US005900863A

United States Patent [19]

Numazaki

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[54] **METHOD AND APPARATUS FOR CONTROLLING COMPUTER WITHOUT TOUCHING INPUT DEVICE**

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[21] Appl. No.: **08/614,502**

[22] Filed: **Mar. 13, 1996**

[30] **Foreign Application Priority Data**

Mar. 16, 1995 [JP] Japan 7-083460
Sep. 28, 1995 [JP] Japan 7-250418

[51] **Int. Cl.**[6] **G09G 5/08**

[52] **U.S. Cl.** **345/158**; 345/156; 345/157; 345/159; 345/175

[58] **Field of Search** 345/158, 157, 345/156, 159, 160, 12, 7, 175; 348/140, 141

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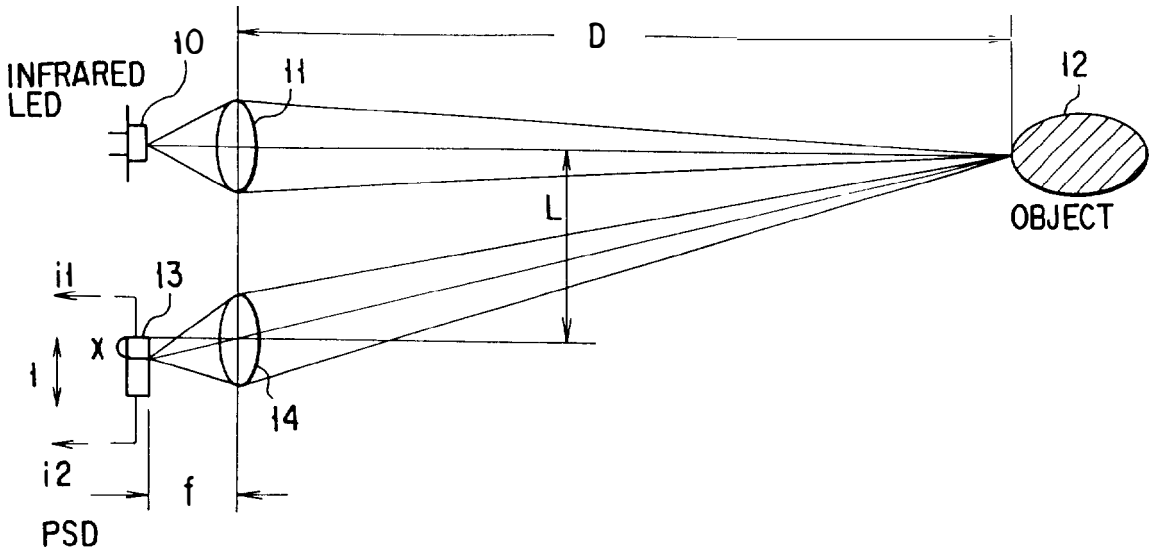
[57] **ABSTRACT**

A distance image representing a distribution of distances, each measured between the apparatus and each conceivable point existing on an object is input. The minimum points in the distance image are detected. The minimum points are some of the conceivable points on the object which have smaller distance values than the other conceivable points. The time differences, each representing a change which each point in the distance image assumes as time passes, are detected. A designating point for designating a command to the system is determined. The designating point is one of the minimum points which has changed in the time difference detected. A system is controlled in accordance with motion of the designating point determined.

