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Cowger et al.

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[54] **UNIT PRINT HEAD ASSEMBLY FOR INK-JET PRINTING**

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[73] Assignee: **Hewlett-Packard Company**, Palo Alto, Calif.

[21] Appl. No.: **192,087**

[22] Filed: **Feb. 4, 1994**

[51] Int. Cl.⁶ **B41J 2/155**

[52] U.S. Cl. **347/42**

[58] Field of Search **347/42, 49, 50, 347/86, 87**

4,694,308	9/1987	Chan et al.	347/65
4,712,172	12/1987	Kiyohara et al.	347/60
4,746,935	5/1988	Allen	347/98
4,771,295	9/1988	Baker et al.	347/87
4,791,438	12/1988	Hanson et al.	347/87
4,806,106	2/1989	Mebane et al.	439/77
4,814,786	3/1989	Hoisington et al.	347/88
4,847,630	7/1989	Bhaskar et al.	347/63
4,872,026	10/1989	Rasmussen et al.	347/56
4,872,027	10/1989	Buskirk et al.	347/19
4,917,286	4/1990	Pollacek	228/110.1
4,929,969	5/1990	Morris	347/87
4,940,413	7/1990	Childers et al.	439/67
4,953,287	9/1990	West et al.	29/611
5,016,023	5/1991	Chan et al.	347/42
5,049,904	9/1991	Nakamura et al.	347/19
5,091,737	2/1992	Togano et al.	347/42
5,448,274	9/1995	Hirabayashi et al.	347/50
5,469,199	11/1995	Allen et al.	347/42

[56] References Cited

U.S. PATENT DOCUMENTS

4,368,478	1/1983	Koto	347/86
4,394,669	7/1983	Ozawa et al.	347/86
4,433,341	2/1984	Thomas	347/6
4,462,037	7/1984	Bangs et al.	347/85
4,475,116	10/1984	Sicking et al.	347/86
4,500,895	2/1985	Buck et al.	347/87
4,510,510	4/1985	Terasawa	347/30
4,577,200	3/1986	Rix et al.	347/49
4,614,948	9/1986	Katerberg et al.	347/89
4,620,202	10/1986	Koto et al.	347/87
4,628,332	12/1986	Matsumoto	347/49
4,633,274	12/1986	Matsuda	347/50
4,635,073	1/1987	Hanson	347/50
4,680,859	7/1987	Johnson	29/611
4,683,481	7/1987	Johnson	347/65

FOREIGN PATENT DOCUMENTS

0376719A3 7/1990 European Pat. Off. .

OTHER PUBLICATIONS

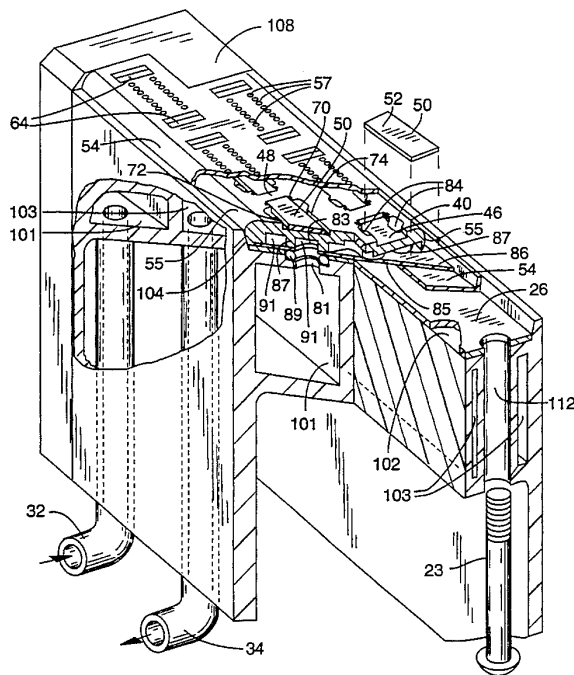
"Printhead Interconnect," R. T. Buck; HP Journal, May 1985.

Primary Examiner—Benjamin R. Fuller
Assistant Examiner—Craig A. Hallacher

[57] ABSTRACT

Ink-jet pens having multiple print heads are manufactured with readily replaceable unit print head assemblies that facilitate testing of print head performance prior to complete assembly of the pen.

