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- **Moore, Steven L., c/o Eastman Kodak Company
Rochester, New York 14650-2201 (US)**
- **Greene, William J., c/o Eastman Kodak Company
Rochester, New York 14650-2201 (US)**

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(74) Representative: **Parent, Yves et al
KODAK INDUSTRIE,
Département Brevets,
CRT - Zone Industrielle
71102 Chalon-sur-Saône Cedex (FR)**

(71) Applicant: **EASTMAN KODAK COMPANY
Rochester, New York 14650 (US)**

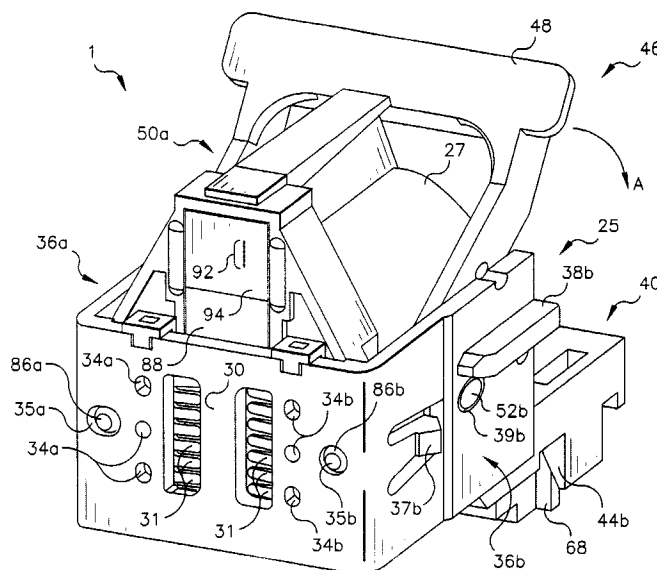
(72) Inventors:
• **Westcott, Robert M.,
c/o Eastman Kodak Company
Rochester, New York 14650-2201 (US)**

(54) **Inkjet printhead mounting cartridge**

(57) A cartridge mounting assembly is provided for an inkjet printhead of the type including an ink cartridge having a plurality of inkjet nozzles and a plurality of exposed electrical contacts for conducting control signals to the nozzles. The mounting assembly has a retainer for releasably securing the ink cartridge, a printer control circuit having a plurality of electrical contacts registrable with the ink cartridge contacts, and a plurality of individually cantilevered spring members for pressing the cir-

cuit contacts into conductive engagement with the cartridge contacts. The mechanical independence of each of the cantilevered spring members allows them to effectively apply a conductively engaging force between the contacts of the control circuit and the ink cartridge regardless of differences in thickness, planarity, or center alignment between the two pairs of contacts caused by manufacturing tolerances, dried ink deposits, or small misalignments in contact registry.

FIG. 3



Description

[0001] Ink jet printers have multiple electrical connection points and provide a means whereby the user can change the replaceable ink holding component in an out of a cartridge. The cartridge in tun provides a means to align with the electrical connections of the ink holding component and to provide contact pressures for electrical connectivity between the contact locations of the ink holding component and the "cartridge that supports and locates this ink holding component."

[0002] This invention generally relates to cartridge-type inkjet printheads of the type formed by the combination of an ink cartridge and a mounting assembly, and is particularly concerned with a mounting assembly which consistently and reliably applies a conductively engaging force between electrical contacts on the ink cartridge and control circuitry carried within the mounting assembly.

[0003] Cartridge-type inkjet printheads are known in the prior art. Such printheads are formed by the combination of an ink cartridge and mounting assembly. The ink cartridge includes a row of inkjet nozzles on its bottom surface, and an array of electrical contact pads on this surface for conducting printer control signals to each of the various inkjet nozzles. The mounting assemblies for such printheads are provided with a control circuit having a plurality of contact buttons registrable with the contact pads of the cartridge which transmit printer control signals. Such mounting assemblies further include a mechanism for detachably securing the ink cartridge within the assembly in a position such that the electrical pads of the cartridge are in registry with the contact buttons of the printer control circuit.

[0004] Such cartridge-type inkjet printheads are particularly adapted for use with document scanners which optically scan the printed information on documents, and convert the written information into digital form. In such an application, the printheads are used to print an identifying number on each of the documents being scanned. The printhead number allows the user of the scanner to identify the image scanned in case a rescan is necessary due to poor or missing image information. It is important that the printhead be easily mountable on and removable from the scanner or other device as the ink cartridge must be periodically replaced due to exhaustion of its ink reservoir. For the same reason, the ink cartridge should be easily installable in and removable from the mounting assembly. Additionally, when the printhead is installed in the scanner, the inkjets present on the bottom surface of the cartridge must align properly with the documents fed through a paper transport device in the scanner in order to insure that the index number printed on the documents is in a desired location. Finally, whenever a new cartridge is installed in the mounting assembly, some sort of alignment mechanism must be present to insure registry between the contact pads and buttons. Additionally, some sort of resilient

means must be provided to insure that an electrically-conductive engagement is reliably created between the contact pads of the ink cartridge and the contact buttons of the control circuitry present within the mounting assembly.

[0005] In prior art mounting assemblies, the necessary alignment between the contact pads of the ink cartridge and the contact buttons of the control circuitry is achieved through a plurality of assembled parts. Additionally, the pressure to form the necessary electrical engagement between these contacts is generated by a single compliant, elastomeric pad that has a series of projections or springs that press the contact pads and buttons together.

[0006] While such prior art mounting assemblies are capable of performing their intended functions, the inventors have observed a number of shortcomings associated with the design of such assemblies. The multi-part aspect of such designs adds unwanted cumulative tolerances to the assembled printhead which can provide non-optimal alignment between the cartridge contact pads and circuit buttons. Such multi-part designs are also relatively expensive to manufacture due to the cost of fabricating the individual pieces, as well as the assembly time and labor necessary to put them together. The use of a single, elastomeric pad to generate the necessary engagement force between the contact pads and buttons creates unwanted non-uniformities in the pressures generated between adjacent pairs of pads and buttons due to the fact that when any one of the pressure-focusing projections or nubs on the pad is above or below the plane of the others, it will experience more or less pressure, which is in turn transferred to the neighboring projections through the beam strength of the pad. The end result is that the projections or nubs on such pads can create unequal contact pressure which in turn can interfere with the reliability of the electrical connection made between the contact pads and buttons of the ink cartridge and control circuitry, respectively. In addition to the potential for unequal pressures, the dimensional molding accuracy of such elastomeric pads is not as precise as that of a straight injection molded plastic. When this factor is added to the placement accuracy of aligning the pad to the support structure, the ability to apply even pressures exactly where they are needed for good electrical contact is further diminished. The end result of the cumulative tolerances necessitated by multi-part construction and the uneven contact pressures generated by the use of elastomeric pads is that the engagement force necessary to conduct electricity between the contact pads and buttons of the ink cartridge and control circuitry may not be reliably generated. These problems are further compounded over the life time of the printhead, where dried ink deposits can further cause non-uniformities in the thicknesses and planarity of the circuit board substrates supported the contact pads of the ink cartridge, and the flexible circuit board material that carries the contact buttons of

the control circuitry.

