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(54) **Tool-less printhead mount**

Werkzeuglose Druckkopfhalterung

Montage d'une tête d'impression sans outil

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US-A- 4 350 448 **US-A- 4 809 015**
US-A- 5 109 239

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DescriptionTechnical Field

[0001] The present invention relates to continuous ink jet printers and, more particularly, to a means for installing, accurately registering, and removing a continuous ink jet printhead without the use of any tools.

Background Art

[0002] Ink jet printing systems are known in which a print head defines one or more rows of orifices which receive an electrically conductive recording fluid, such as for instance a water base ink, from a pressurized fluid supply manifold and eject the fluid in rows of parallel streams. Printers using such print heads 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.

[0003] In the prior art, it is known to have separate assemblies for each component of the ink jet printer system. For example, there are separate assemblies for the orifice plate, the charge plate, and the printhead. When an assembly needs to be replaced or repaired, there are several assemblies that need to be attended to. For instance, if a component of one assembly is replaced, the replacement component is required to be realigned with the various other components in the assembly, and various other assemblies in the system. This, in turn, has traditionally required certain tools to be available to attempt the installation, realignment, and registration. The process, therefore, is time consuming and costly, besides that accurate registration and realignment is extremely difficult to achieve.

[0004] Continuous ink jet printheads are one such consumable item in ink jet printing systems and must be replaced when their performance degrades. To install or replace one of these printheads, one must disconnect fluid connections that then leak, use a tool to loosen screws, and unplug an electrical connection that requires removal of a screw, which becomes a loose part. Furthermore, screws that mount and register the printhead require significant clearance around the screw body so that a connection can be made to the printing system. The realignment and registration of the printhead was a critical and tedious task, but also distasteful was the inevitable ink leakage that occurred during the uncoupling of the fluid supply and return lines to the orifice cavity. Replacement of the printhead, therefore, has been a relatively complex, messy and time consuming job, which was not at all suitable for a customer/user.

[0005] It is seen then that there is a need for a printhead which can be quickly and easily replaced, even in the field, overcoming the disadvantages associated with the prior art.

Summary of the Invention

[0006] This need is met in part by the tool-less installation and positioning printhead mount according to US-A-4 809 015, whereas the present invention provides a more precise method for the customer/user to locate and mount a continuous ink jet printhead without using tools.

[0007] In accordance with one aspect of the present invention, a printhead mounting system is used to install an ink jet printhead in a continuous ink jet printing system. The mounting system comprises a printhead nest for mating with the resonator assembly of the printhead; latch means associated with the printhead nest for securing the printhead to the printhead nest when the printhead nest mates with the resonator assembly; and a snap and lock mechanism associated with fluid inlet and outlet lines and a catcher outlet line, the fluid inlet and outlet lines each having an internal check valve feature, to prevent fluid leakage.

[0008] Accordingly, it is an object of the present invention to solve for the above-noted problems associated with the replacement and registration of a continuous ink jet printhead. It is an advantage of the present invention that a customer/user can quickly and accurately effect replacement of such a printhead, without the use of any tools.

[0009] 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 Drawings**[0010]**

Fig. 1 is an exploded view of an ink jet printhead structure illustrating the printhead mount in accordance with the present invention; and

Fig. 2 is a view of the electrical connection for the printhead of Fig. 1.

Detailed Description of the Preferred Embodiments

[0011] The present invention provides for a user friendly design wherein a customer/user can precisely locate and mount a continuous ink jet printhead without the use of any tools. Referring to Fig. 1, a tool-less system and method for precisely installing, aligning and registering a printhead 1 in an ink jet printing system 7 is illustrated. Initially, the ink jet printhead 1 is loaded into printhead nest 4, with the load direction being in the direction of arrow 13, by matching first rectangular region 8 of resonator assembly 2 with recessed rectangular region 9 of nest 4. For purposes of clarity, the printhead nest 4 is illustrated in exploded view in Fig. 1 as separate from the printing system 7; however, the nest 4 is actually a permanent part of the printing system 7.

[0012] In a preferred embodiment of the present in-

vention, rectangular regions 8 and 9 have just enough clearance to each other to allow proper assembly of the printhead 1 to the nest 4. First rectangular area 8 at the top of the resonator assembly 2 is toleranced precisely to the resonator. When the printhead 1 is installed in the nest 4, then, an accurate and functional relationship is established to the printing system 7.

