4,146,924

Birk et al.

[56]

[45] Mar. 27, 1979

[54]	SYSTEM FOR VISUALLY DETERMINING POSITION IN SPACE AND/OR ORIENTATION IN SPACE AND APPARATUS EMPLOYING SAME	
[75]	Inventors:	John R. Birk, Peacedale; Robert B. Kelley, Kingston, both of R.I.; David A. Seres, Newark, Del.
[73]	Assignee:	Board of Regents for Education of the State of Rhode Island, Providence, R.I.
[21]	Appl. No.:	615,716
[22]	Filed:	Sep. 22, 1975
[52]	U.S. Cl 318/568 Field of Sea 444/1; 3	

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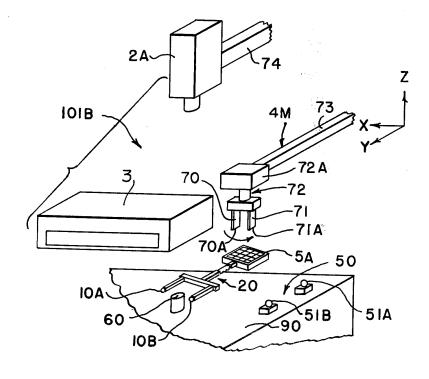
3,454,169 3,589,134 3,669,549 3,804,270 3,850,313 3,888,362	7/1969 6/1971 6/1972 4/1974 11/1974 6/1975	Bridges
3,888,362	6/1975	Fletcher 214/1 CM X
3,890,552	6/1975	Devol et al 318/568

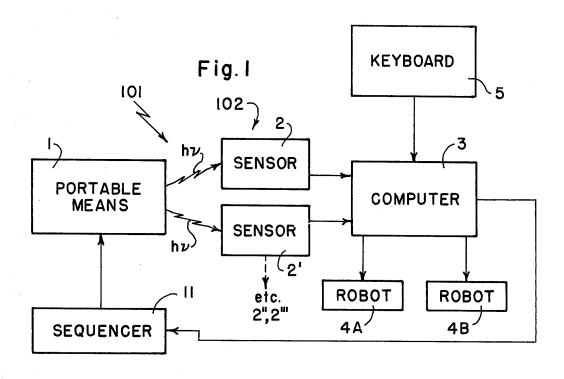
Primary Examiner-Joseph F. Ruggiero

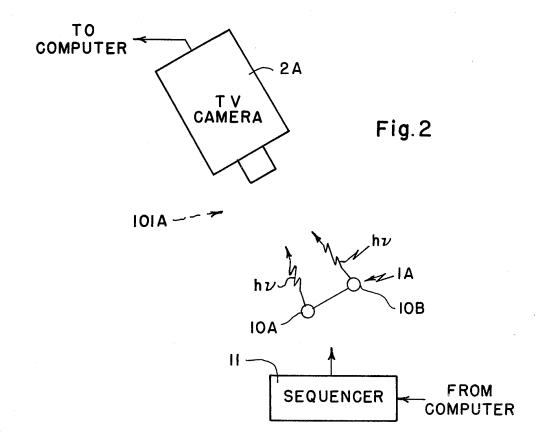
7] ABSTRACT

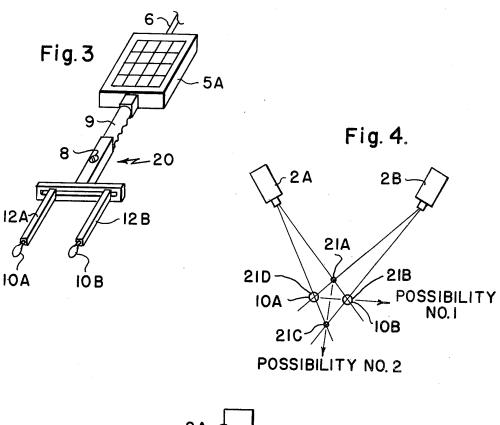
Visual system for determining position in space and/or orientation in three-dimensional space for purposes, for example, of directing or instructing an industrial robot to perform manipulative acts and apparatus employing the visual system. The system includes a portable object arbitrarily movable in three-dimensional space and possessing the discernible properties of position in space and/or orientation in space. One or more sensors extract visual information or image data from the portable object and convert the same to an electric signal or signals. A computer is connected to receive the signal or signals which are analyzed and, in the case of the industrial robot, the information obtained is used to prepare operating instructions.

61 Claims, 13 Drawing Figures









ZA TO COMPUTER

Fig. 5A

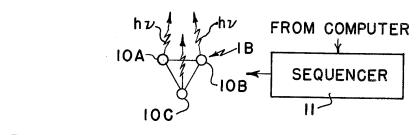
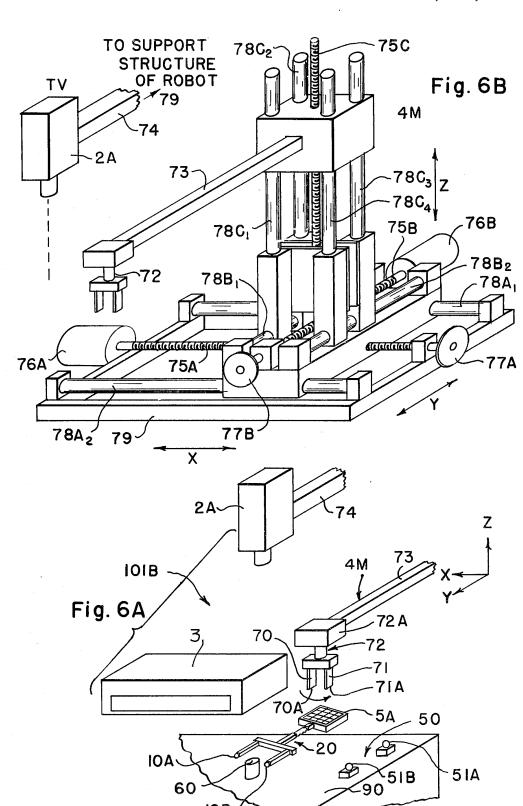
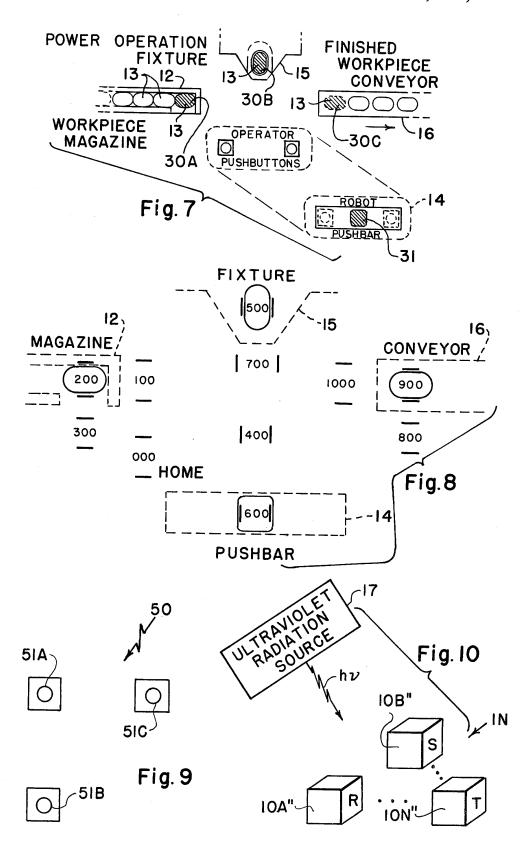


Fig. 5B





IOB



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