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United States Patent [19]

Granger et al.

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[45] **Date of Patent: Jun. 18, 1996**

[54] **POSITION-MARKING METHOD FOR A MACHINE THAT MEASURES IN THREE DIMENSIONS, AND APPARATUS FOR IMPLEMENTING THE METHOD**

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[73] Assignee: **Romer**, Montoire, France

[21] Appl. No.: **308,304**

[22] Filed: **Sep. 19, 1994**

[30] **Foreign Application Priority Data**

Sep. 20, 1993 [FR] France 93 11157

[51] **Int. Cl.**[6] **G06F 19/00**; G05B 19/18

[52] **U.S. Cl.** **364/474.37**; 364/474.28; 364/167.01; 318/568.16; 395/86

[58] **Field of Search** 364/167.01, 474.03, 364/474.05, 474.37, 474.28; 318/568.16, 577; 901/9, 15, 46; 395/80, 86, 93, 94, 97

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Attorney, Agent, or Firm—Sixbey, Friedman Leedom & Ferguson; Gerald J. Ferguson, Jr.; Tim L. Brackett, Jr.

[57] **ABSTRACT**

The contact sensor of the hinged arm of a measurement machine for taking measurements in three dimensions is replaced by a light sensor secured at the same position. A first position-marking axis defined by a light beam emitted by an emitter disposed in a first position is used to determine a first vector by two measured points. The emitter is moved in a plane so as to take up a second position, and a second position-marking axis defined by the light beam of said emitter is used by measuring a point on the second axis. The projection [O_1] of the second axis point onto the first position-marking axis is then used to enable a frame of reference [O_1X, O_1Y, O_1Z] to be established. If the machine needs to be displaced in order to take measurements in a zone that is further away, a new frame of reference is determined using the same steps, using the same first axis and using a new point on another second axis that is obtained by a new displacement of the emitter performed so that it remains in the same plane, thereby enabling the origin [O_2] of the new frame of reference to be determined, thus making it possible to make available a plurality of known frames of reference.

