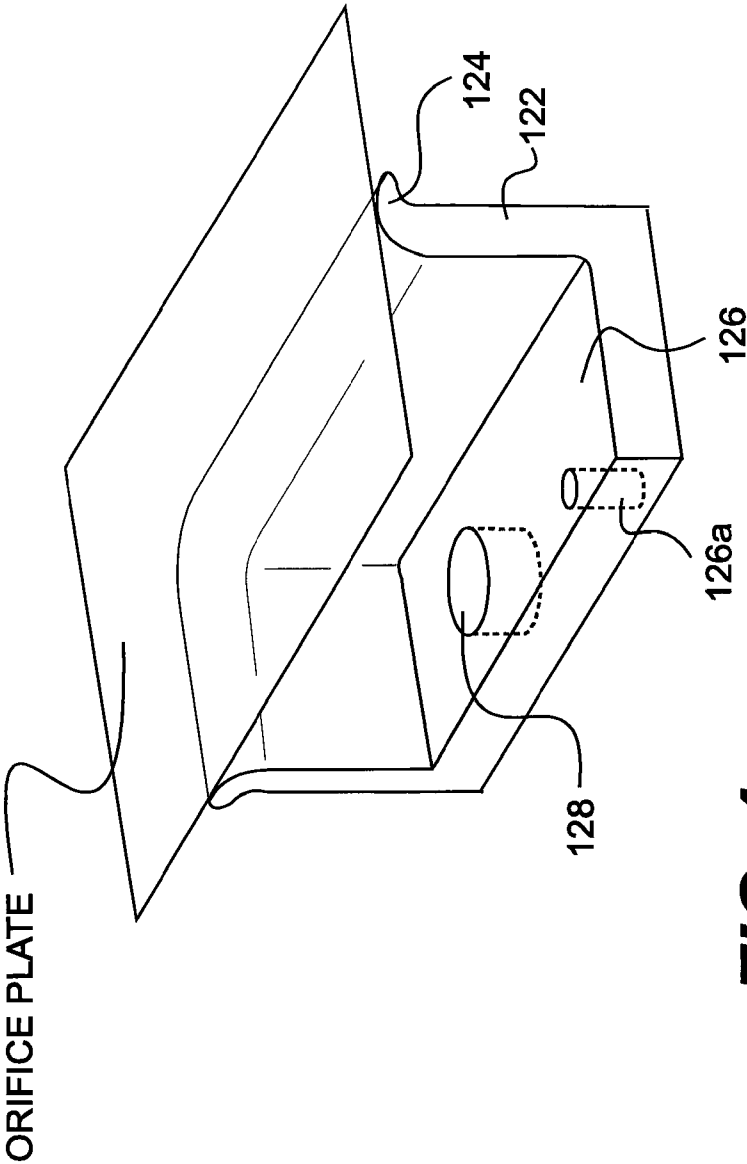


FIG. 4

