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### (54) **Attachable/detachable umbilical platform for a continuous ink jet printhead**

(57) A system (10) is provided for linking an umbilical (1) to a continuous ink jet printhead. An ink jet printhead support structure (2) supports the ink jet printhead, and a rigid printhead housing cap (3) is situated between

the ink jet printhead support structure (2) and the umbilical (1). The ink jet printhead support structure (2) is attachable to the rigid printhead housing cap (3), using screws (5). A threaded aperture (9) through the rigid printhead housing cap (3) receives the umbilical (1).

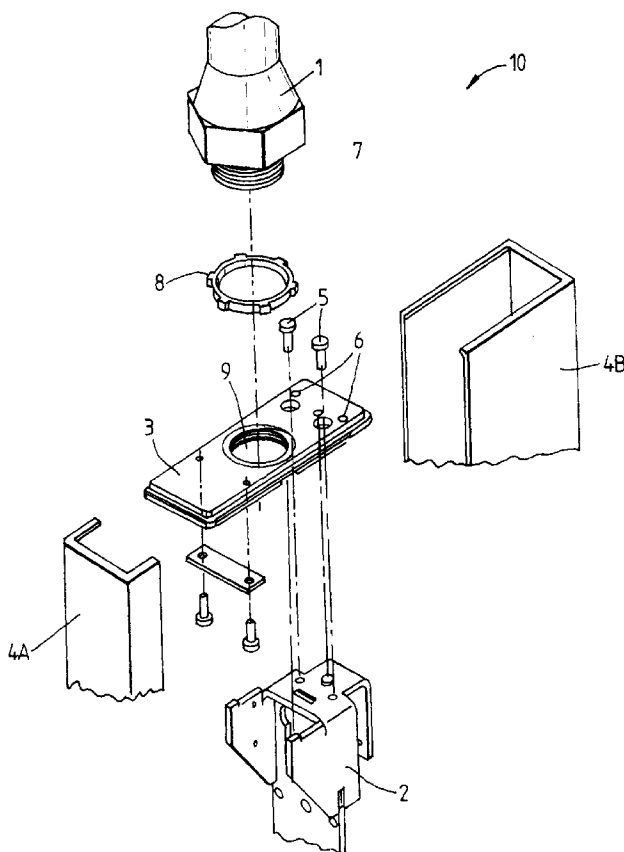


FIG. 1

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## Description

### Technical Field

The present invention relates to continuous ink jet printing and, more particularly, to an attachable and detachable umbilical cap that facilitates ink, power, air, data and registration for a continuous ink jet printhead and printing system.

### Background Art

Ink jet printing systems are known in which a printhead defines one or more rows of orifices which receive an electrically conductive recording fluid from a pressurized fluid supply manifold and eject the fluid in rows of parallel streams. Printers using such printheads accomplish graphic reproduction by selectively charging and deflecting the drops in each of the streams and depositing at least some of the drops on a print receiving medium, while others of the drops strike a drop catcher device.

Continuous ink jet printing systems include an umbilical that supplies fluid (ink), air, power, and data to the printhead. In prior art designs, installation of the umbilical has been a difficult and tedious process, comprised of a complex weldment with precision machined features that contributed little to assembling of the hardware. The umbilical has typically had many lines, cables, and connectors. Additionally, in the prior art, the printhead housing cap and spine (i.e., ink jet printhead support) have been welded together. While threading the umbilical to the welded assembly, cables become twisted, connectors get caught on other features, and various elements end up out of position. After component parts from the printing assembly were assembled to the spine, dis-assembly was almost impossible without damaging the hardware.

It is seen then that there exists a need for an optimum connection between a printing system umbilical and the structure known as a spine that supports an ink jet printhead.

### Summary of the Invention

This need is met by the attachable/detachable umbilical platform according to the present invention, wherein the platform serves as an attachment/detachment point for the umbilical, covers, and structural elements of a continuous ink jet printhead.

In accordance with one aspect of the present invention, a system links an umbilical to a continuous ink jet printhead. An ink jet printhead support structure supports the ink jet printhead, and a rigid printhead housing cap is situated between the ink jet printhead support structure and the umbilical. The umbilical is easily attachable/detachable by separating the printhead housing cap from the ink jet printhead support structure, and

threading the umbilical into or out of the rigid printhead housing cap.

Accordingly, it is an object of the present invention to provide a platform that serves as an attachment/detachment point for an umbilical, covers, and structural elements of a continuous ink jet printing system. It is a further object of the present invention to provide such a platform that is an optimum connection between the printing system umbilical and the ink jet printhead support structure. Finally, it is an advantage of the present invention that it facilitates serviceability, functionality, manufacturability, registration, and cost effectiveness of a continuous ink jet printing system.