11 Claims, 4 Drawing Sheets

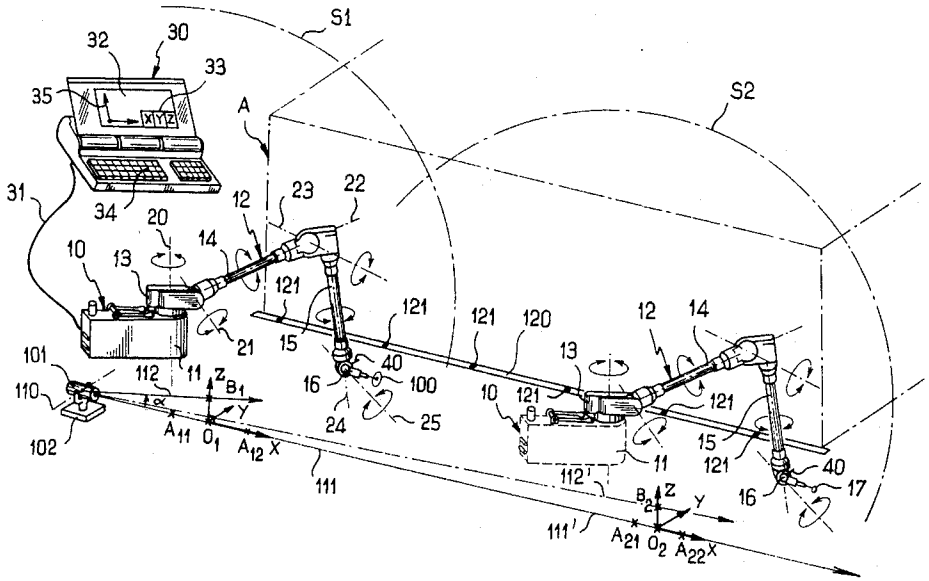


FIG_1

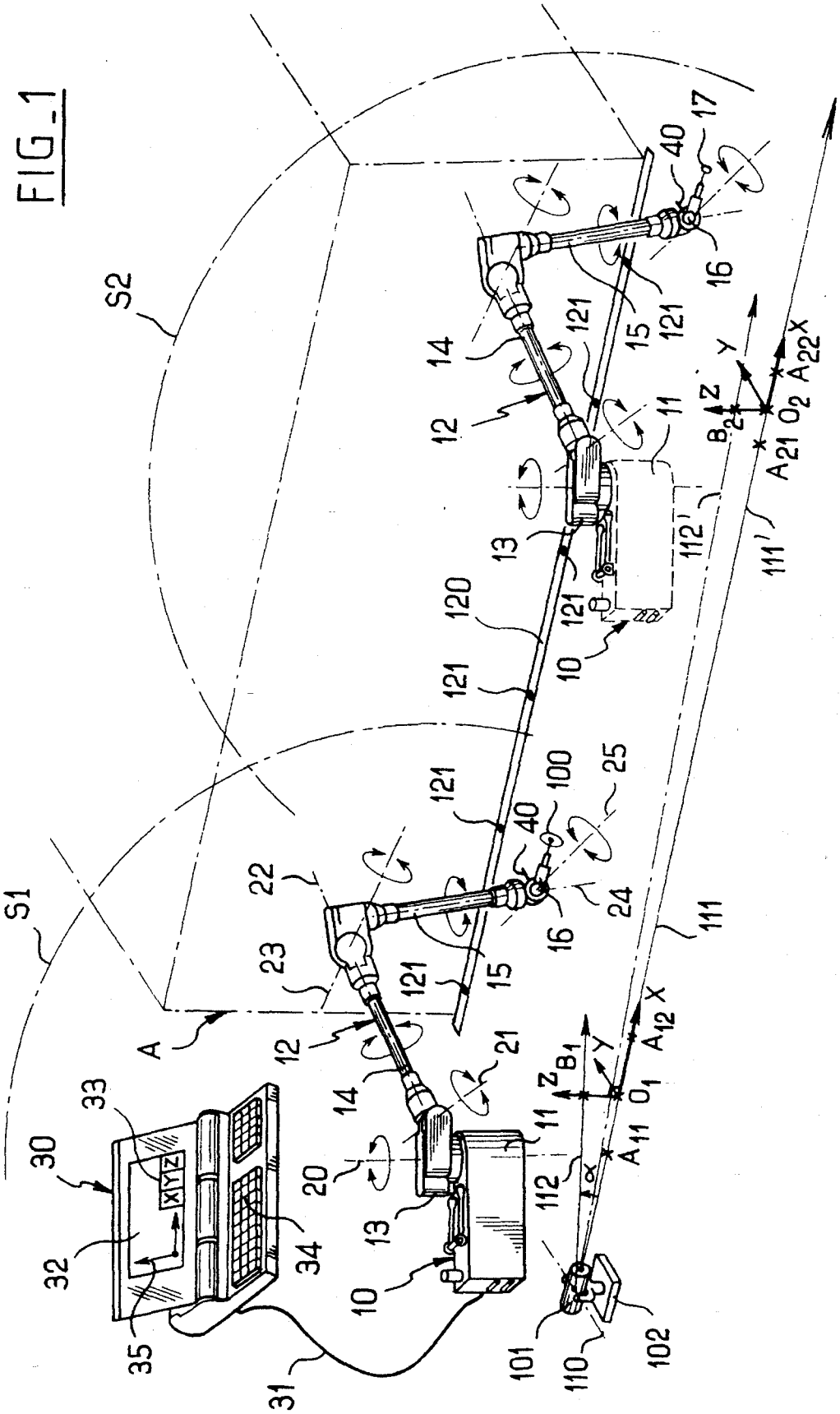


FIG_2

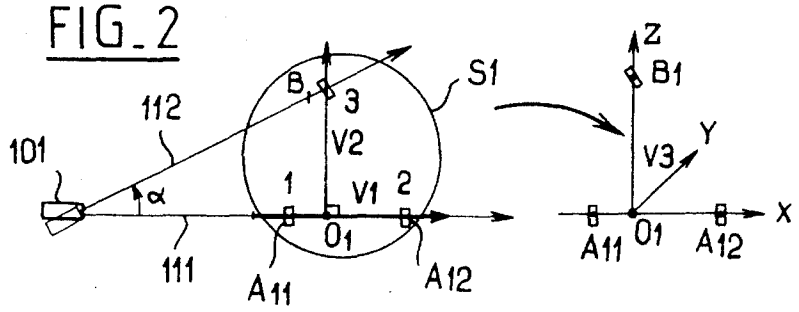


