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United States Patent [19]

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Boie et al.

[45] Date of Patent: * Oct. 31, 1995

[54] **COMPUTER MOUSE OR KEYBOARD INPUT DEVICE UTILIZING CAPACITIVE SENSORS**

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[73] Assignee: **AT&T IPM Corp.**, Coral Gables, Fla.

"The Art of Electronics," Second Edition, Horowitz and Hill, p. 889, Cambridge University Press (1989).

[*] Notice: The portion of the term of this patent subsequent to May 12, 2009, has been disclaimed.

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[21] Appl. No.: **11,040**

[57] ABSTRACT

[22] Filed: **Jan. 29, 1993**

A computer input device for use as a computer mouse or keyboard comprises a thin, insulating surface covering an array of electrodes. Such electrodes are arranged in a grid pattern and can be connected in columns and rows. Each column and row is connected to circuitry for measuring the capacitance seen by each column and row. The position of an object, such as a finger or handheld stylus, with respect to the array is determined from the centroid of such capacitance values, which is calculated in a microcontroller. For applications in which the input device is used as a mouse, the microcontroller forwards position change information to the computer. For applications in which the input device is used as a keyboard, the microcomputer identifies a key from the position of the touching object and forwards such key identity to the computer.

[51] Int. Cl.⁶ **H03K 17/94**

[52] U.S. Cl. **341/33; 345/174**

[58] Field of Search 341/33; 178/18, 178/19; 345/174

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10 Claims, 6 Drawing Sheets

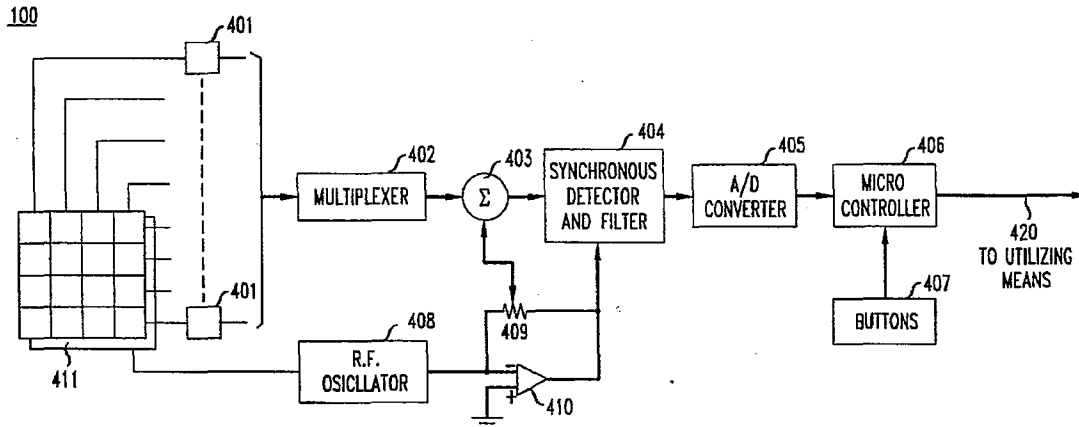


FIG. 1

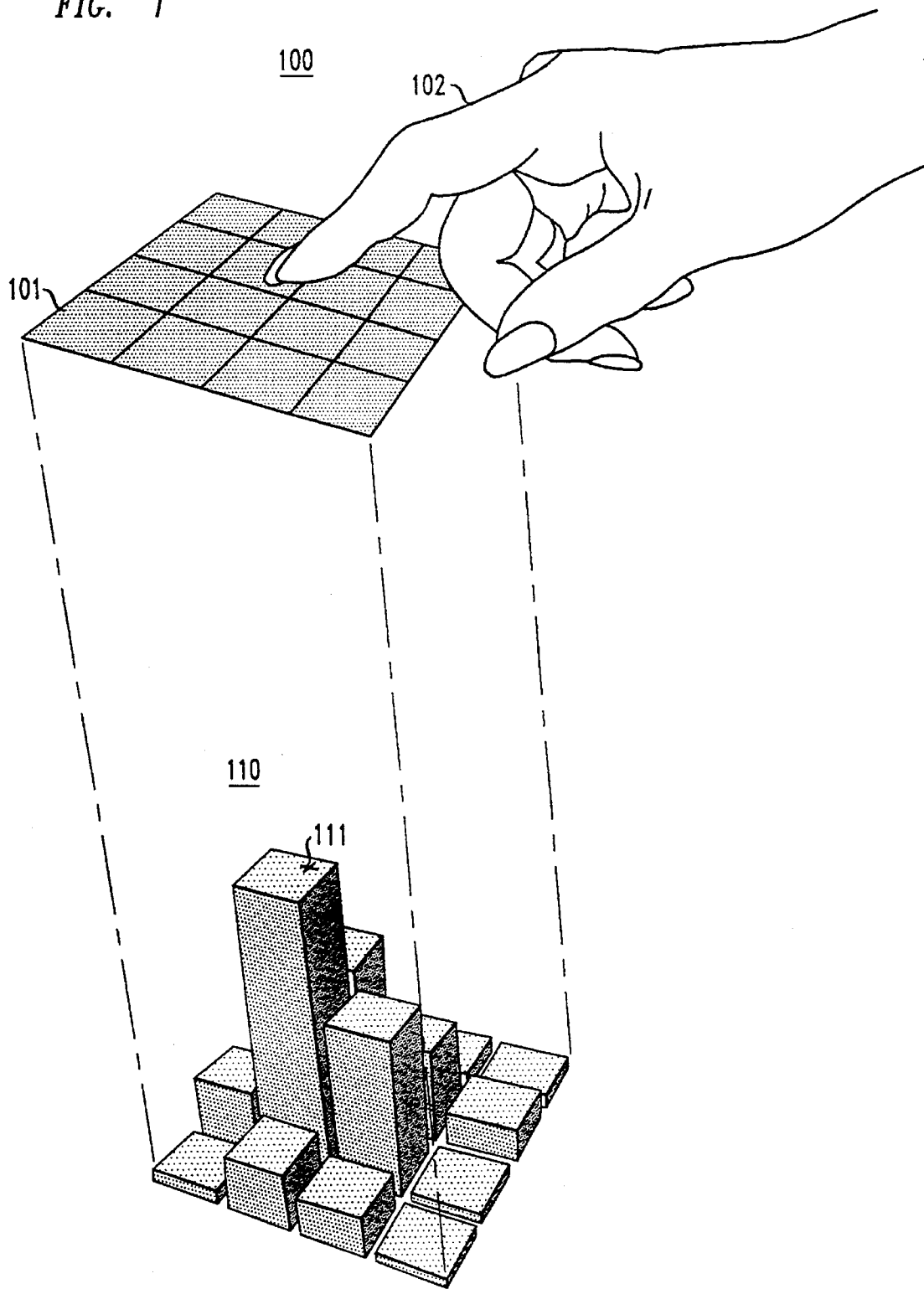


FIG. 2

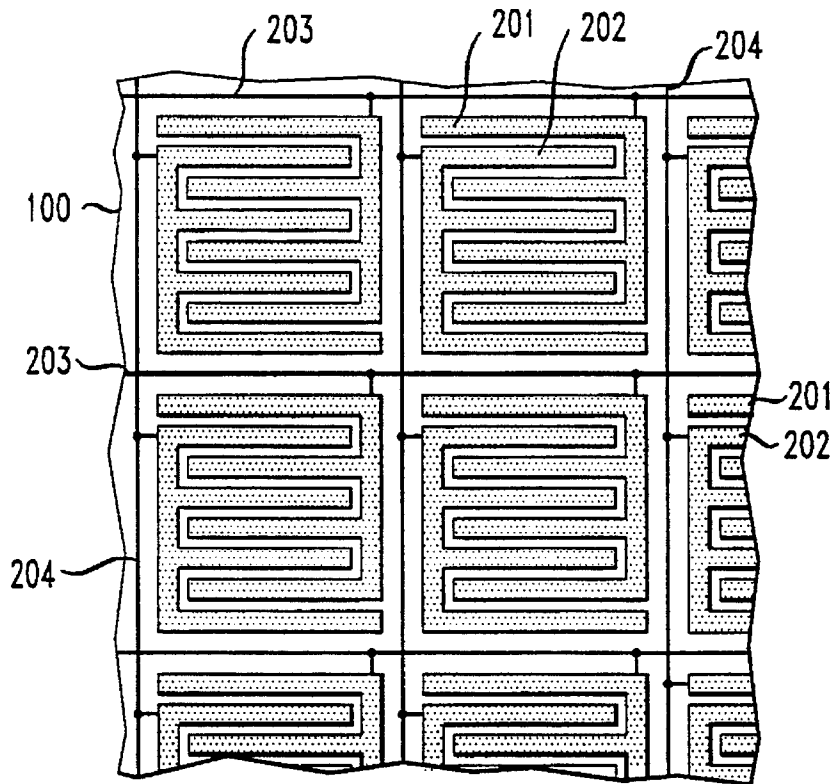
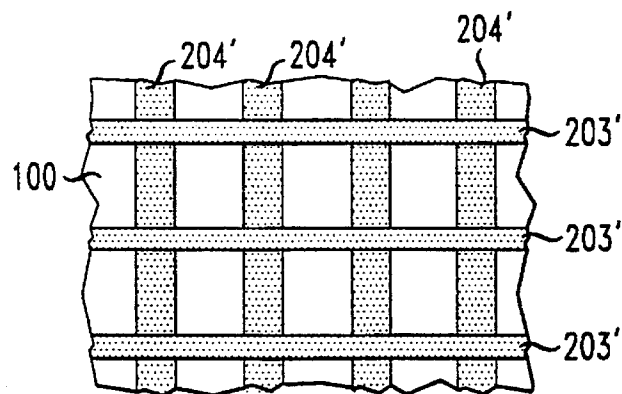