[0007] Clearly, what is needed is a printhead cartridge having a mounting assembly formed from a small number of easily assembled parts to reduce the problems associated with the cumulative tolerances and the expenses associated with multi-part construction. Ideally, such a mounting assembly should have a plurality of mechanically independent spring members for generating the necessary contact pressure between the pads of the ink cartridge and the buttons of the control circuitry to insure that the necessary contact pressure is consistently and reliably generated, despite any misalignments and non-uniformities and planarities caused by cumulative tolerances and dried ink deposits.

[0008] Generally speaking, the invention is an inkjet printhead that eliminates or ameliorates all of the aforementioned problems associated with the prior art. To this end, the inkjet printhead comprises an ink cartridge having a plurality of inkjet nozzles, and a plurality of electrical contacts for conducting control signals to the nozzles, and a mounting assembly having a retainer for releasably securing the ink cartridge, and a plurality of mechanically independent spring members for pressing electrical contacts of a printer control circuit into conductive engagement with the contacts of the ink cartridge. Each of the independent spring members is preferably independently cantilevered from a wall of the mounting assembly. Each spring member may have a proximal end that is integrally connected to the wall of the mounting assembly, and a distal end that includes a projecting nub for engaging one of the printer control circuit contacts. The wall of the mounting assembly is preferably formed from an injection moldable plastic material, and the integral connection and formation of the cantilevered spring members with the wall advantageously provides a design that is easily accurately manufactured, and which provides uniform engagement pressures between the contacts.

[0009] The retainer of the mounting assembly includes at least one locking member for engaging the contacts of the ink cartridge against the contacts of the circuit when the retainer secures the ink cartridge in the mounting assembly. The retainer may include a pair of leg members pivotally mounted in side walls of the mounting assembly, and locking lugs at each end of each leg for applying an engagement force against lock flanges provided on the ink cartridge. To insure proper registration between the contacts of the ink cartridge and the control circuit of the mounting assembly, the mounting assembly and the cartridge include interfitting members such as pegs and holes for creating the desired alignment. An alignment means for the control circuit captured within the mounting assembly is also provided which may take the form of registry holes in the control circuit through which alignment pegs of a circuit retainer are inserted during the construction of the mounting assembly.

[0010] The mounting assembly may further include a

mechanism for detachably connecting the printhead to a printer. The mounting assembly may take the form of resilient fingers which snap-fit into opposing slots provided in a printer well of the printer, in combination with alignment ribs which are insertable into a selected one of a plurality of slots in the printer well. Such a structure allows the position of the printhead on the printer to be adjusted so that the position of the printed index number or other image may be adjusted on the paper fed through the printer.

[0011] The invention and its objects and advantages will become more apparent in the detailed description of the preferred embodiment presented below.

Figure 1 is a side view of the scanner printer that the printhead of the invention may be used in combination with;

Figures 2A and 2B are perspective views of the printer of the invention, illustrating how it can be removed from the printer for cartridge replacement or other servicing;

Figure 3 is a perspective bottom view of the printhead of the invention as seen along line 3-3 in Figure 2B;

Figure 4 is a perspective, exploded view of the printhead, illustrating in particular the components of the mounting assembly of the invention;

Figure 5 is a perspective, plan view of the mounting assembly along the line 5-5 in Figure 4, and

Figure 6 is a bottom, perspective view of the ink cartridge.

[0012] With reference now to Figures 1, 2A, and 2B, the printhead assembly 1 of the invention is particularly adapted for use in a scanner 2 that scans documents and converts the printed information thereon into digitized form. In such an application, the printer assembly 1 prints an identifying number on documents fed through the scanner 2, which number is also incorporated into the digitized, electronic document created by the CCD module of the scanner 2. As is best seen in Figures 2A and 2B, the printhead assembly 1 is detachably mounted to a printer well 3 that is likewise detachably mounted on the exterior surface of a semi-cylindrical paper guide 4. As is best seen in Figure 1, the scanner 2 includes a plurality of rollers 6 for conveying documents around the semi-circular path defined by the paper guide 4. A paper sensor 8 is provided on the exterior of the guide 4 for actuating the printer assembly 1. Together, the printhead assembly 1, paper guide 4, rollers 6, and paper sensor 8 form a printer 9 for the scanner 2. A camera assembly 10 is disposed within the semi-cylindrical paper guide 4 for optically reading the printed information on the documents fed through the paper guide 4. The camera assembly 10 includes a housing 12 and the previously mentioned CCD module 14. A plurality of mirrors 16 allows the CCD module to detect light reflected from documents circulating around the paper guide 4

through a slide 18 provided in an inner guide member 20. With the exception of the printhead assembly 1 and well 3, the various components of the scanner 2 are conventional, and form no part of the instant invention.

[0013] With reference to Figures 3, 4, and 5, the printhead assembly 1 is formed from the combination of a mounting assembly 25, and an ink cartridge 27. As will be seen hereinafter more clearly, the principal purposes of the mounting assembly 25 are (1) to establish secure electrical connections between the printer circuit board in the ink cartridge 27 and the control circuitry of the printer; (2) to provide a means whereby the printhead assembly 1 may be easily installed and removed from the printer well 3 via a snap-fit arrangement, and (3) to provide a means for the ink cartridge to be easily secured into and removed from the mounting assembly for replacement or maintenance.

[0014] To the first of these ends, the mounting assembly 25 includes a bottom wall 30 over which the ink cartridge 27 is mountable. Bottom wall 30 includes a plurality of cantilevered spring members 31. As is best seen in Figure 5, each of these cantilevered spring members 31 terminates in a projecting nub 33. As will be described in more detail hereinafter, the integral, cantilevered structure of the spring members 31 in combination with the projecting nubs 33, form independent, spring-loaded members which are responsible for securing electrical connection between contact pads of ink cartridge 25 and the contact buttons of a printer control circuit. Bottom wall 30 also includes inner alignment holes 34a,b and outer alignment holes 35a,b which cooperate with similar alignment holes in the circuit assembly 60 of the printer to align button contacts present in this circuit with the aforementioned, spring-loaded nubs 33.