FIG_3

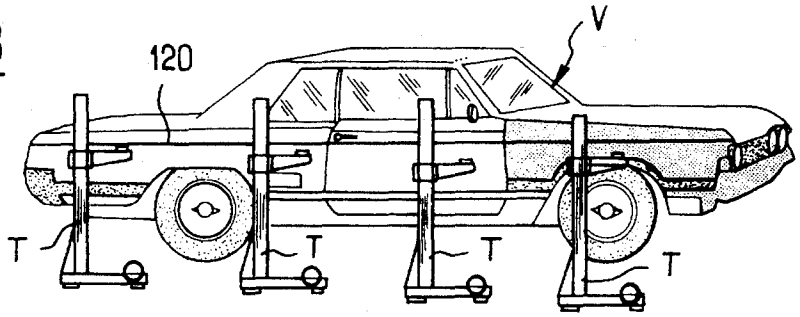


FIG_4

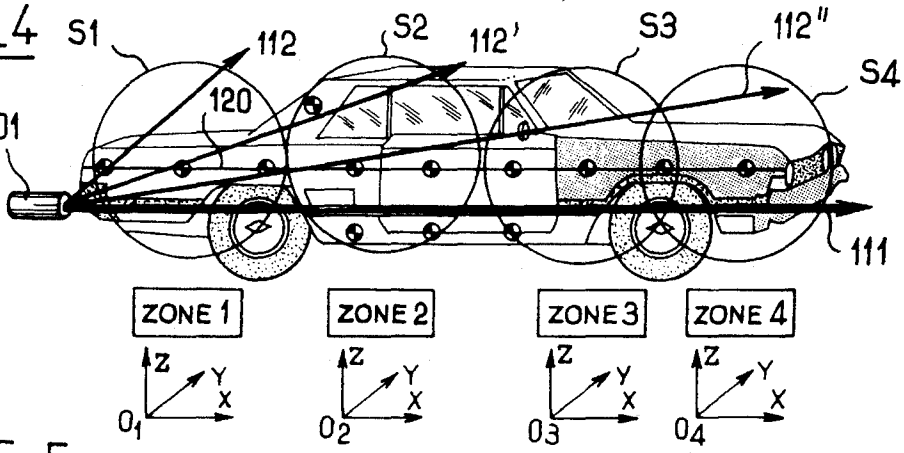
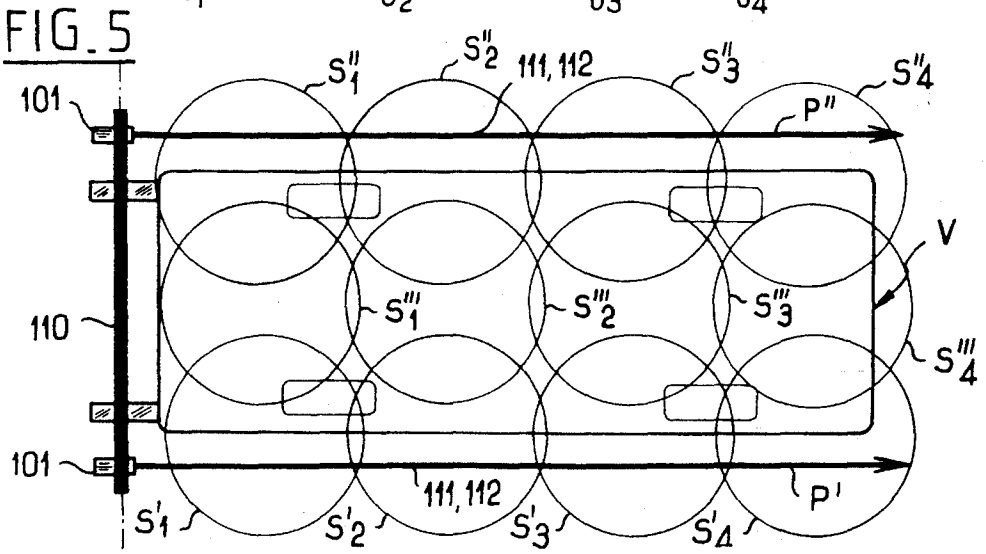