10 Claims, 5 Drawing Sheets



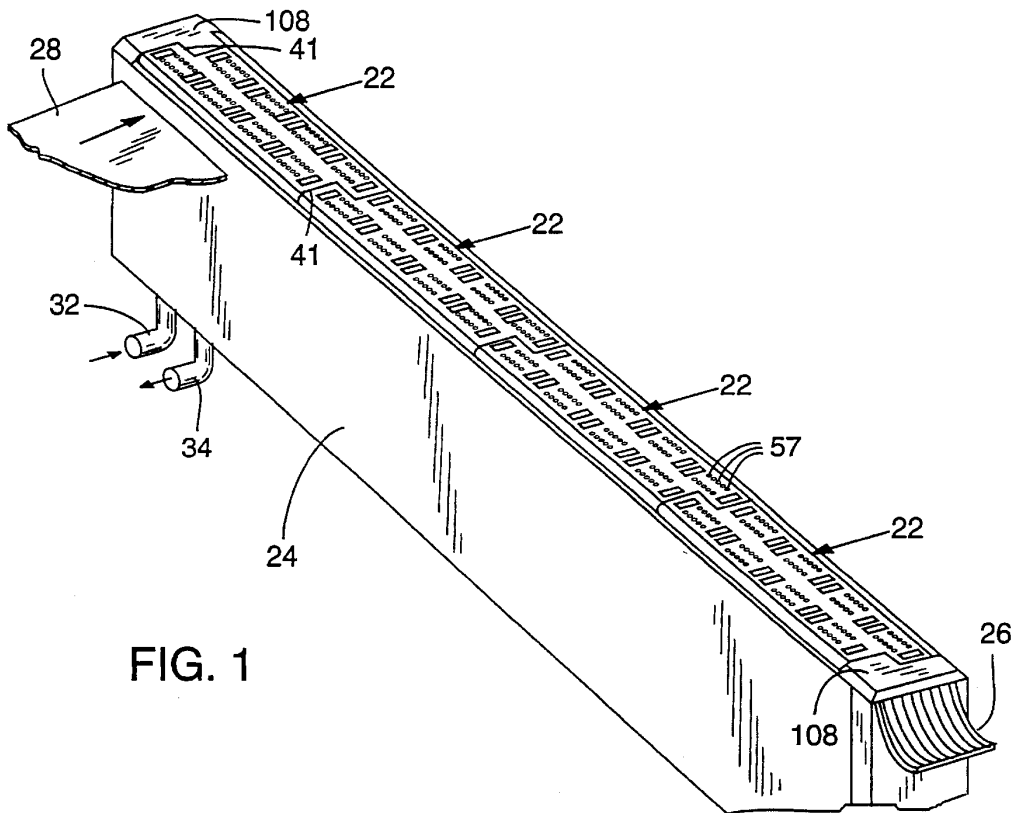


FIG. 1

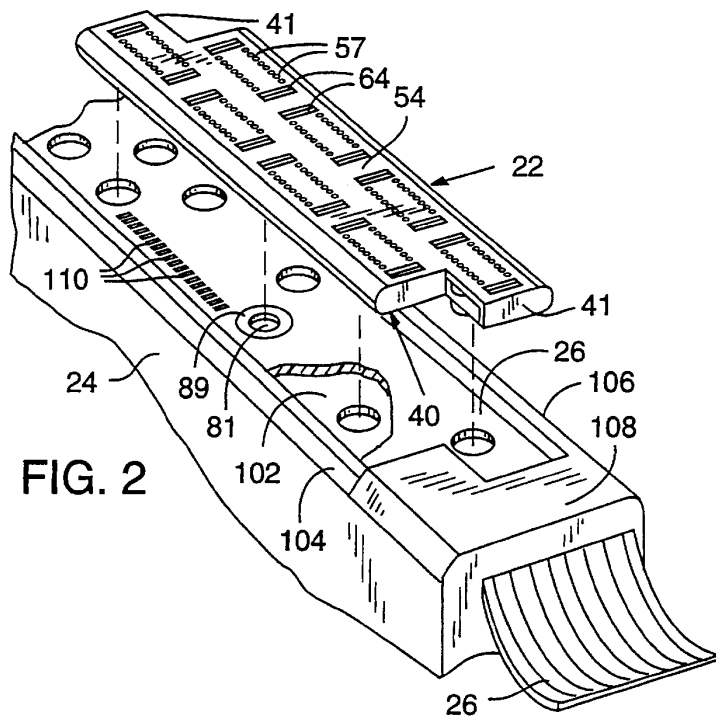