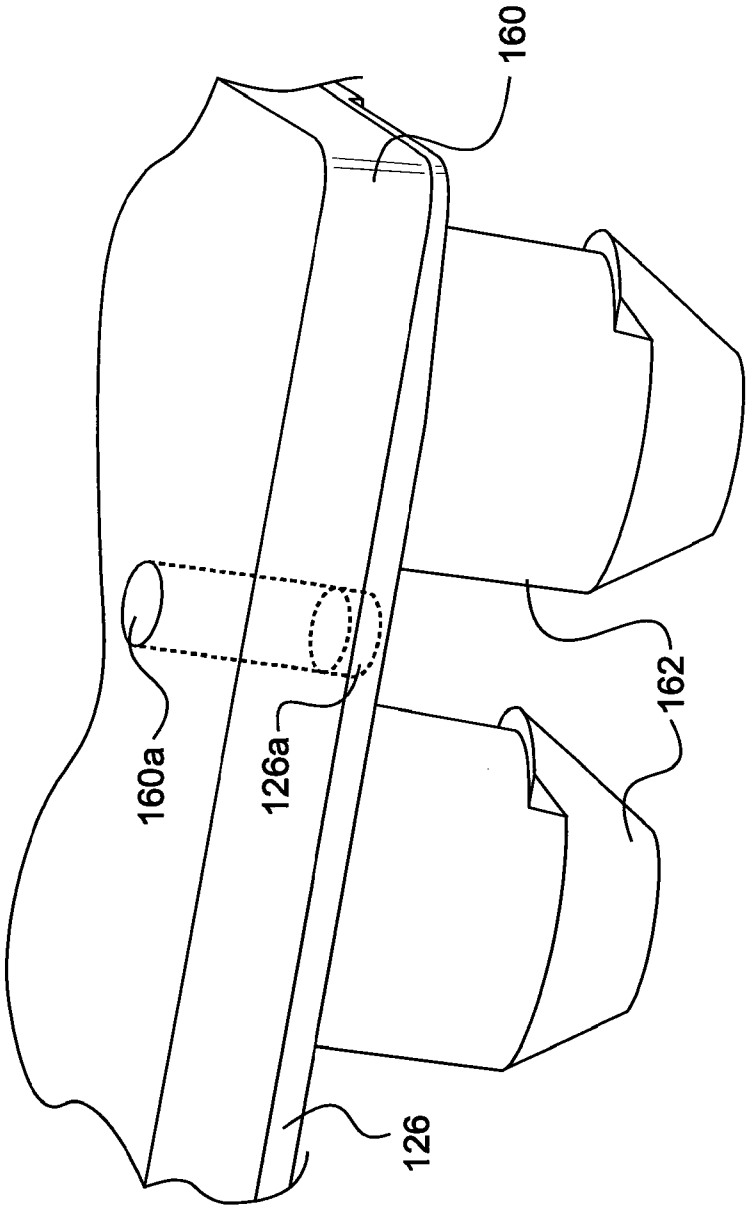
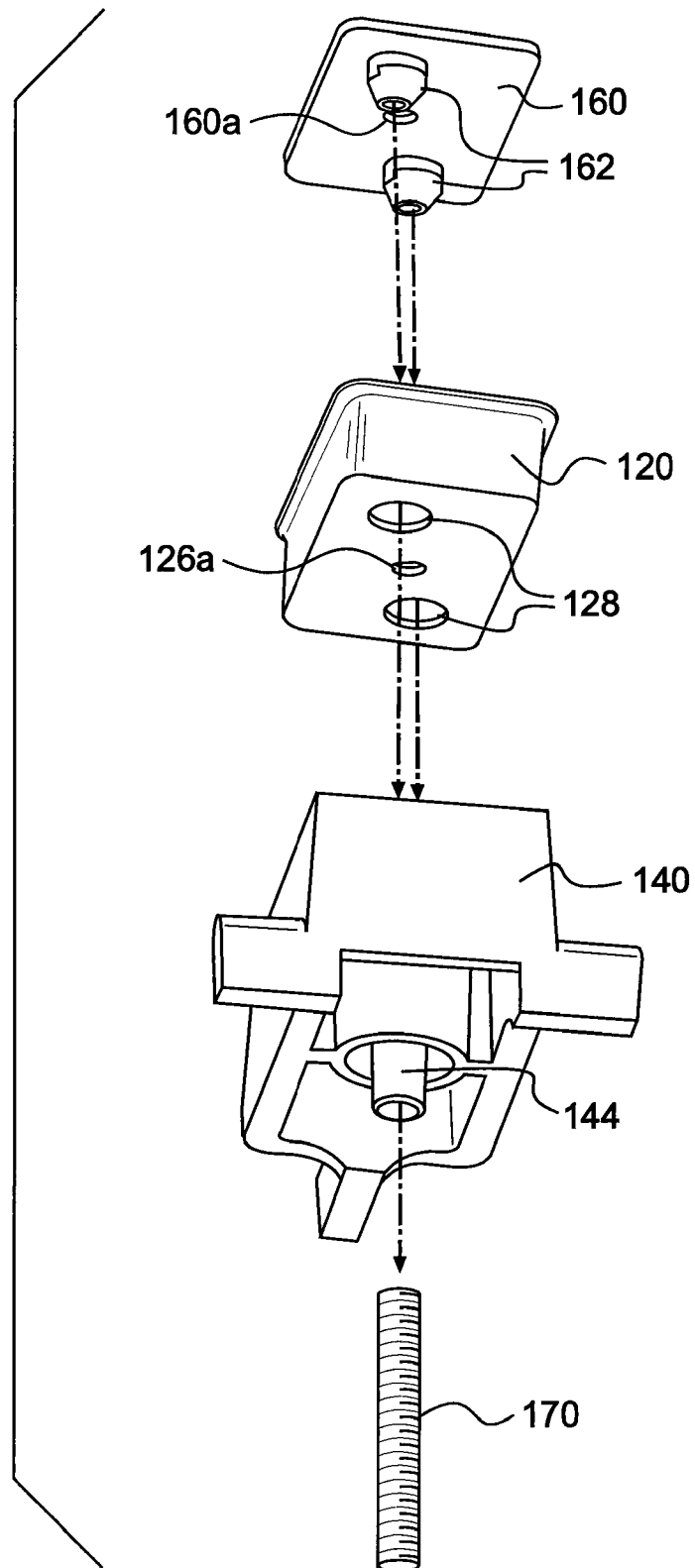