Other objects and advantages of the invention will be apparent from the following description, the accompanying drawings and the appended claims.

### Brief Description of the Drawing

Fig. 1 is an exploded view of an ink jet printhead structure illustrating alignment between the ink jet printhead support structure and the umbilical, in accordance with the present invention.

### Detailed Description of the Preferred Embodiments

Referring to Fig. 1, there is illustrated a linkage system 10 for linking a printing system umbilical 1 and an ink jet printhead support structure 2. There is a need for a device in a continuous ink jet printing system that will serve as a rigid link between the umbilical 1 that supplies fluid (ink), air, power, and data to a continuous ink jet printhead (not shown) and the support structure 2 which supports the printhead and receives the fluid, air, power and data.

Continuing with Fig. 1, the present invention provides for a rigid ink jet printhead housing cap and umbilical platform 3. The rigid member 3 is located between the ink jet printhead support structure 2 and the umbilical 1. The rigid member 3 operates as a "cap" or lid for the structure 2, and as a platform under the umbilical 1.

As can be seen in Fig. 1, the umbilical 3 has a threaded end portion 7. The umbilical is easily attached/detached by separating the rigid member 3 from the support structure 2 and threading the umbilical end portion 7 into or out of receiving means or threaded aperture 9 of the rigid member 3. A locking means, such as a nut 8, can be placed between the threaded end portion 7 and the rigid member 3 as umbilical 1 is attached to member 3, to lock the umbilical 1 to the rigid member 3. The support structure 2 can also be easily attached/detached from the umbilical and rigid member assembly by removing attachment means, such as screws 5. Hence, the umbilical 1 is threaded into the top of rigid member 3, and the support structure 2 is screwed onto the bottom of rigid member 3.

With the present invention, the umbilical 1 and the rigid platform 3 can be built as a module, thereby elim-

inating twisting of components. The support structure 2 and all of its related hardware can also be built as a module. Final assembly, then, merely comprises placing both assemblies together via self-locating features, and fastening the modules with attachment means 5. Built-in registration features in the rigid plate 3 accurately align the support structure 2. This insures transference of position of everything that mounts on the support structure 2 to the rigid platform 3. Covers 4A and 4B then enclose the entire linkage apparatus 10. Built-in alignment features also automatically locate and properly position the covers 4A and 4B.

The self-locating or built-in features can be seen in Fig. 1 as naturally occurring features of tongue-and-groove, lap joining, and pin-in-hole. These naturally occurring features are the keys that locate all of the separate pieces together, without resorting to complex weldment. With the loose hardware precisely located together from printhead to rigid platform 3, tolerances involving the continuous ink jet printhead are known at remote mount holes 6. Hardware that is modular and self-locating is easier to fabricate, inspect, assemble, and is more cost effective, functional, and reliable.

#### Industrial Applicability and Advantages

The present invention is useful in the field of ink jet printing, and has the advantage of providing an optimum connection between a printing system umbilical and the structure that supports an ink jet printhead. The present invention provides the further advantage of providing a platform that serves as an attachment/detachment point for the umbilical, covers, and structural elements of a continuous ink jet printing system. Finally, the attachable/detachable umbilical platform facilitates ink, power, air, and data transference, and registration of a continuous ink jet printhead and printing system.

Having described the invention in detail and by reference to the preferred embodiment thereof, it will be apparent that other modifications and variations are possible without departing from the scope of the invention defined in the appended claims.

#### **Claims**

1. A system for linking an umbilical to a continuous ink jet printhead comprising:

an ink jet printhead support structure for supporting the ink jet printhead;  
a rigid printhead housing cap located between the ink jet printhead support structure and the umbilical;  
attachment means for attaching the ink jet printhead support structure to the rigid printhead housing cap; and  
receiving means associated with the rigid print-

head housing cap for receiving the umbilical, whereby the umbilical is threadable into and out of the receiving means of the rigid printhead housing cap.