33 Claims, 46 Drawing Sheets



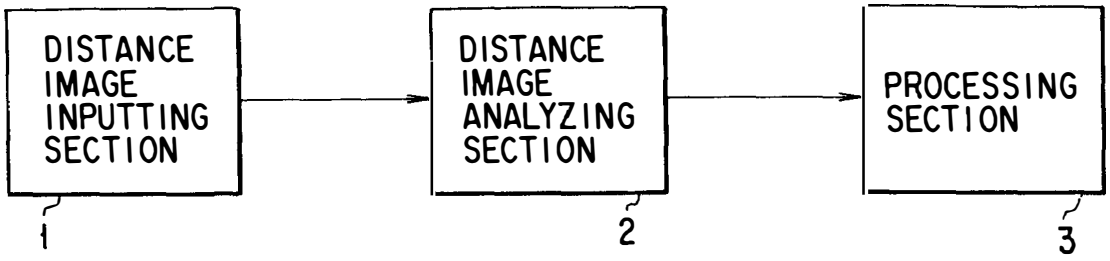


FIG. 1

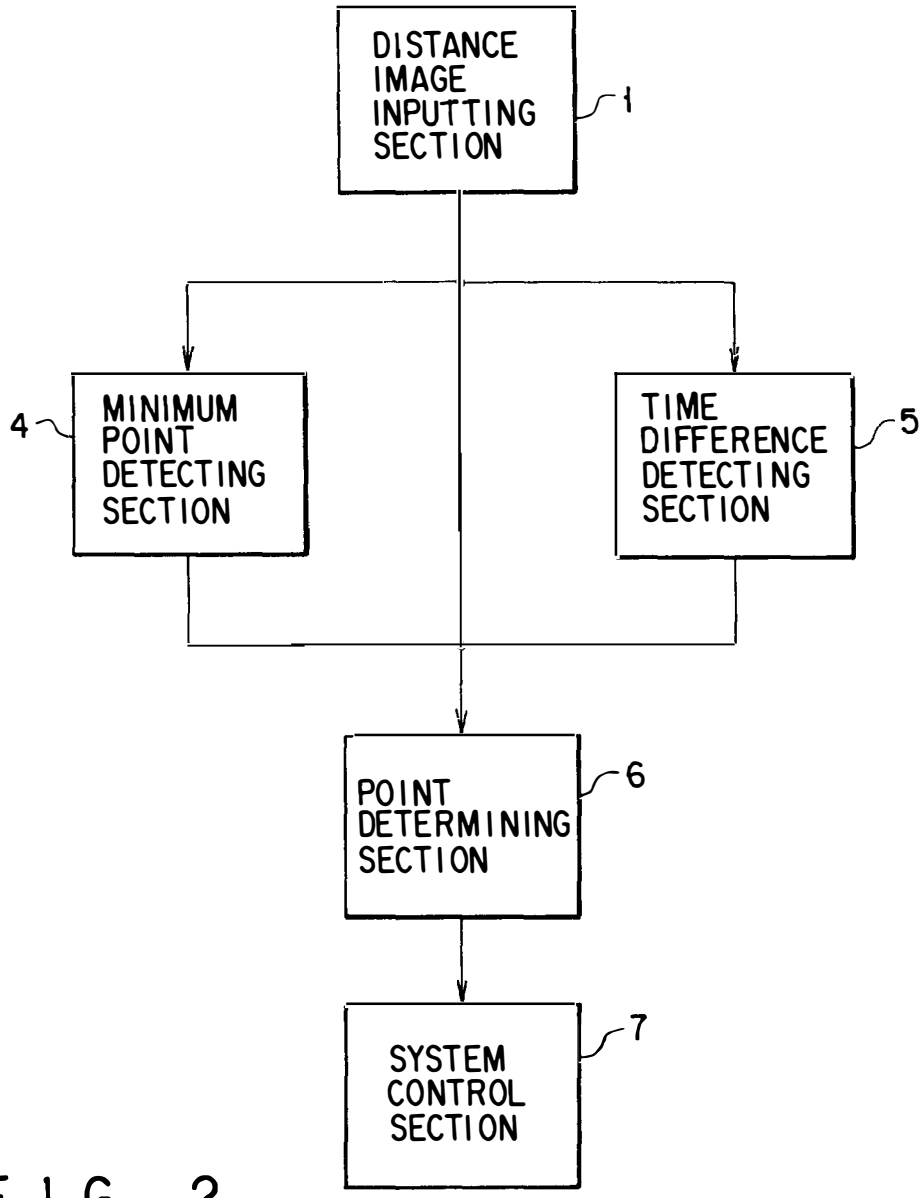