FIG. 3



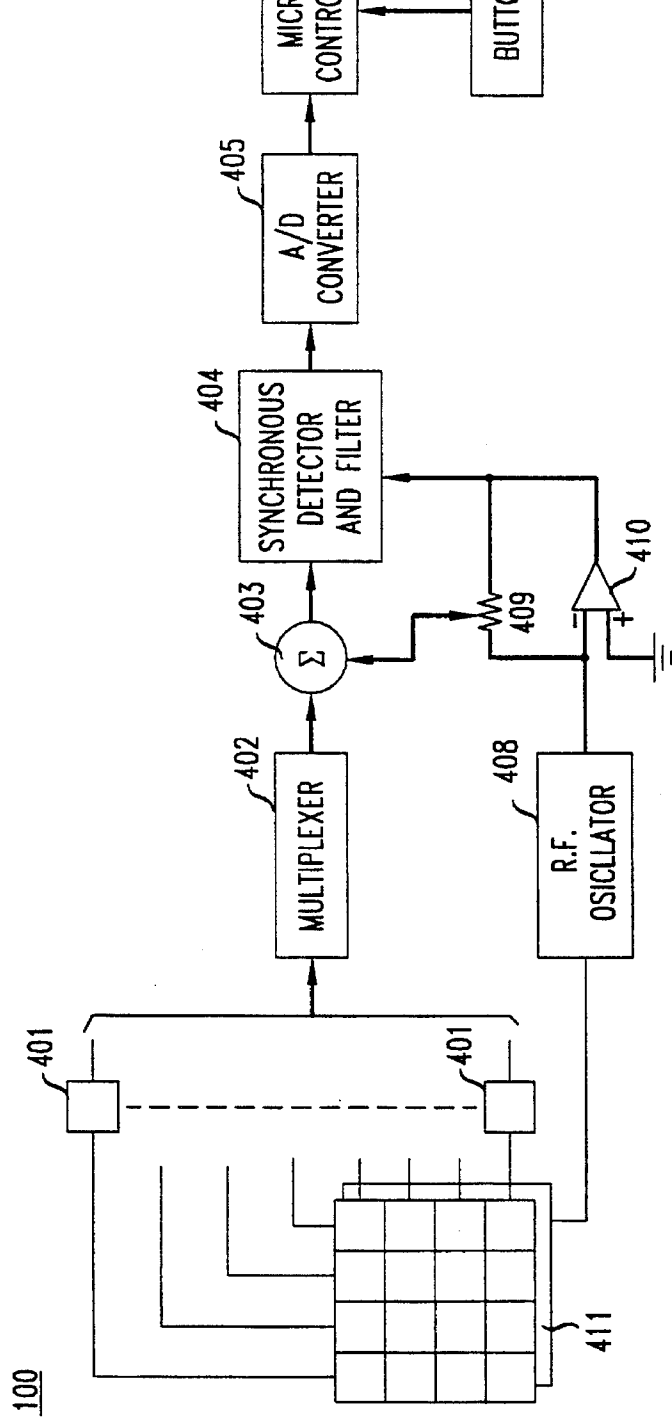


FIG. 4

FIG. 5

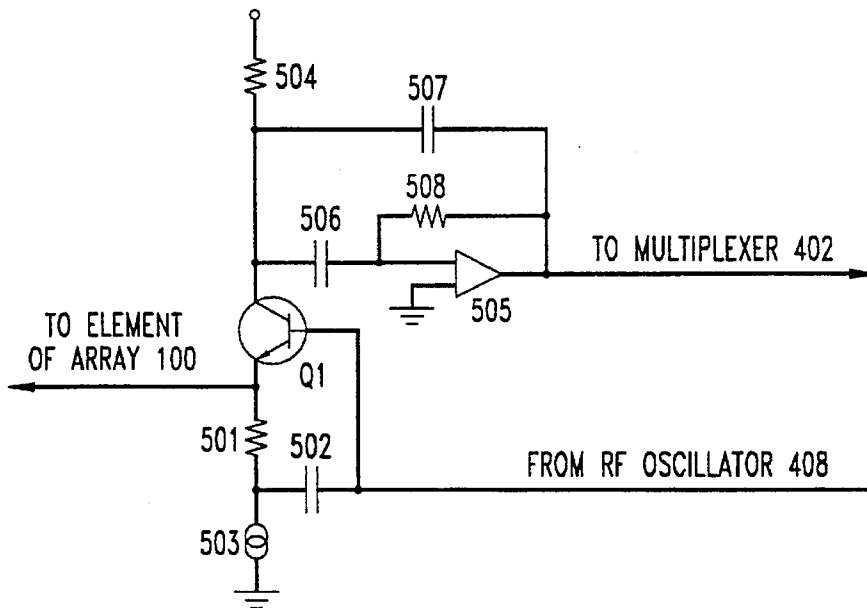