[0013] As the rectangular regions 8 and 9 are mated, a snap and lock mechanism encourages catcher outlet 3C to snap and lock into its corresponding fluid port 10. This allows the installer (customer/user) to let go of the printhead 1, without losing any positioning advantage, and proceed with final seating of the printhead 1. The snap and lock mechanism also provides both tactile and audible advantage to let the customer/user know that a good connection has been made.

[0014] Continuing with Fig. 1, latch means 5 can now be actuated. A loop 11 of the latch means 5 engages with loop mating portion 12 of printhead 1. In a preferred embodiment of the present invention, two identical latches 5, positioned on opposite sides of the nest, engage with corresponding loop mating portions 11 positioned on corresponding opposite side of printhead 1. Actuating the latch means 5 secures the printhead 1 to the nest, and, thereby, to the printing system 7, with approximately 40 pounds of force. Of course, the customer/user exerts only a small fraction of this force because of a built-in mechanical advantage in each latch 5.

[0015] Continuing with Fig. 1, printhead 1 comprises a fluid inlet 3A, to allow ink into the printhead 1, and a fluid outlet 3B. Fluid fittings 3A and 3B have a snap and lock mechanism like catcher outlet 3C, to snap and lock into their corresponding fluid ports (not shown). As with the catcher outlet line 3C, the snap and lock mechanism provides both tactile and audible advantage to let the customer/user know that a good connection has been made for each fluid fitting. The user no longer has to twist fluid connections together, as required by the prior art, eliminating those instances where connections separated and ink erupted. Furthermore, the fluid fittings of the present invention comprise internal check valve means to prevent ink leakage during installation and removal of the printhead 1.

[0016] Continuing with Fig. 1 and referring now to Fig. 2, an electrical connection with electrical connector 6 is achieved for the printhead 1 by joining connector board 15 with a pre-existing printed circuit board 16. Connection via line 19 is made between the connector board 15 and the printhead 1. To maintain the tool-less advantage of the present invention, a mating aperture 14 receives spring pin 18 which is a permanent part of the printing system 7. The spring pin 18, then, is used as a restraint, rather than a screw, as in the prior art. Additionally, mating connector 17 mates with connector 6. Between the contact force of connector 6 with mating connector 17 and the spring pin 18 with aperture 14, a rigid and stable connection is made, eliminating loose screws and tools.

[0017] Although the preferred mode of practicing the

invention has been described with reference to an ink jet print head for a continuous ink jet printer, the principle of the present invention can also be applied to a wide variety of ink jet printers.

Industrial Applicability and Advantages

[0018] The print head assembly apparatus according to the present invention is useful in continuous ink jet printers. The apparatus of the present invention provides for a user friendly design that allows for precise installation, alignment, and registration of a continuous ink jet printhead in a continuous ink jet printing system, by any user. The printhead mount of the present invention has the further advantage of being an entirely tool-less mount, with positive location and confident fluid connections. This advantage, in turn, provides the additional advantage of eliminating a screw used in the prior art to secure the electrical connection, thereby removing all loose parts. Fluid fittings have integral check valves to stop ink from leaking, and engage a snap and lock mechanism to provide tactile and audible feedback, assuring a good connection. Keying off the resonator assembly allows for precise registration of the printhead to its nest. The present invention provides the further advantage of using clamps activated by hand to secure the printhead, eliminating the need for tools.

[0019] 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 printhead mounting system for installing an ink jet printhead in a continuous ink jet printing system, the ink jet printhead (1) having a resonator assembly (2) and further having fluid inlet and outlet lines and a catcher outlet line, the mounting system comprising:

a printhead nest (4) for mating with the resonator assembly (2);

latch means (5) associated with the printhead nest (4) for providing tool-less securement of the printhead (1) to the printhead nest (4) when the printhead nest (4) mates with the resonator assembly (2); and

an electrical connector (6) for achieving an electrical connection for the ink jet printhead (1);

characterised by a snap and lock mechanism associated with the fluid inlet (3A) and outlet (3B) and the catcher outlet (3C), the snap and lock mechanism engaging the inlet and outlets (3A, 3B)

with associated mates when the latch means (5) are engaged.

2. A printhead mounting system as claimed in claim 1 wherein the fluid inlet (3A) and outlet (3B) comprise internal check valves. 5
3. A printhead mounting system as claimed in claim 1 wherein the snap and lock mechanism provides tactile and audible feedback to assure connection. 10
4. A printhead mounting system as claimed in claim 1 wherein actuation of the latch means (5) secures the printhead (1) to the printhead nest (4). 15
5. A printhead mounting system as claimed in claim 1 wherein the latch means (5) comprise a loop portion (11). 20
6. A printhead mounting system as claimed in claim 5 wherein the loop portion (11) of the latch means (5) engages with a loop mating portion (12) of the printhead (1).