2. A system for linking an umbilical to a continuous ink jet printhead as claimed in claim 1 wherein the attachment means comprise at least one screw.
3. A system for linking an umbilical to a continuous ink jet printhead as claimed in claim 1 wherein the receiving means comprises a threaded aperture through the rigid printhead housing cap.
4. A system for linking an umbilical to a continuous ink jet printhead as claimed in claim 1 further comprising first built-in registration features in the rigid printhead housing cap to accurately align with the ink jet printhead support structure.
5. A system for linking an umbilical to a continuous ink jet printhead as claimed in claim 1 further comprising enclosure means for enclosing the linkage system.
6. A system for linking an umbilical to a continuous ink jet printhead as claimed in claim 5 further comprising second built-in registration features to automatically locate and properly position the enclosure means.
7. A system for linking an umbilical to a continuous ink jet printhead as claimed in claim 1 further comprising self-locating features for properly aligning the umbilical and the rigid printhead housing cap with the ink jet printhead support structure.

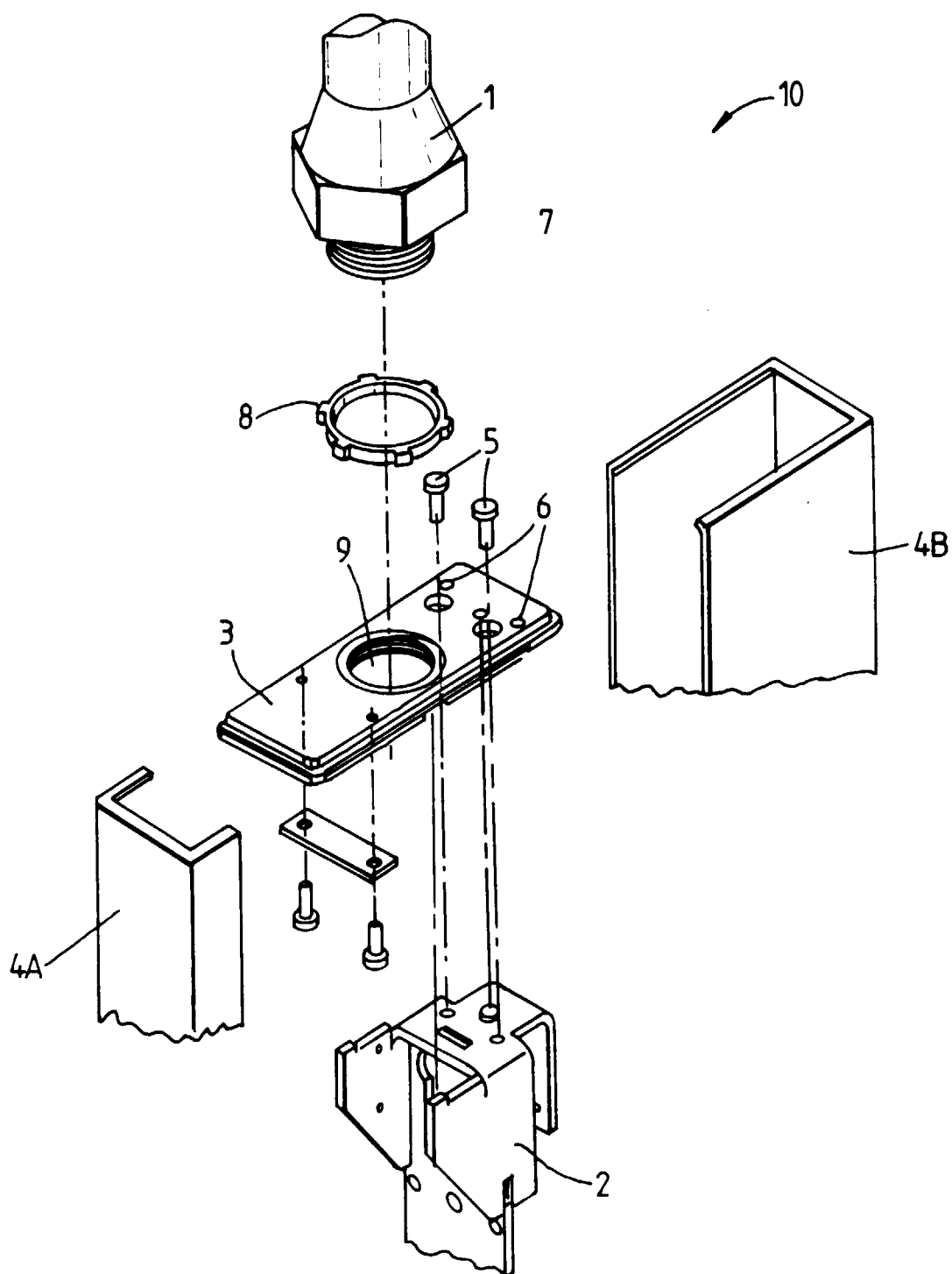


FIG. 1