FIG. 2

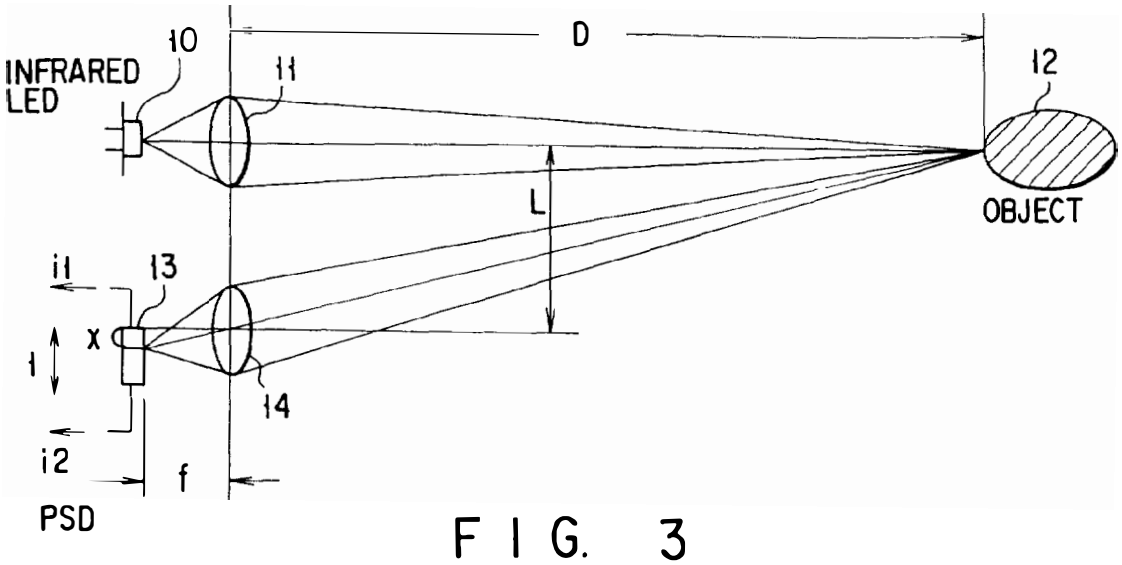


FIG. 3

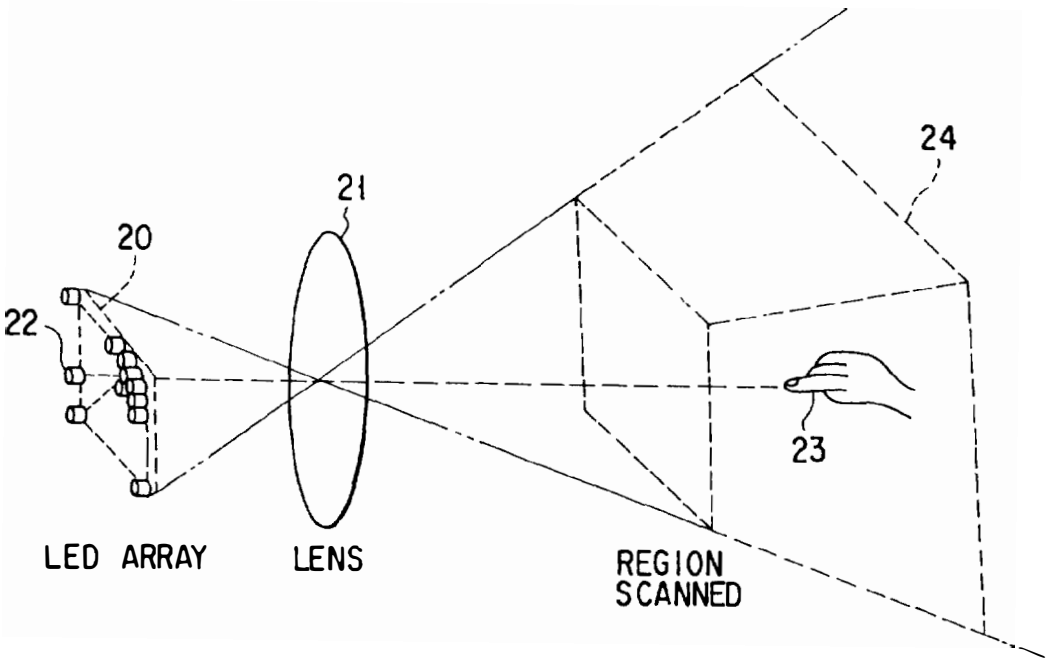