[0015] The mounting assembly 25 further includes a pair of opposing side walls 36a,b. Each of these side walls includes a resilient retaining fingers 37a,b. These fingers, 37a,b, are insertable into complementary slots 37c,d present in the printer well 3 in order to detachably connect the printer assembly 1 via a snap-fit mechanism (as is indicated in Figure 2B). Each of the side walls 36a,b further includes an alignment rib 38a,b which is insertable into a selected one of several vertically-oriented slots 38c,d in the printer well 3. The various pairs of vertically-oriented slots 38c,d allow the position of the printhead 1 to be adjusted relative to the documents fed through the paper guide 4. A pair of axle holes 39a,b is also present in each of the side walls 36a,b for a purpose which will become clear presently. Mounting assembly 25 also has a back wall 40 integrally connected to the bottom wall 30 and side walls 36a,b. Back wall 40 includes, near its upper end, a circuit admission slot 42 for receiving the flexible circuit assembly of the printer 1. A pair of retaining clips 44a,b project from the back side of the wall 40 for securing the connector terminal of the circuit assembly.

[0016] As is best seen in Figure 4, the mounting assembly 25 has a cartridge retainer 46 formed from a

handle 48 and two opposing legs 50a,b. Stub axles 52a,b project from each of the legs 50a,b and are snap-fit-able into the axle holes 39a,b due to the resiliency of the plastic or other material forming the retainer. Each of the legs 50a,b has a longitudinally-shaped locking recess 53a,b at its lower end. These recesses cooperate with the inner side of each of the previously discussed retaining fingers 37a,b present in side walls 36a,b to help secure the cartridge retainer 36 in a cartridge-retaining position when the retainer 46 is pivoted into the position illustrated in Figures 2B and 3. A pair of locking cams 54a,b are defined by the flat bottom surfaces of each of the legs 50a,b of the retainer 46. Finally, flat portions projecting from the front of the legs 50a,b form stop portions 56a,b which abut the back wall 40 of the mounting assembly 25 when the retainer 46 is pivoted into a cartridge-retaining position.

[0017] With reference again to Figure 4, the printer assembly 1 further has a flexible circuit assembly 60. The circuit assembly 60 includes a foot portion 62 having an array of contact buttons 64. Each of these contact buttons 64 is registrable with a contact pad located on the bottom wall of the ink cartridge 27. Disposed outside of the contact buttons 64 are two pairs of alignment holes 66a,b. The circuit assembly 60 further includes, on its opposite end, a connector terminal 68 which snaps into position behind the upper portion of back wall 40 of the mounting assembly 25 via retaining clips 44a,b. As is also best seen in Figure 4, a circuit retainer 70 is provided for securing the central portion of the flexible circuit assembly 60 to the back wall 40 of the mounting assembly 25. The circuit retainer 70 has a pair of retaining feet 72a,b, as shown. These feet 72a,b include alignment pegs 74a,b which are registrable with the alignment holes 66a,b present in the foot portion 62 of the circuit assembly 60. The circuit retainer 70 also has a retaining wall 76 integrally connected to the retaining feet 72 for capturing and pressing the central portion of the circuit assembly 60 against the back wall 40 of the mounting assembly 25. Finally, at its upper end, the retainer 70 is provided with a pair of opposing, resilient fingers 78a,b which snap-fit into opposing sides of the circuit admission slot 42 of back wall 40 in order to secure the retainer 70 onto the mounting assembly 25.

[0018] With reference to Figure 6, the ink cartridge 27 of the printer assembly 1 includes an ink reservoir 80 for storing a supply of ink. A handle 82 extends from the side of the ink reservoir 80 to facilitate the insertion and removal of the cartridge 27 from the mounting assembly 25. The base 84 of the ink cartridge 27 is provided with a pair of alignment pegs 86a,b which are registrable in and insertable into outer alignment holes 35a,b located on the bottom wall 30 of the mounting assembly 25. Centrally disposed on the bottom of the base 84 is a circuit board 88 having a plurality of contact pads 90. Each of the contact pads 90 controls one of the plurality of printing orifices 92 present on the printer face 94. Finally, the base 84 of the ink cartridge 27 includes a pair

of opposing retaining flanges for a purpose which will become evident shortly.

[0019] In operation, the mounting assembly 25 of the printhead 1 is first mounted by extending the foot portion 62 of the flexible circuit assembly 60 through the back of the admission slot 42 of the back wall 40. The alignment holes 66 of the foot portion 52 are next placed into registry with the inner alignment holes 34a,b present on the bottom wall 30, as is partly shown in Figure 5. The alignment pegs 74a,b of the circuit retainer 70 are next inserted through the registered alignment holes 66a,b and 34a,b and the resilient fingers 78a,b are snapped into the ends of the slot 42 of back wall 40. Terminal connector 68 is then attached to the upper rear portion of the back wall 40 via retaining clips 44a,b. When the mounting assembly 25 is so assembled, the projecting nubs 33 of each of the cantilevered spring members 31 will be applying pressure beneath each one of the contact buttons 64 on circuit foot portion 62.

[0020] To install an ink cartridge 27, the handle 48 of the cartridge retainer 46 is pivoted against the back wall 40 in the direction indicated by the arrow in Figure 3. The ink cartridge 27 is then slid over the bottom wall 30 of the mounting assembly 25 until the alignment pegs 86a,b are aligned and inserted into the outer alignment holes 35a,b of the bottom wall 30. The handle 48 of the cartridge retainer 46 is then pivoted away from the back wall 40 in the direction opposite from that indicated by the arrow in Figure 3. When this occurs, the locking cams 54a,b located on the bottom of the cartridge retainer 46 forcefully engage the retaining flanges 96a,b on the base 84 of the ink cartridge 27 downwardly to press the contact pads 90 of the cartridge 27 against contact buttons 64. Moreover, the legs 50a,b of the cartridge retainer 46 are snap-fitted into this cartridge locking position by the action of the resilient retaining fingers 37a,b snapping into the locking recesses 53a,b on the bottom portion of the legs of cartridge retainer 46. The registration and insertion of the alignment pegs 86a,b of the ink cartridge 27 with the outer alignment holes 35a,b of bottom wall 30 insures the registration of the contact buttons 64 of the flexible circuit assembly 60 with the contact pads 90 of the ink cartridge 27. The upward spring pressure that the nubs 33 on the ends of the cantilevered spring members 31 apply to the contact buttons 64, in combination with the downward pressure that the locking cams 54a,b of the cartridge retainer 46 apply to the base of the ink cartridge 27 insures that a reliable electrical connection is made between the contact buttons 64 and the contact pads 90. Moreover, the independent resiliency of each of the spring members 31 achieved by virtue of the independently cantilevered structure of these members insures that a sufficient electrical contact pressure will be applied to each of the contact buttons 64 regardless of misalignments, variations in the thicknesses of the buttons 64, or pads 90, or irregularities in the planarity or thicknesses of the circuit foot portion 62 or cartridge circuit board 88 caused

by deposits of dried ink.