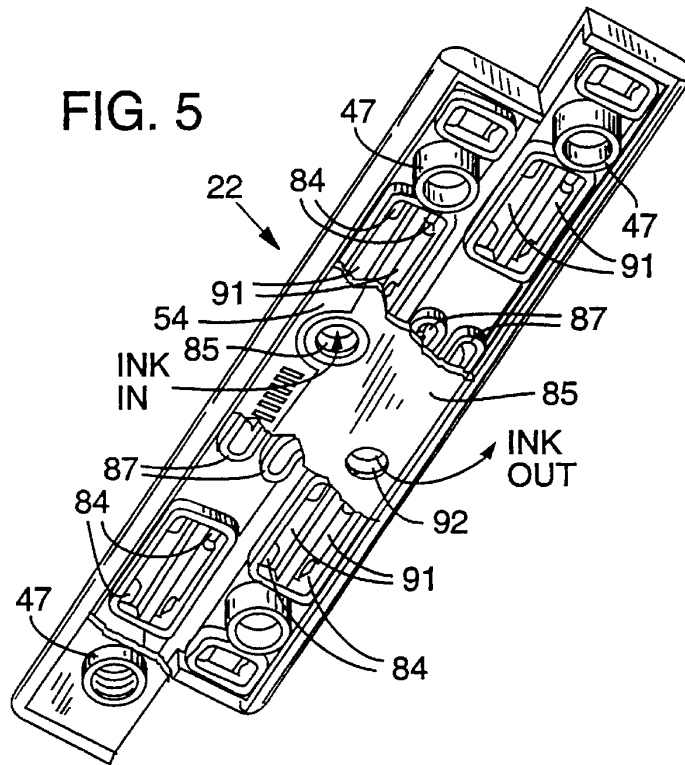
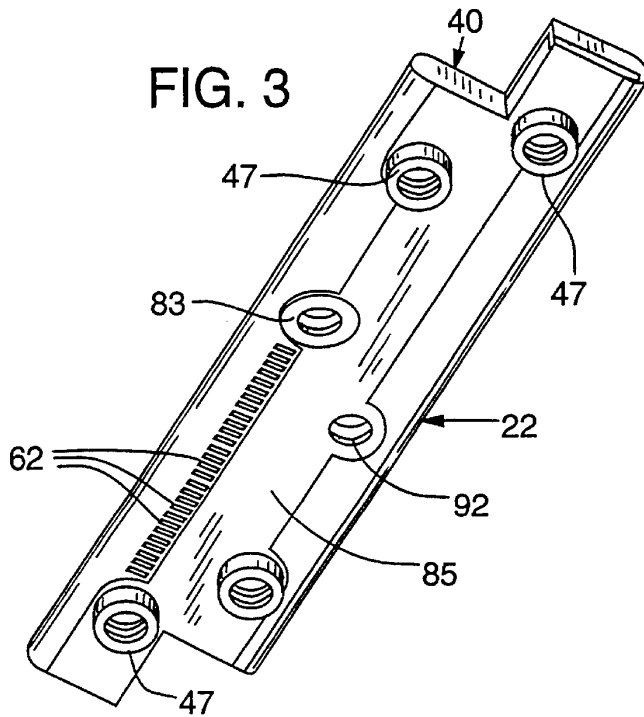
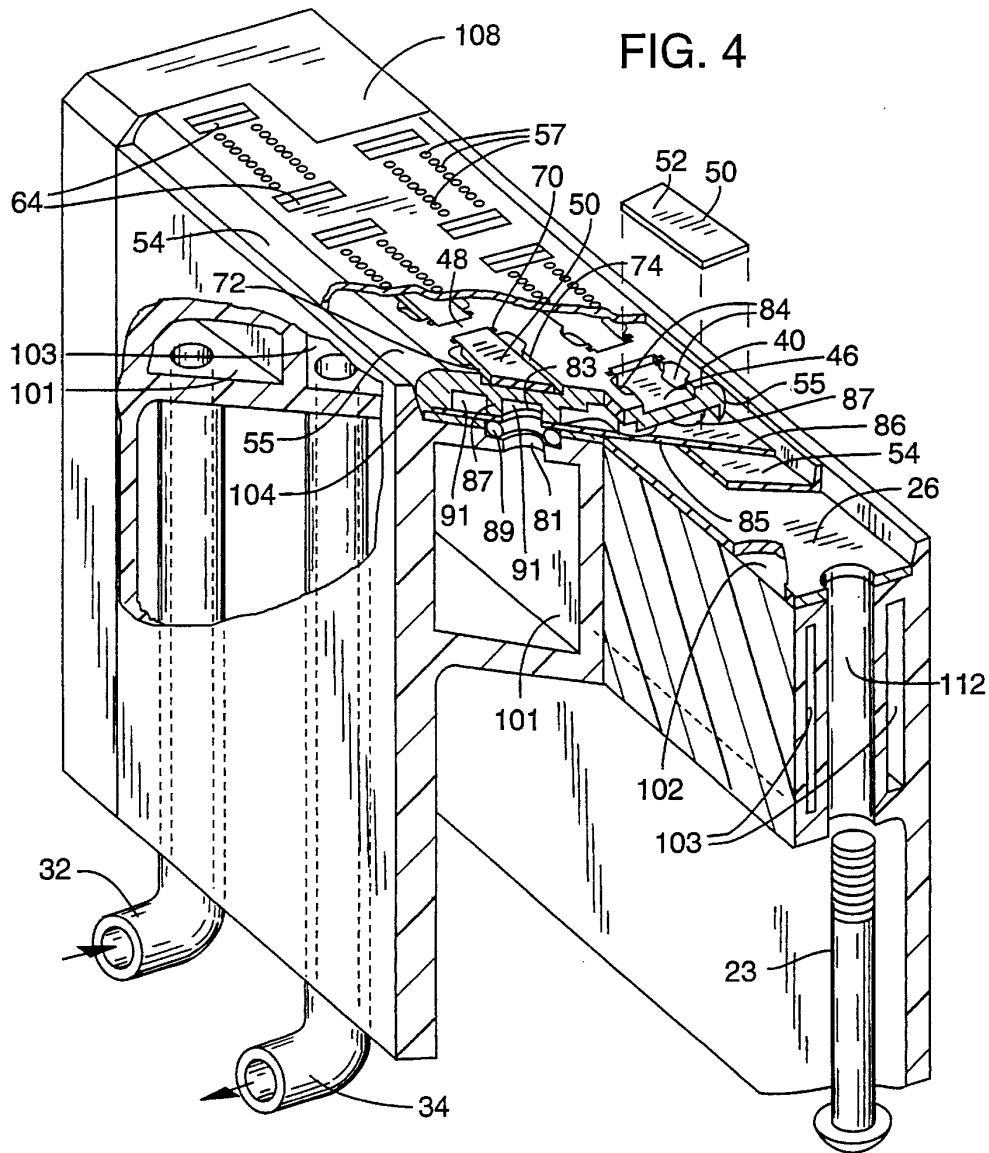