FIG. 4

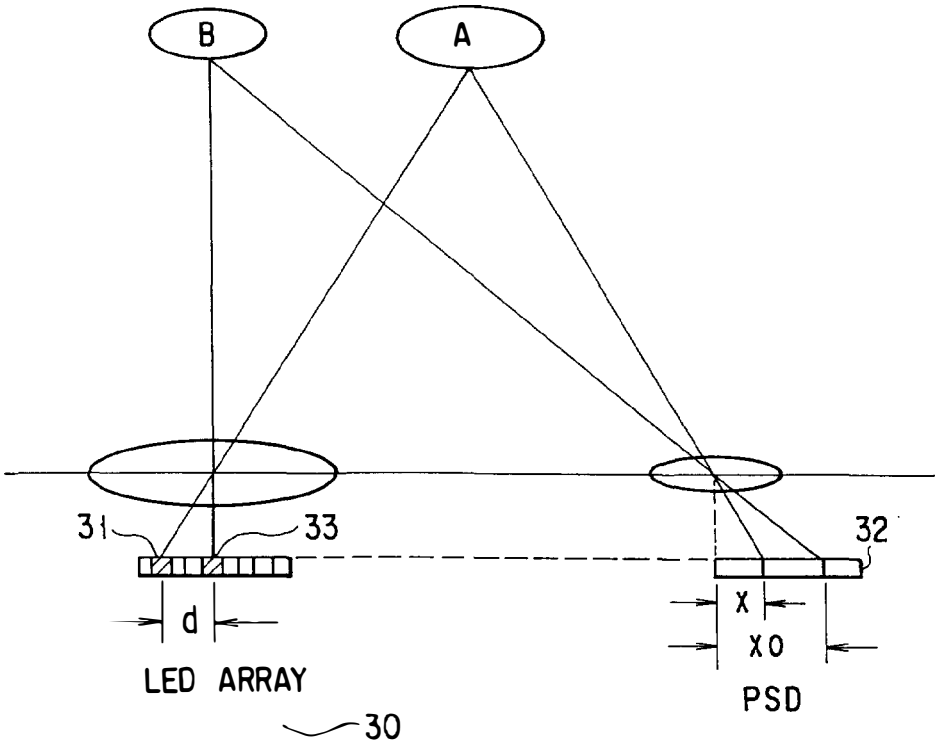


FIG. 5

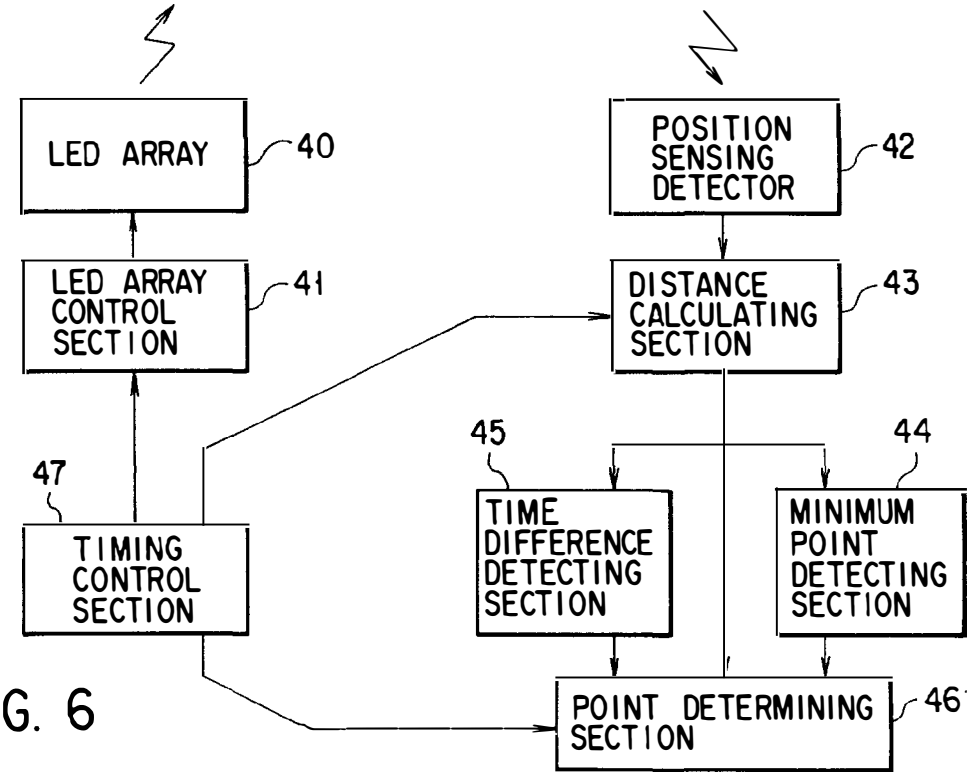


