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**Boyd et al.**

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(54) **MULTILAYERED PLATFORM FOR MULTIPLE PRINTHEAD DIES**

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**Related U.S. Application Data**

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(51) **Int. Cl.**<sup>7</sup> ..... **B47J 2/175**

(52) **U.S. Cl.** ..... **347/85**

(58) **Field of Search** ..... 347/85, 86, 87,  
347/20, 40, 41, 71, 72

(56) **References Cited**

**U.S. PATENT DOCUMENTS**

4,917,286	4/1990	Pollacek	228/110
5,016,023	5/1991	Chan et al.	347/42
5,489,930	* 2/1996	Anderson	347/71
5,808,635	* 9/1998	Kneezel et al.	347/41
5,939,206	* 8/1999	Kneezel et al.	428/480

**OTHER PUBLICATIONS**

Imler, Scholz, Cobarruviaz, Nagesh, Chao, Haitz, "Precision Flip-Chip Solder Bump Interconnects for Optical Packaging", IEEE Transactions on Components, Hybrids, and Manufacturing Tech., vol. 15, #6, Dec. 1992, pp. 997-982.

Itoh, Sasaki, Uda, Yoneda, Honmou, Fukushima, "Use of AuSn Solder Bumps in Three-dimensional Passive Aligned Packaging of LD/PD Arrays on Si Optical Benches," IEEE Electronic Components and Technology Conference, 1996, pp. 1-7.

Deshmukh, Brady, Roll, King, Shmulovic, Zolnowski, "Active Atmosphere Solder Self-Alignment and Bonding of Optical Components", The International Journal of Micro-circuits and Electronic Packaging, vol. 16, #2, second quarter 1993, pp. 97-107.

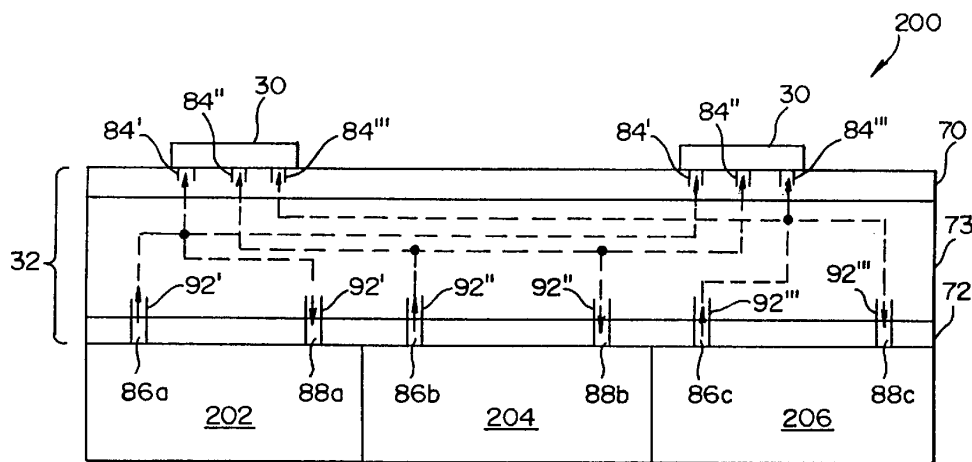
Ludwig, "Multilayered focal plane structures with self-aligning detector assembly", Infrared Readout Electronics III, SPIE, vol. 2745, 1996, pp. 149-158.

Primary Examiner—Anh T. N. Vo

(57) **ABSTRACT**

An inkjet pen includes a multilayered platform and a plurality of printhead dies each mounted on the multilayered platform. The multilayered platform includes a first layer having an ink inlet defined therein, a second layer having a plurality of ink feed slots defined therein, and at least one third layer having an ink manifold defined therein. As such, the ink manifold of the at least one third layer fluidically couples the ink inlet of the first layer with the ink feed slots of the second layer. Each of the printhead dies are mounted on the second layer of the multilayered platform and include an array of printing elements and an ink refill slot communicating with the array of printing elements, with each of the printing elements including a firing chamber and a feed channel communicating with the firing chamber. As such, the ink refill slot of each of the printhead dies communicates with at least one of the ink feed slots of the multilayered platform and the feed channel of each of the printing elements communicates with the ink refill slot of one of the printhead dies. Thus, a first of the ink feed slots of the second layer of the multilayered platform communicates with a first of the printhead dies and a second of the ink feed slots of the second layer of the multilayered platform communicates with a second of the printhead dies.

**20 Claims, 10 Drawing Sheets**



OTHER PUBLICATIONS

Kallmayer, Oppermann, Kloeser, Zakel, Reichl, Experimental Results on the Self-Alignment Process Using Au/Sn Metallurgy and on the Growth of the C-Phase During the Reflow, '95 Flip Chip, BGA, TAB & AP Symposium, 1995, pp. 225-237.

Linder, Baltes, Gnaedinger, Doering, "Photolithography in Anisotropically Etched Grooves", IEEE 9th Intl. Workshop on MEMS, 1996, pp. 38-43.