Claims

1. An inkjet printhead, comprising:
 - an ink cartridge having a plurality of inkjet nozzles, and a plurality of electrical contacts for conducting control signals to said nozzles, and a mounting assembly having a retainer for releasably securing said ink cartridge, and a plurality of mechanically independent spring members for pressing electrical contacts of a printer control circuit into conductive engagement with said contacts of said ink cartridge.
2. The inkjet printhead defined in claim 1, wherein each of said independent spring members is a cantilevered spring member.
3. The inkjet printhead defined in claim 2, wherein each spring member is cantilevered from a wall of said mounting assembly.
4. The inkjet printhead defined in claim 3, wherein each spring member has a proximal end that is integrally connected to said wall of said mounting assembly.
5. The inkjet printhead defined in claim 1, wherein each spring member includes a projecting nub for engaging one of said contact buttons.
6. The inkjet printhead defined in claim 4, wherein each spring member has a distal end that includes a projecting nub for engaging one of said circuit contacts.
7. The inkjet printhead defined in claim 1, wherein said retainer includes at least one locking member for engaging said contacts of said ink cartridge against said contacts of said circuit when said retainer secures said ink cartridge.
8. The inkjet printhead defined in claim 7, wherein said retainer includes a pair of leg members pivotally mounted in side walls of said mounting assembly, and locking lugs at an end of each leg for applying force against said ink cartridge.
9. The inkjet printhead defined in claim 1, wherein said mounting assembly and said cartridge include interfitting members for aligning said contacts of said cartridge and said assembly.
10. The inkjet printhead defined in claim 1, wherein said mounting assembly includes means for aligning

said circuit contacts with said plurality of spring members.

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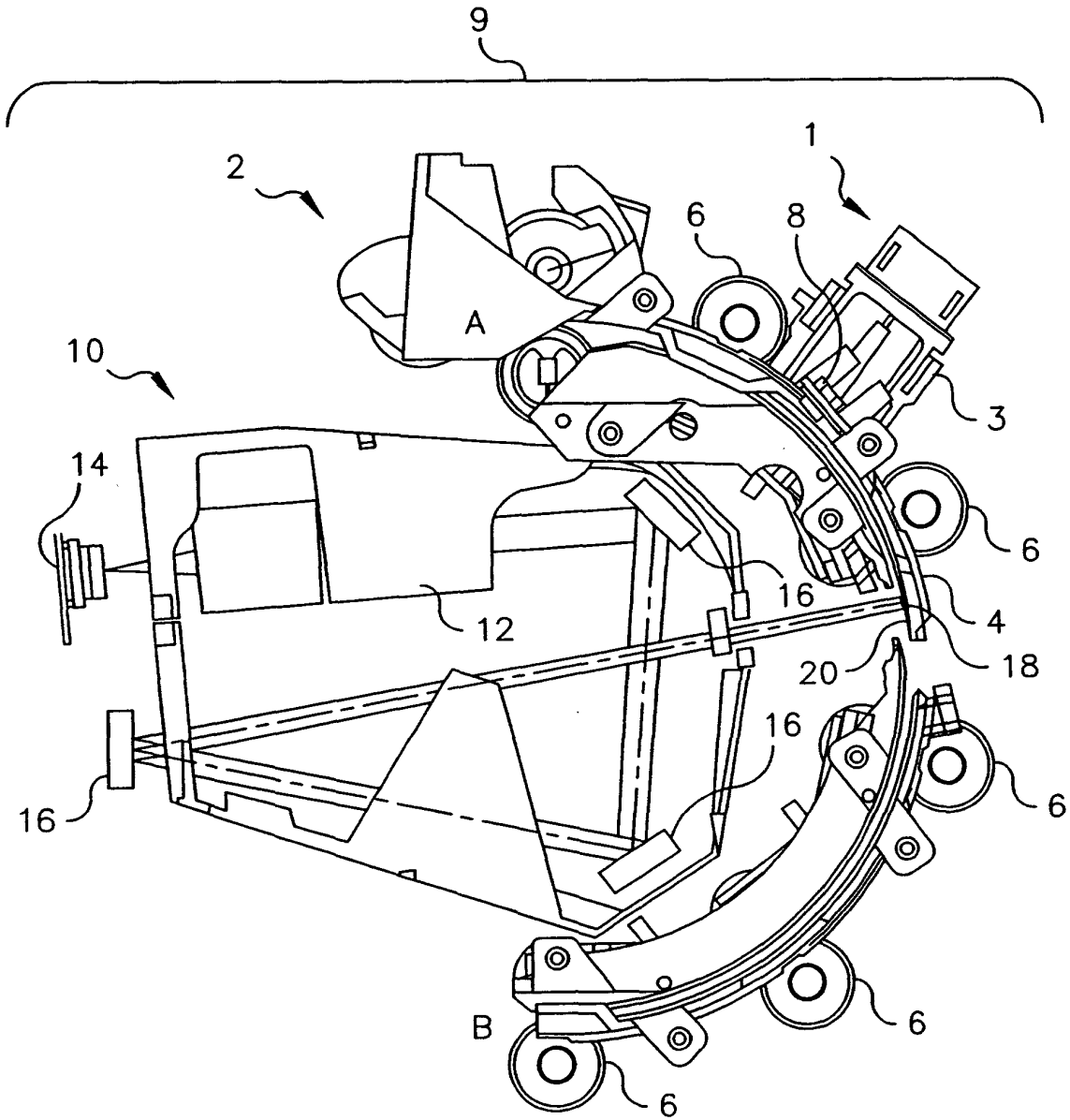