FIG. 6

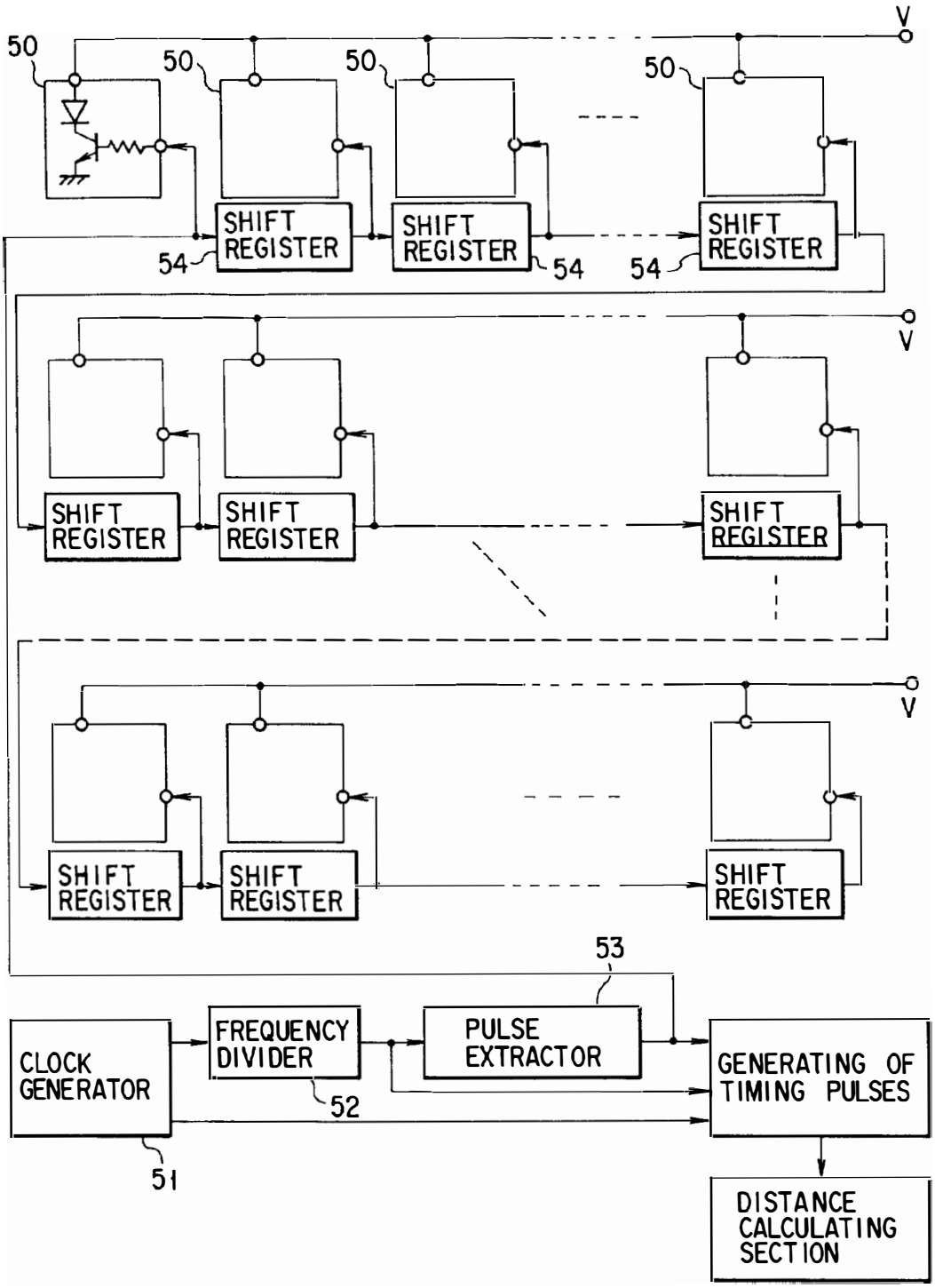


FIG. 7

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