\* cited by examiner

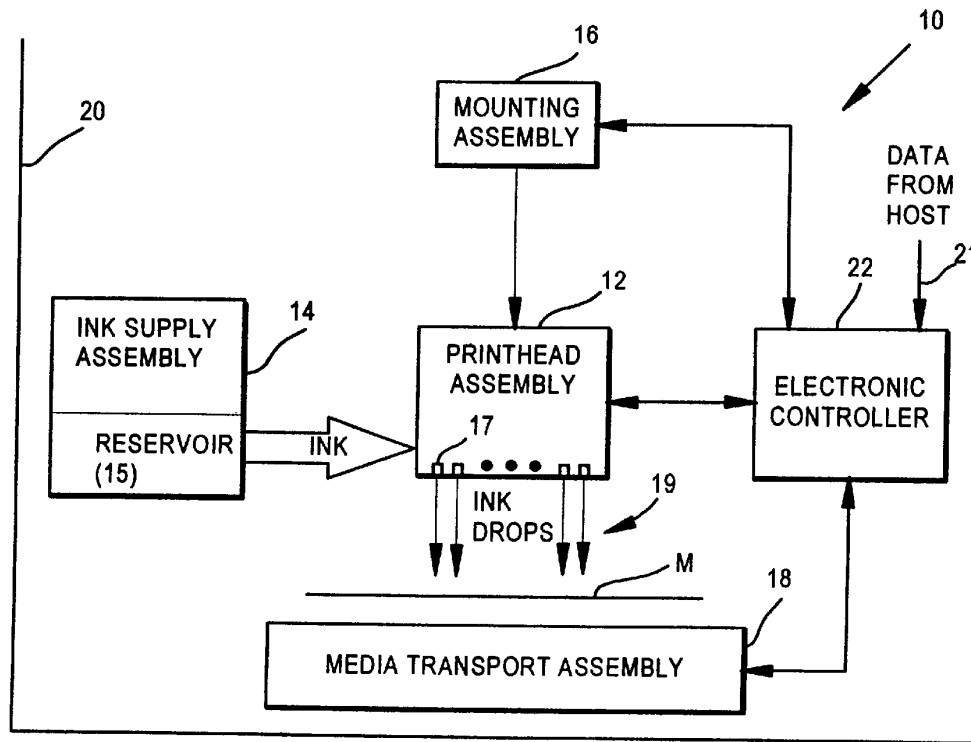


FIG. 1

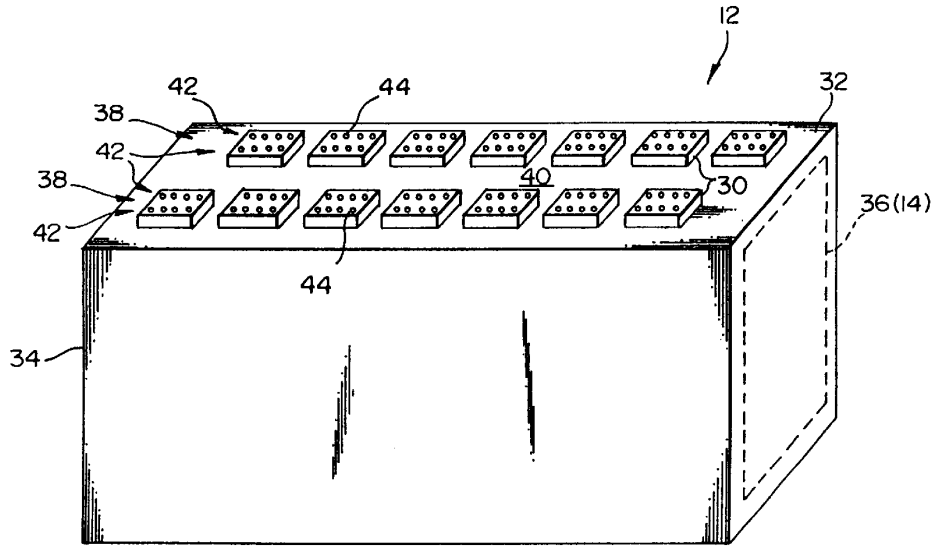


FIG. 2

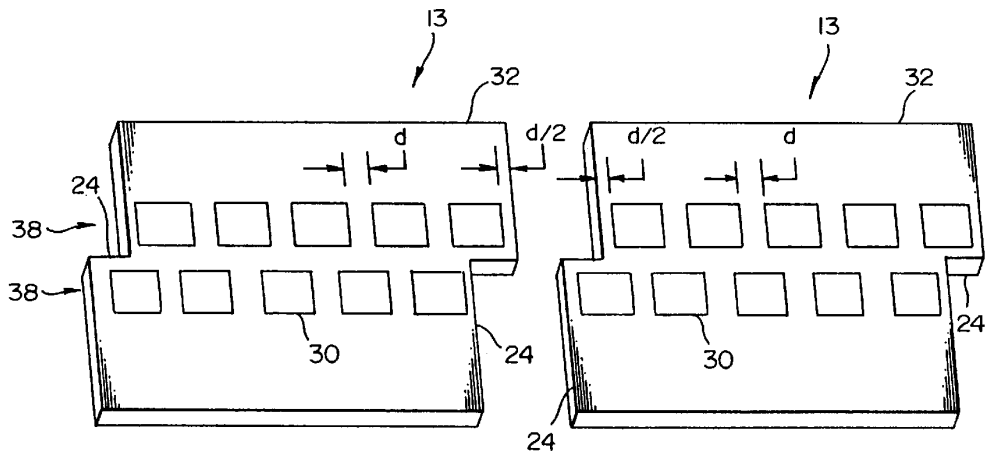