FIG_5



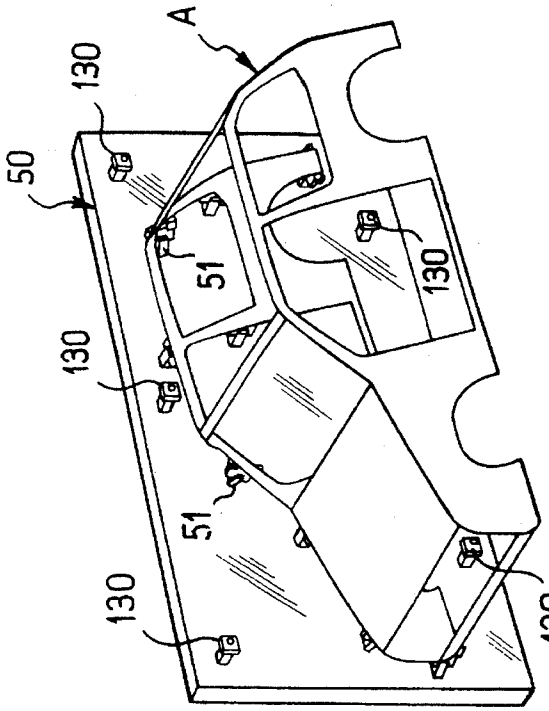


FIG_6

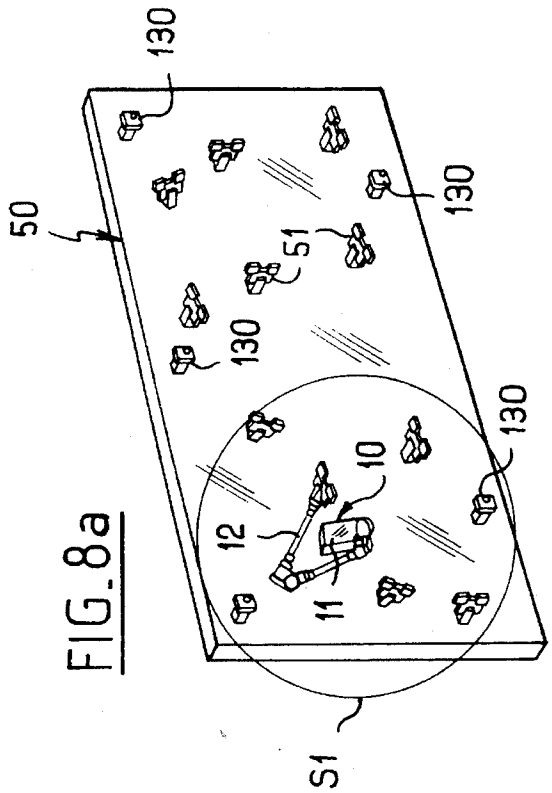


FIG_8a

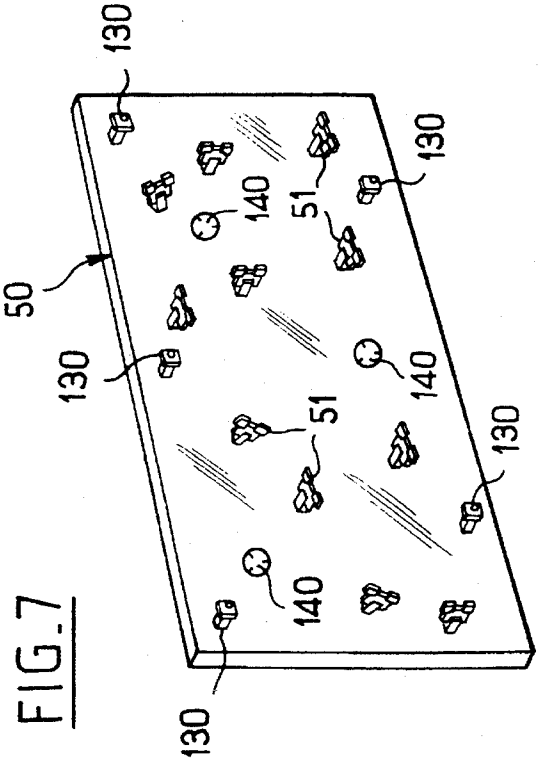