Patentansprüche

1. Ein Druckkopfhaltungssystem zum Einsetzen eines Tintenstrahl-druckkopfs in ein kontinuierliches Tintenstrahl-drucksystem, bei dem der Tintenstrahl-druckkopf (1) einen Resonatoraufbau (2) aufweist und desweiteren Flüssigkeitseinlass- und auslassleitungen und eine Auffangauslassleitung aufweist, wobei das Halterungssystem umfasst:
 - eine Druckkopfaufnahme (4), welche an den Resonatoraufbau (2) angepasst ist;
 - Rastmittel (5), welche der Druckkopfaufnahme (4) zugeordnet sind, um eine werkzeuglose Sicherung des Druckkopfs (1) in der Druckkopfhaltung (4) zu ermöglichen, wenn die Druckkopfhaltung (4) mit dem Resonatoraufbau (2) zusammenpasst; und
 - einen elektrischen Verbinder (6) um eine elektrische Verbindung für den Tintenstrahl-druckkopf (1) zu erreichen;

gekennzeichnet durch einen Schnapp- und Verriegelungsmechanismus, welcher dem Flüssigkeitseinlass (3A) und -auslass (3B) und dem Auffangauslass (3C) zugeordnet ist, wobei der Schnapp- und Verriegelungsmechanismus den Einlass und die Auslässe (3A, 3B, 3C) mit zugeordneten Partnern verbindet, wenn die Rastmittel (5) im Eingriff sind. 50
2. Druckkopfhaltungssystem nach Anspruch 1, bei dem der Flüssigkeitseinlass (3A) und -auslass

(3B) interne Prüfventile umfassen.

3. Druckkopfhaltungssystem nach Anspruch 1, bei dem der Schnapp- und Verriegelungsmechanismus fühl- und hörbare Rückmeldungen gibt, um die Verbindung sicherzustellen.
4. Druckkopfhaltungssystem nach Anspruch 1, bei dem die Betätigung der Rastmittel (5) den Druckkopf (1) in der Druckkopfaufnahme (4) sichert.
5. Druckkopfhaltungssystem nach Anspruch 1, bei dem die Rastmittel (5) einen Schleifenabschnitt (11) aufweisen.
6. Druckkopfhaltungssystem nach Anspruch 5, bei dem der Schleifenabschnitt (11) der Rastmittel (5) mit einem Schleifenaufnahmeabschnitt (12) des Druckkopfs (1) zusammenwirkt.

Revendications

1. Système de montage de tête d'impression pour installer une tête d'impression à jet d'encre dans un système d'impression à jet d'encre en continu, la tête d'impression à jet d'encre (1) possédant un ensemble de résonateur (2) et possédant, de plus, des lignes d'entrée et de sortie de fluide et une ligne de sortie de dispositif d'arrêt, système de montage comprenant :
 - un emboîtement de tête d'impression (4) pour une adaptation avec l'ensemble de résonateur (2) ;
 - des moyens de verrouillage (5) associés à l'emboîtement de tête d'impression (4) pour constituer une fixation sans outil de la tête d'impression (1) dans l'emboîtement de tête d'impression (4) lorsque l'emboîtement de tête d'impression (4) s'adapte à l'ensemble de résonateur (2) ; et
 - un connecteur électrique (6) pour établir une connexion électrique pour la tête d'impression à jet d'encre (1) ;

caractérisé par un mécanisme d'encliquetage associé à l'entrée (3A) et la sortie (3B) de fluide et à la sortie du dispositif d'arrêt (3C), le mécanisme d'encliquetage s'engageant dans les entrée et sortie (3A, 3B) à l'aide d'adaptations associées lorsque les moyens de verrouillage (5) sont engagés. 50
2. Système de montage de tête d'impression selon la revendication 1, dans lequel l'entrée de fluide (3A) et la sortie de fluide (3B) comprennent des clapets anti-retour internes. 55

3. Système de montage de tête d'impression selon la revendication 1, dans lequel le mécanisme d'encliquetage fournit une rétroaction tactile et audible pour assurer la connexion.

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4. Système de montage de tête d'impression selon la revendication 1, dans lequel l'actionnement des moyens de verrouillage (5) fixent la tête d'impression (1) dans l'emboîtement de tête d'impression (4).