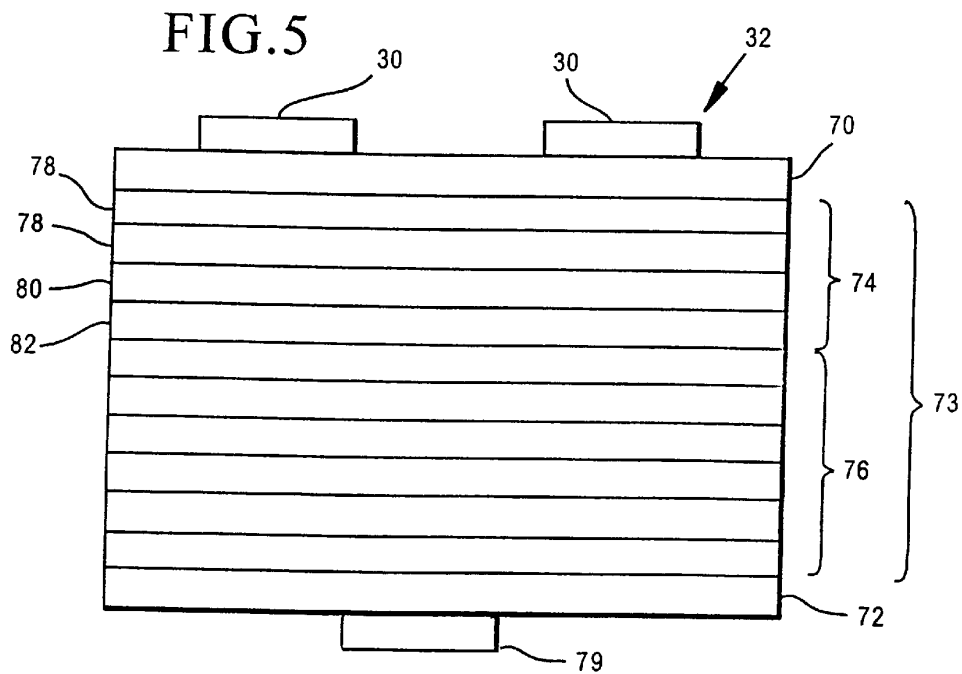
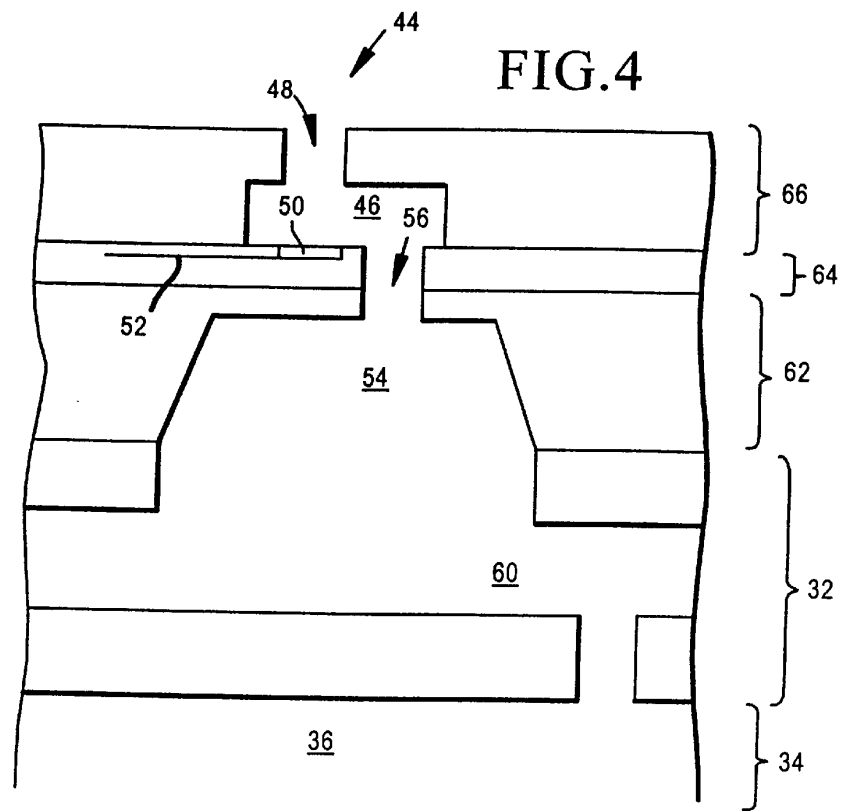


FIG. 3



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