FIG. 5

6/10

FIG. 6



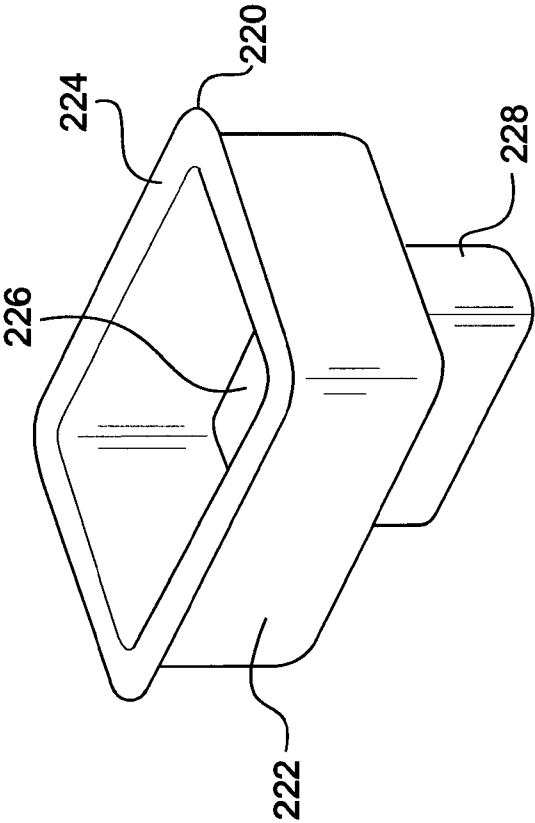


FIG. 7A

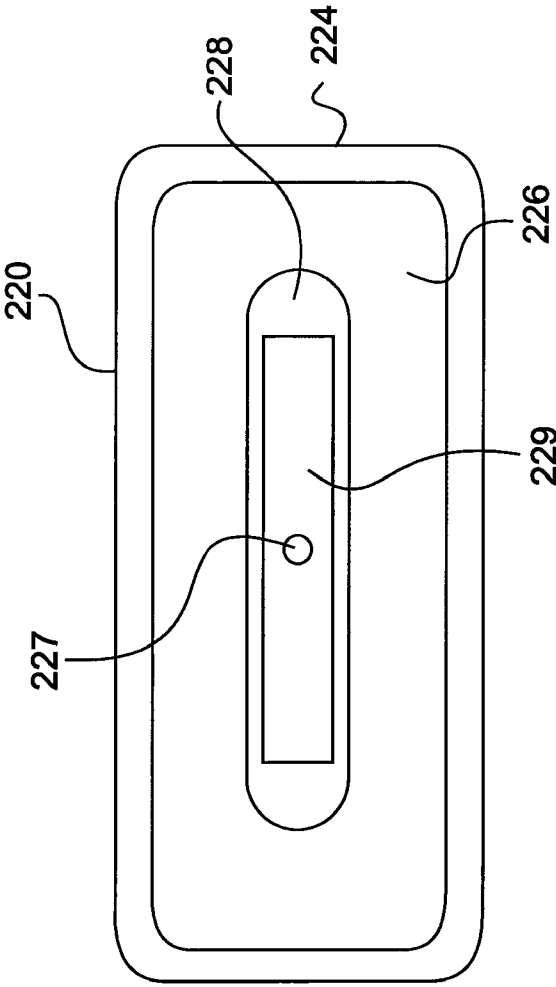


FIG. 7B

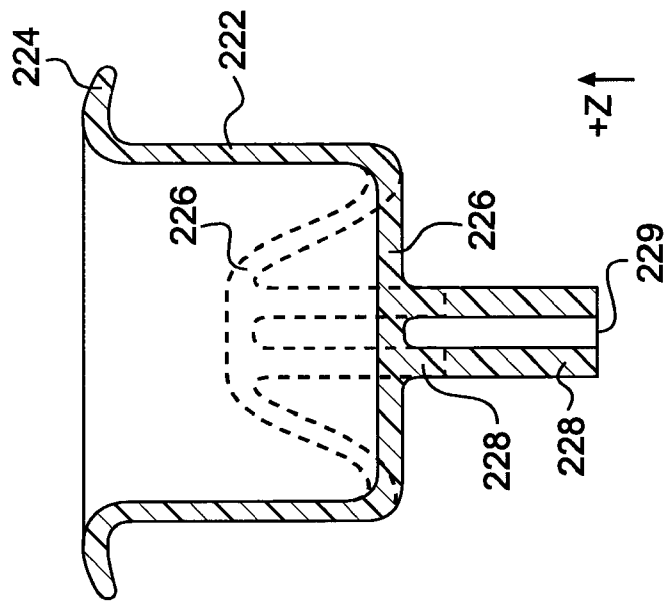


FIG. 7C

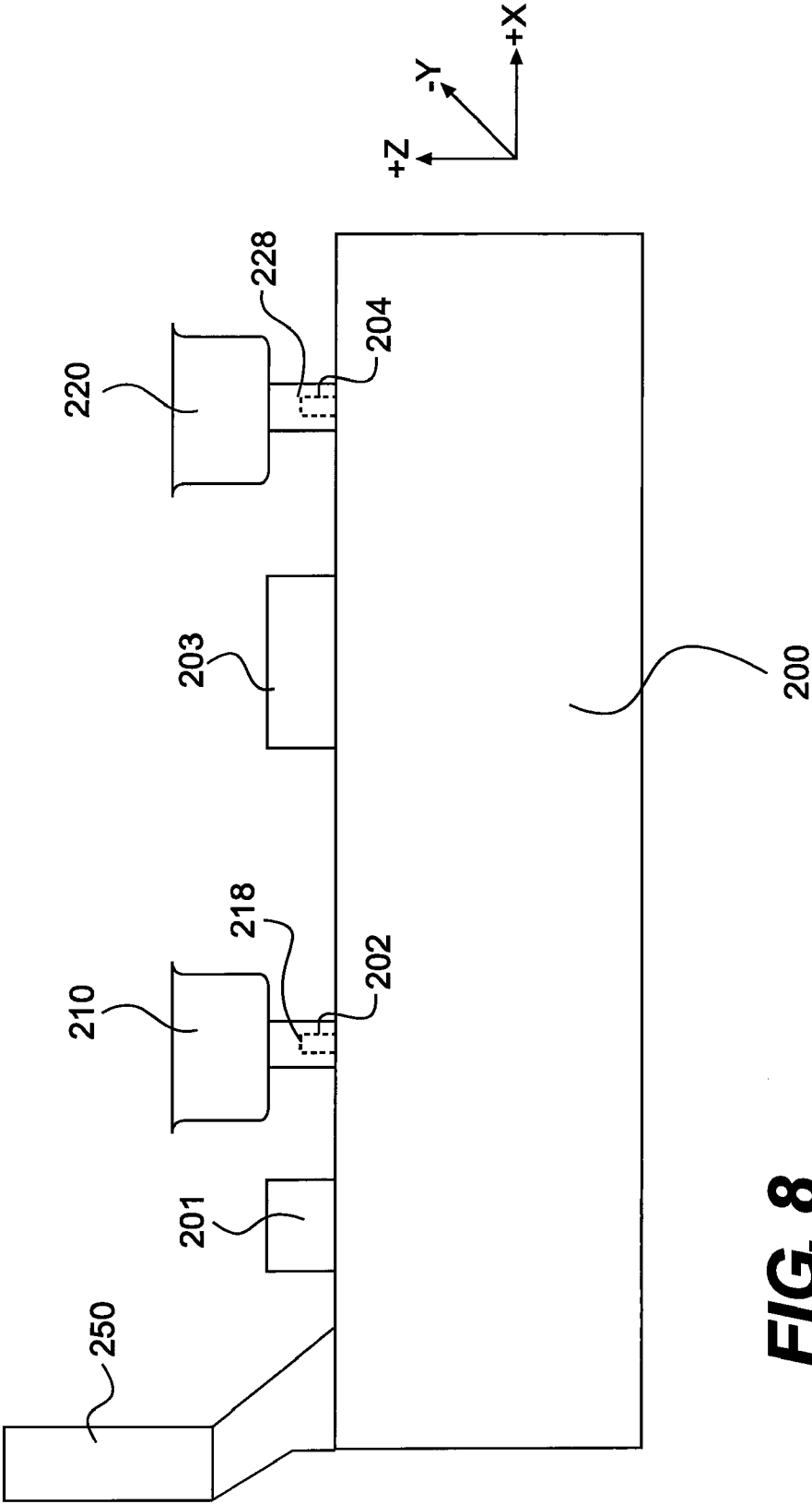


FIG. 8

A. CLASSIFICATION OF SUBJECT MATTER***B41J 2/165(2006.01)i, B41J 2/175(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)

B41J 2/165; B41J 2/175; B41J 2/18

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

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

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