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5. Système de montage de tête d'impression selon la revendication 1, dans lequel les moyens de verrouillage (5) comprennent une partie de boucle (11).

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6. Système de montage de tête d'impression selon la revendication 5, dans lequel la partie de boucle (11) des moyens de verrouillage (5) s'engage dans une partie d'adaptation de boucle (12) de la tête d'impression (1).

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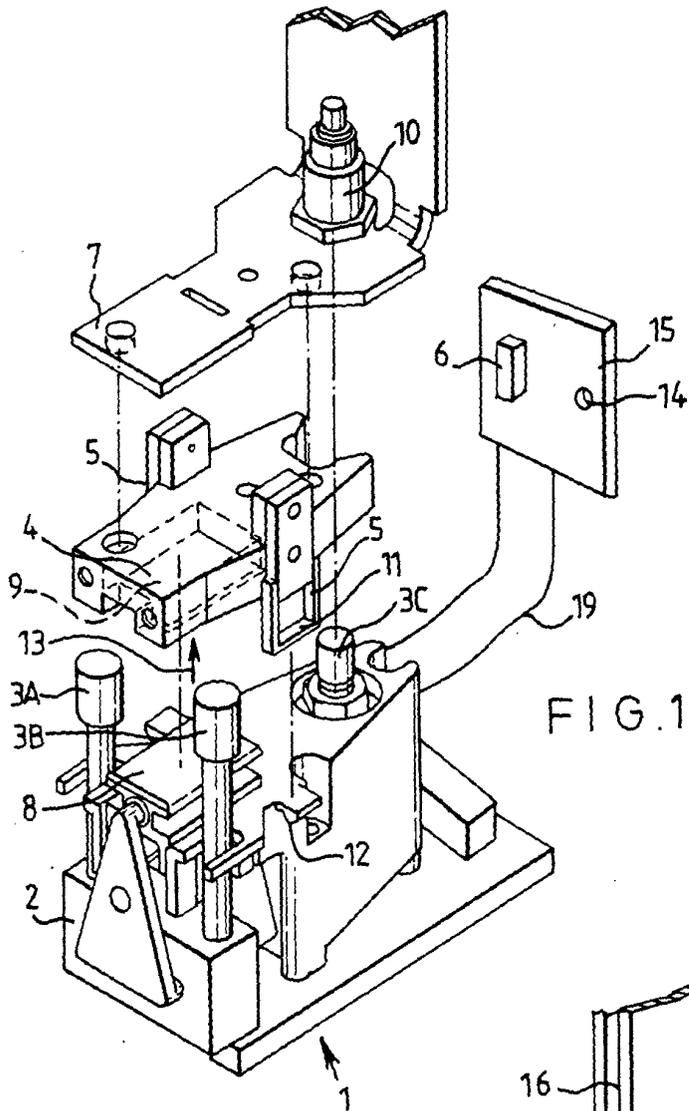


FIG. 1

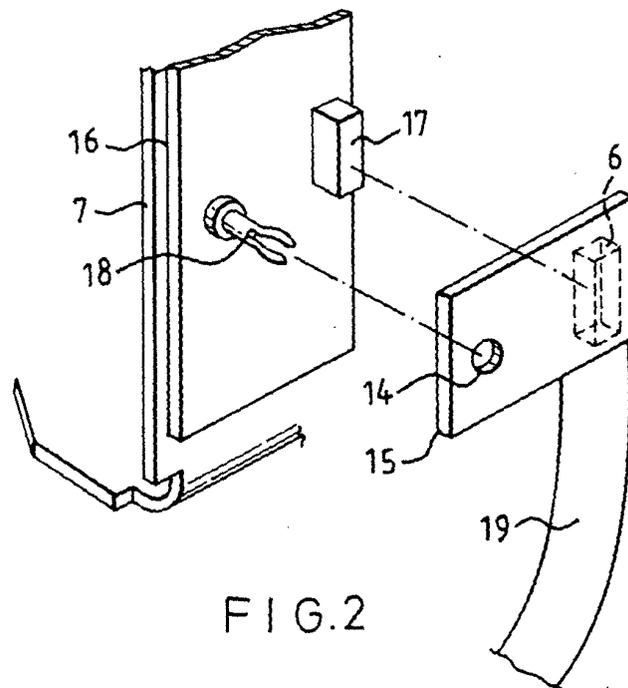


FIG. 2