FIG. 1

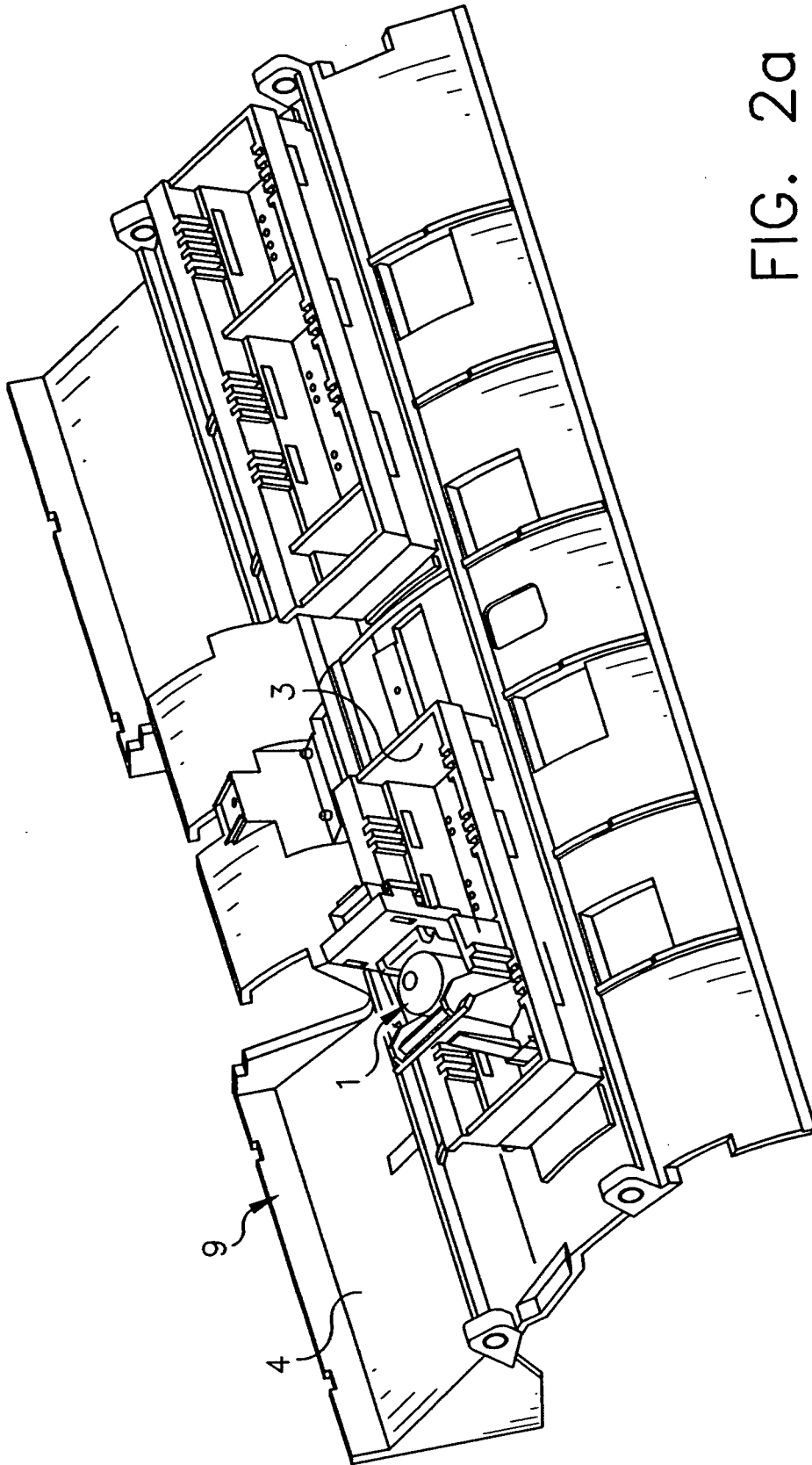


FIG. 2a

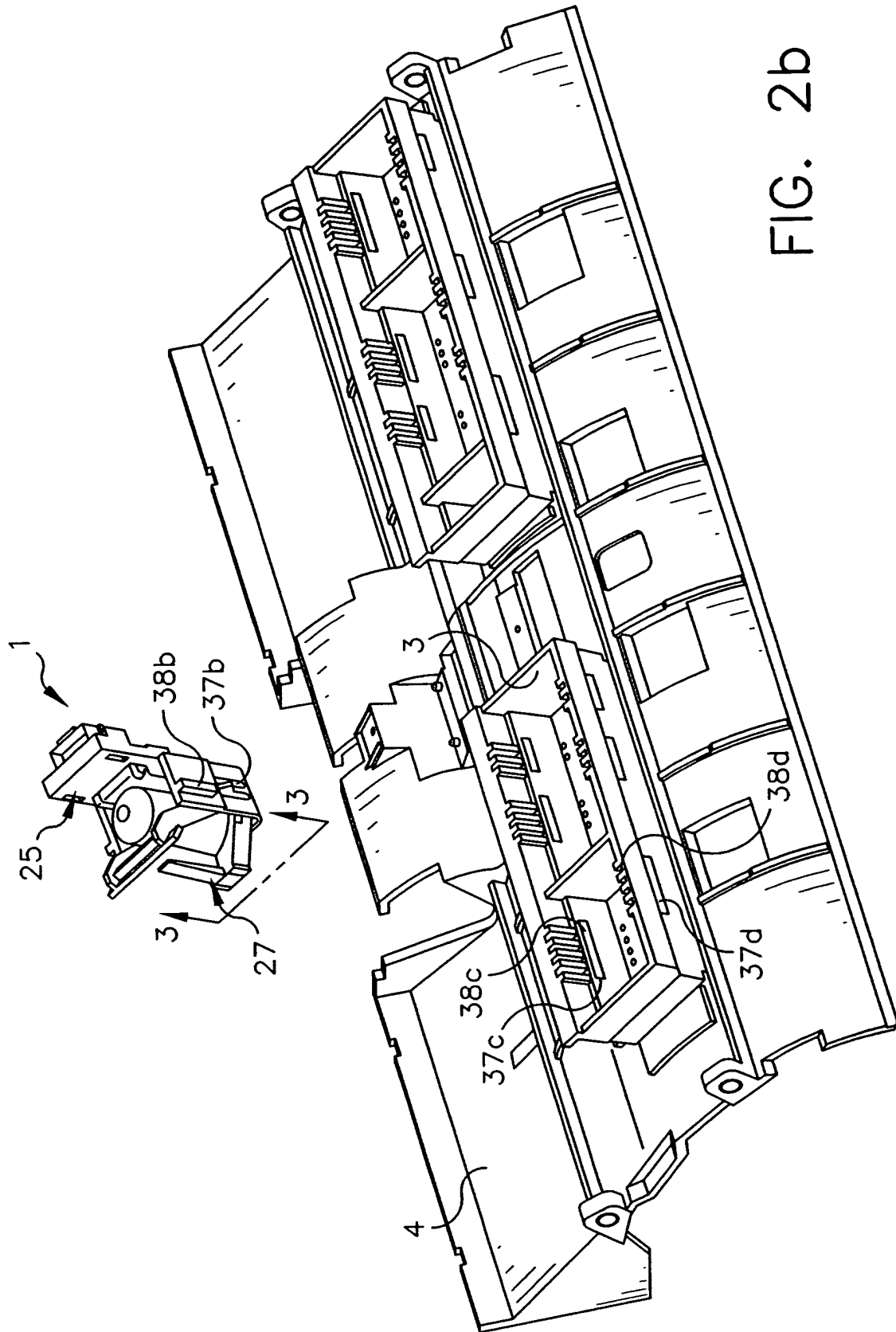


FIG. 2b

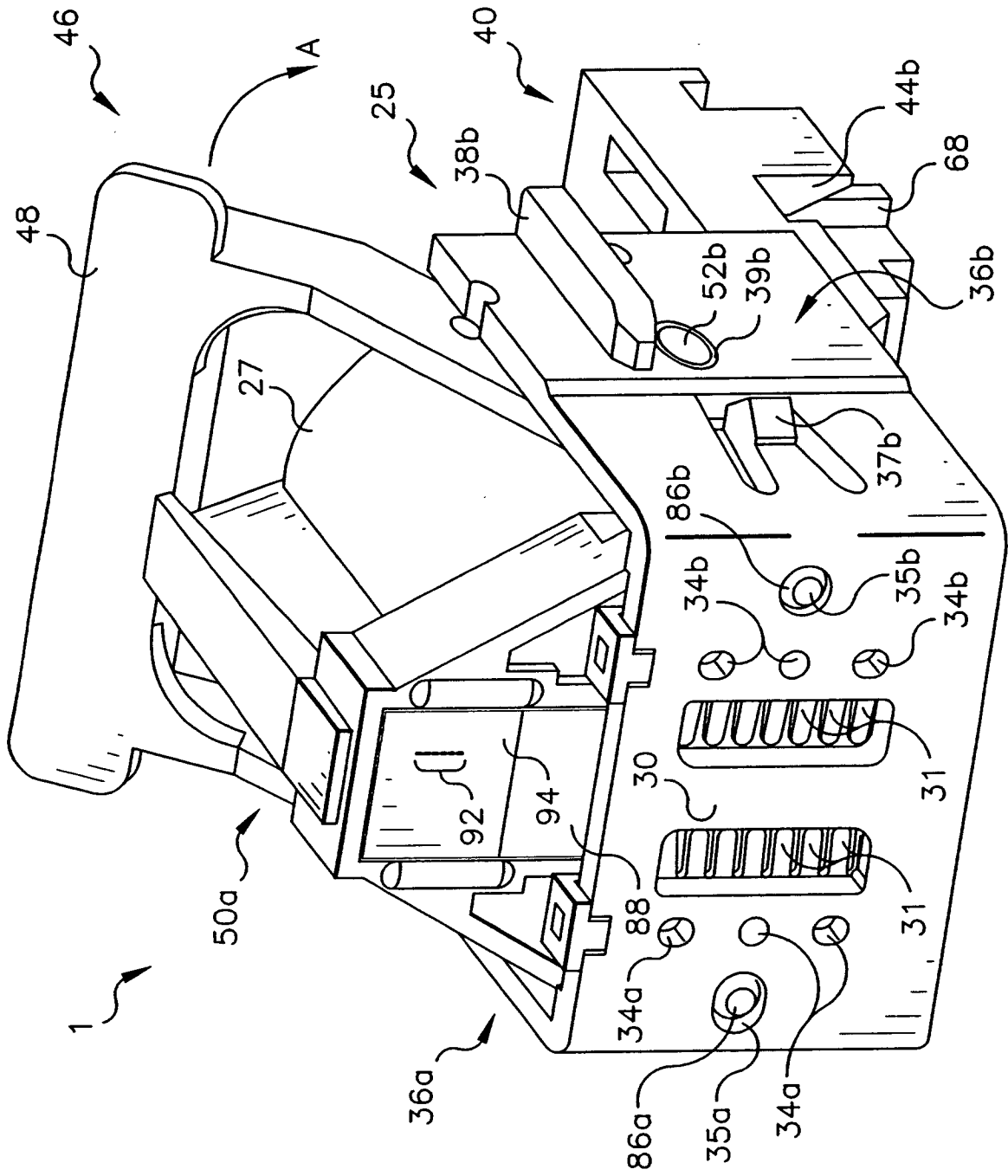


FIG. 3

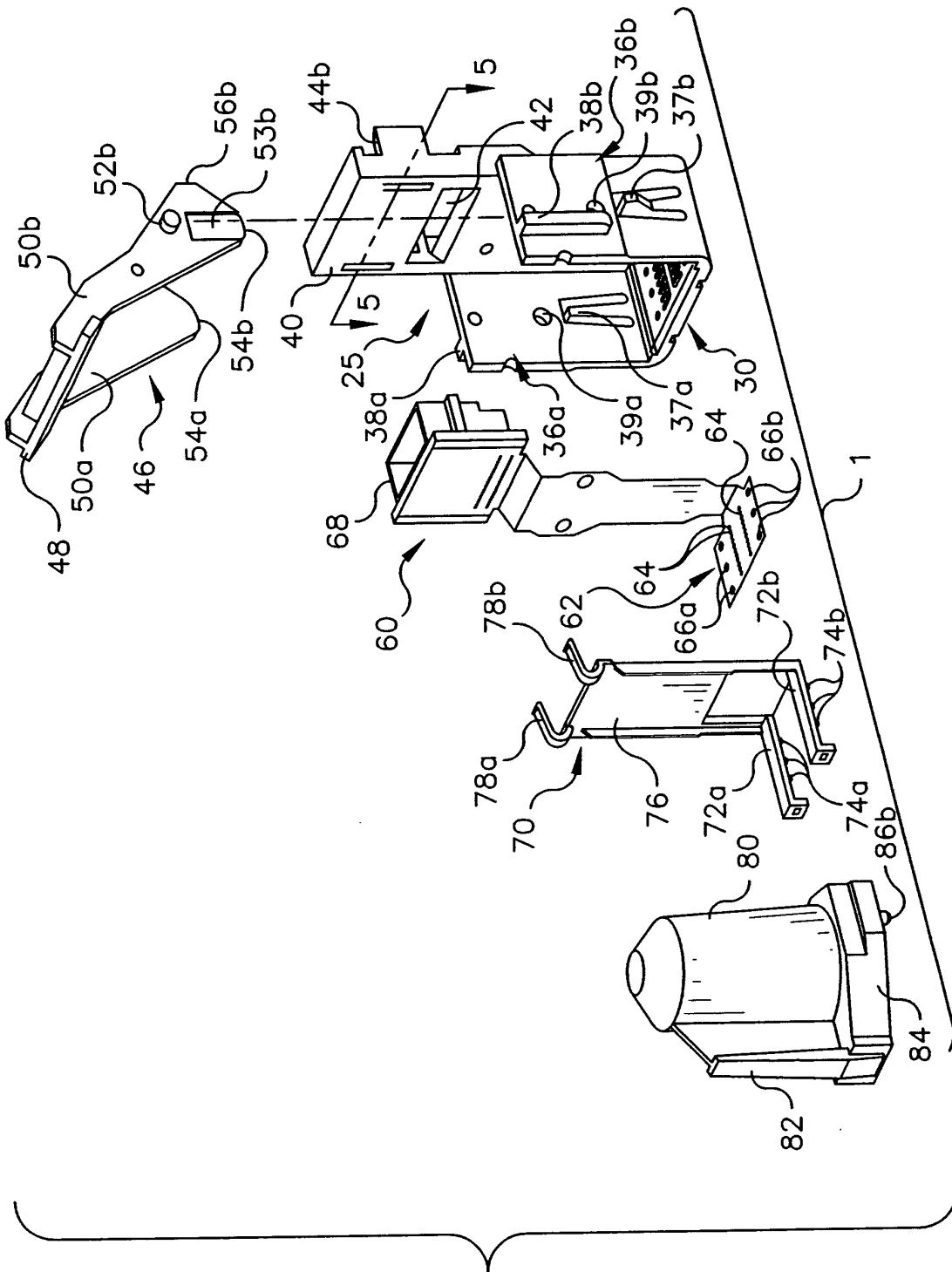


FIG. 4

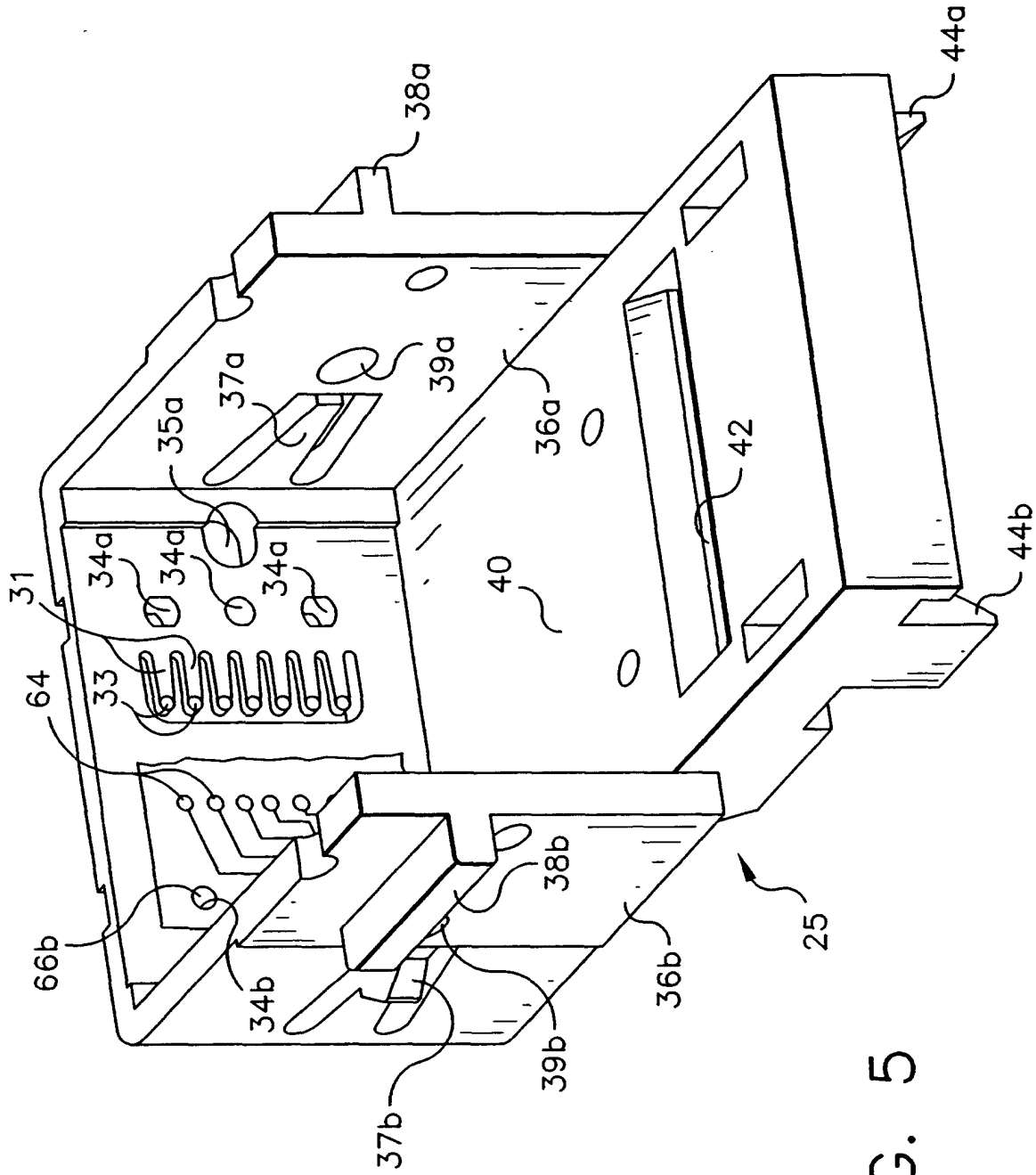


FIG. 5

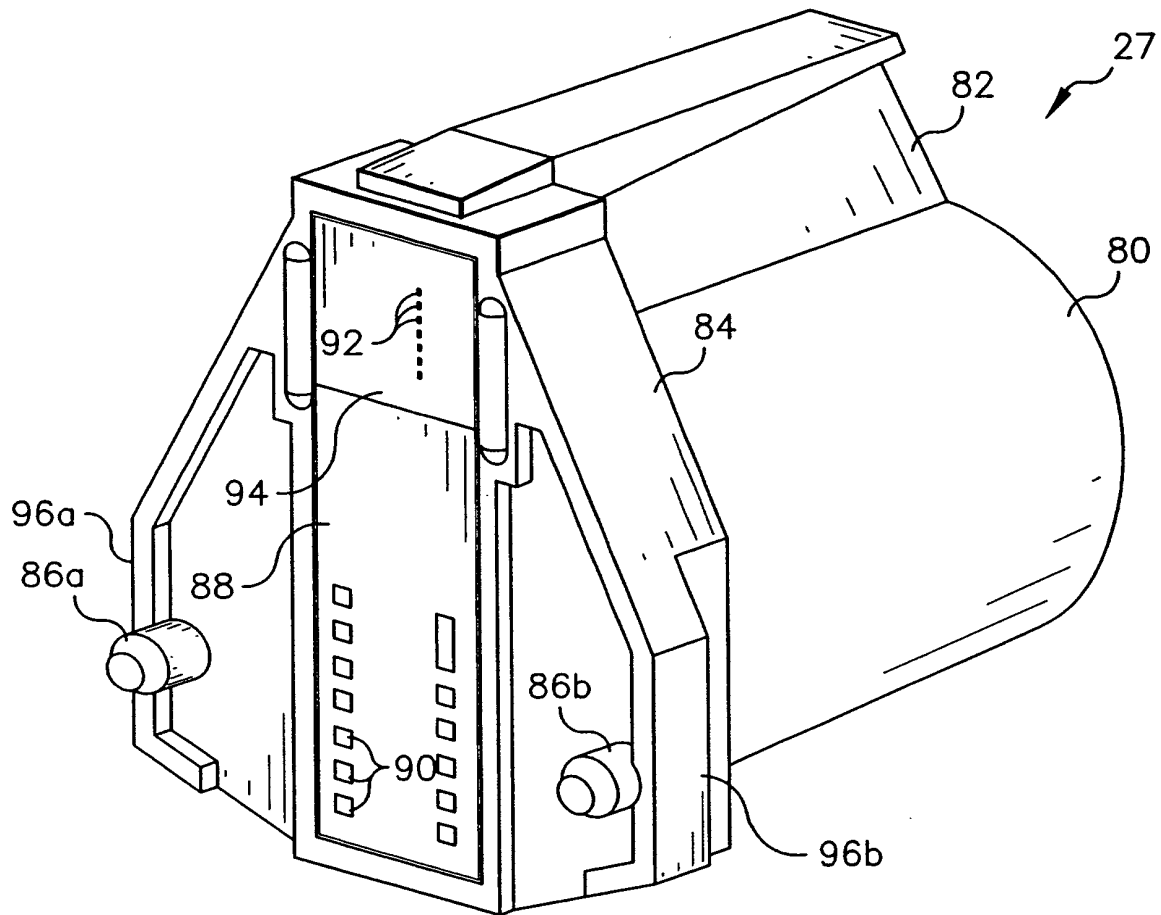


FIG. 6



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 01 20 1199

DOCUMENTS CONSIDERED TO BE RELEVANT							
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)				
X	EP 0 847 866 A (SEIKO EPSON CORP) 17 June 1998 (1998-06-17)	1,5-7,9, 10	B41J25/34				
A	* column 22, line 46 - column 24, line 50; figures 4,7,15 *	2,7,8					
X	EP 0 696 082 A (CANON KK) 7 February 1996 (1996-02-07)	1,5-7,9, 10					
A	* column 6, line 8 - column 12, line 16 *	2,7					
X	EP 0 376 719 A (CANON KK) 4 July 1990 (1990-07-04)	1,5-7,9, 10					
A	* column 13, line 55 - column 17, line 5; figures 12-14B *	2					