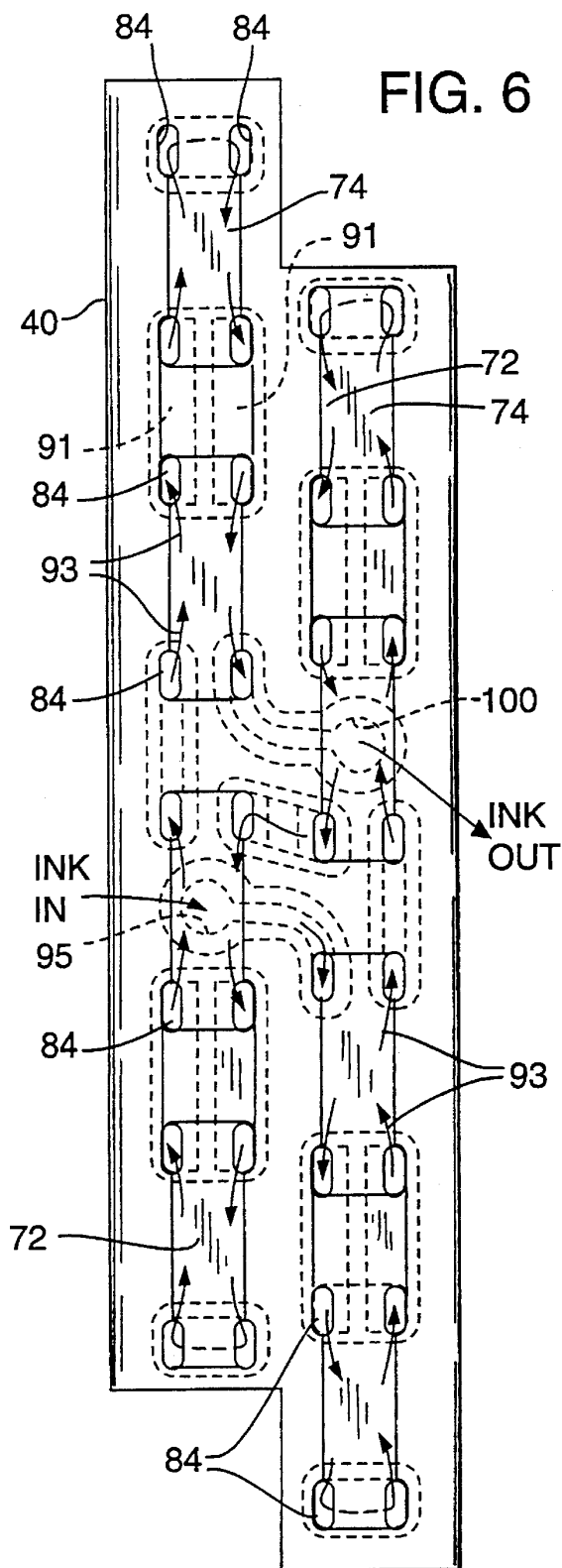


FIG. 2







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