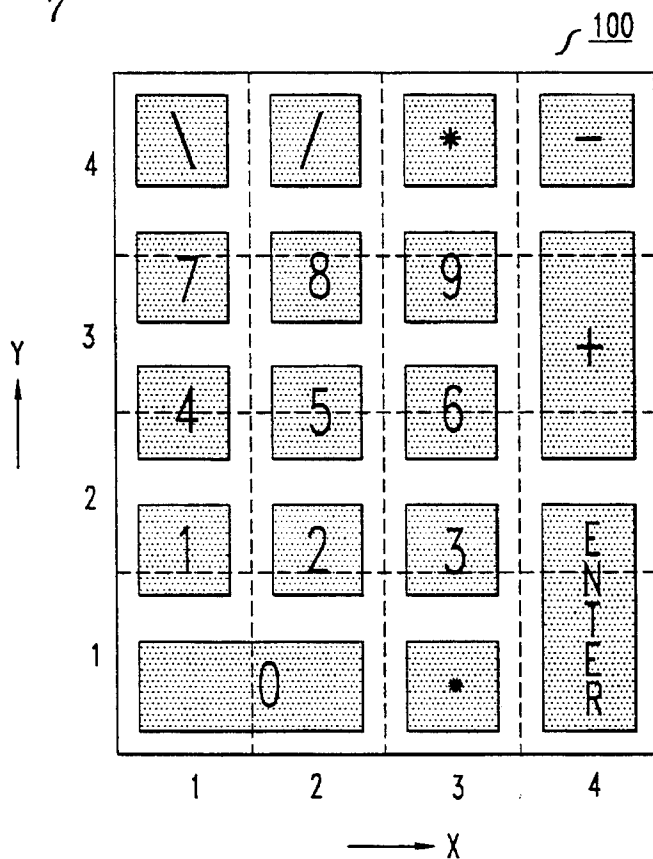


FIG. 7



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