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- (54) **MULTIPLE ARRAY AND METHOD OF MAKING A MULTIPLE ARRAY**
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5,295,289 A	3/1994	Inagaki et al.
5,331,505 A	7/1994	Wilheim
5,334,968 A	8/1994	Negoro
5,360,353 A	11/1994	Kinoshita
5,367,430 A	11/1994	DeVoe et al.
5,461,536 A	10/1995	Beach et al.
5,493,471 A	2/1996	Walthier et al.
5,495,386 A	2/1996	Kulkarni
5,495,387 A	2/1996	Mandai et al.

(List continued on next page.)

FOREIGN PATENT DOCUMENTS

EP 0915488 12/1999

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(57) **ABSTRACT**

A capacitor array device is described including a multiple capacitor chip for mounting upon an electronic circuit board. The device includes a device body defined by a plurality of dielectric layers and conductive layers arranged in a stack to form a number of adjacent capacitors. Barium titanate may be employed as a dielectric. The capacitor array device includes a plurality of terminal structures electrically connected to the electrode plates. The device typically includes a sintered body of a multilayer ceramic material in which multiple electrode layers are stacked with dielectric layers being located between the electrode layers. Multiple combinations of capacitance values may be used within the array. An array having two, three, four, five, six, or more capacitors may be constructed, such that certain of the capacitors have about the same capacitance value, while other capacitors within the array have other different capacitance values. The capacitance values among the adjacent capacitors within the array may differ by ratios as high as 1:100 or more.

(56) **References Cited**
U.S. PATENT DOCUMENTS

4,513,167 A	4/1985	Brandstetter
4,554,622 A	11/1985	Mommsen et al.
4,822,550 A *	4/1989	Komathu 264/263
4,853,827 A *	8/1989	Hernandez 361/321
4,870,541 A	9/1989	Cole
4,881,149 A	11/1989	Tokura et al.
4,988,850 A	1/1991	Masuda et al.
5,023,578 A	6/1991	Kaneko et al.
5,069,641 A	12/1991	Sakamoto et al.
5,142,439 A *	8/1992	Huggett et al. 361/321
5,153,554 A	10/1992	Becker et al.
5,282,759 A	2/1994	Sakamoto et al.

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