A	EP 0 603 901 A (CANON KK) 29 June 1994 (1994-06-29)	1,2,7,9, 10	<table border="1"> <thead> <tr> <th colspan="2">TECHNICAL FIELDS SEARCHED (Int.Cl.7)</th> </tr> </thead> <tbody> <tr> <td></td> <td>B41J</td> </tr> </tbody> </table>	TECHNICAL FIELDS SEARCHED (Int.Cl.7)			B41J
TECHNICAL FIELDS SEARCHED (Int.Cl.7)							
	B41J						
A	* column 8, line 19 - column 9, line 22; figure 1 *						
A	* column 20, line 52 - column 21, line 36; figure 12 *						
A	EP 0 622 233 A (HEWLETT PACKARD CO) 2 November 1994 (1994-11-02)	1-10					
A	* column 7, line 10 - column 20, line 50; figures *						
A	EP 0 553 561 A (CANON KK) 4 August 1993 (1993-08-04)	1-10					
	* column 18, line 4 - column 22, line 30; figures 18-20 *						
The present search report has been drawn up for all claims							
Place of search		Date of completion of the search	Examiner				
THE HAGUE		20 July 2001	De Groot, R				
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application I : document cited for other reasons & : member of the same patent family, corresponding document					
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document							

EPC FORM 1503 03/82 (P04001)

ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.

EP 01 20 1199

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

20-07-2001

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0847866 A	17-06-1998	JP 8132634 A	28-05-1996
		JP 8197750 A	06-08-1996
		JP 8318621 A	03-12-1996
		EP 0927641 A	07-07-1999
		DE 69514617 D	24-02-2000
		DE 69514617 T	21-09-2000
		EP 0710568 A	08-05-1996
		US 6170940 B	09-01-2001
		US 5748210 A	05-05-1998
EP 0696082 A	07-02-1996	JP 8099449 A	16-04-1996
		DE 69514967 D	16-03-2000
		DE 69514967 T	29-06-2000
		US 5801728 A	01-09-1998
EP 0376719 A	04-07-1990	JP 2188246 A	24-07-1990
		JP 2698638 B	19-01-1998
		JP 2178050 A	11-07-1990
		JP 2728912 B	18-03-1998
		JP 2178051 A	11-07-1990
		JP 2763310 B	11-06-1998
		DE 68918074 D	13-10-1994
		DE 68918074 T	26-01-1995
		DE 68928706 D	16-07-1998
		DE 68928706 T	10-12-1998
		EP 0602020 A	15-06-1994
		ES 2058563 T	01-11-1994
		KR 9311859 B	21-12-1993
		US 5847731 A	08-12-1998
		US 5861901 A	19-01-1999
		US 5245361 A	14-09-1993
EP 0603901 A	29-06-1994	AU 673554 B	14-11-1996
		AU 5267693 A	14-07-1994
		CA 2112182 A	26-06-1994
		CN 1102156 A, B	03-05-1995
		JP 6238913 A	30-08-1994
		KR 137634 B	15-05-1998
		MX 9400151 A	29-07-1994
		US 6151051 A	21-11-2000
EP 0622233 A	02-11-1994	US 5461482 A	24-10-1995
		DE 69413292 D	22-10-1998
		DE 69413292 T	25-02-1999
		ES 2120531 T	01-11-1998
		JP 6320833 A	22-11-1994

EPC FORM P/0459

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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 01 20 1199

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20-07-2001

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0553561 A	04-08-1993	JP 5169647 A	09-07-1993
		DE 69227673 D	07-01-1999
		DE 69227673 T	20-05-1999
		EP 0873879 A	28-10-1998
		US 6022091 A	08-02-2000

EPO FORM P0459

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