eKOMPASS(KIPO internal) & Keywords: inkjet, printer, compliant, cap, floor, wall, extend, lip, volume, accommodate, tab, area, orifice, device, spring, post, clip, element, location, prong, receptacle, gimbal, motor, sled, head, volume.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	JP 07-195702 A (CANON INC) 01 August 1995 See abstract, paragraph [0026] - paragraph [0030] and figure 8.	1 2,8
X Y	JP 2008-094040 A (BROTHER IND LTD) 24 April 2008 See abstract, paragraph [0030] - paragraph [0035] and figures 2-5.	1 2,8
A	US 5867184 A1 (QUINTANA; JASON) 02 February 1999 See abstract, column 9, line 54 - column 11, line 25 and figures 1-4.	1-15
A	US 2004-0189738 A1 (ATSUHISA NAKASHIMA) 30 September 2004 See abstract, paragraphs [0030], [0031] and figure 5.	1-15



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

27 JANUARY 2011 (27.01.2011)

Date of mailing of the international search report

07 FEBRUARY 2011 (07.02.2011)

Name and mailing address of the ISA/KR

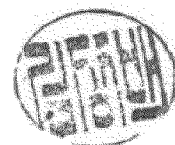
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Telephone No. 82-42-481-5454



INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2010/033104

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