FIG_7

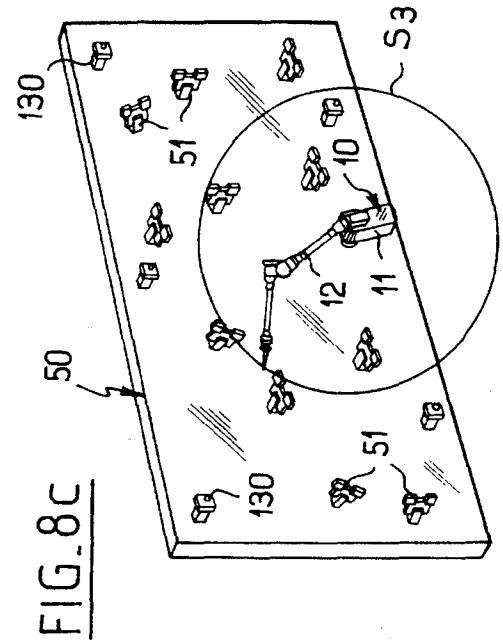


FIG_8c

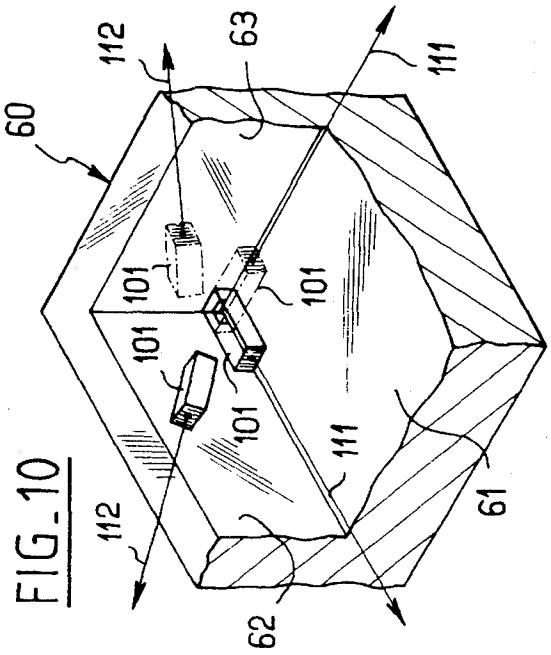


FIG_10

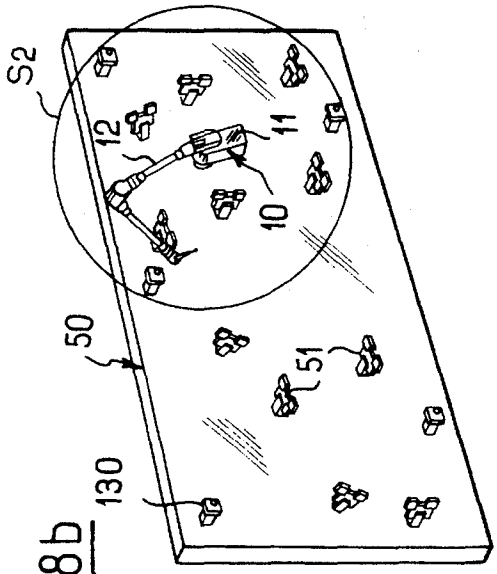


FIG_8b

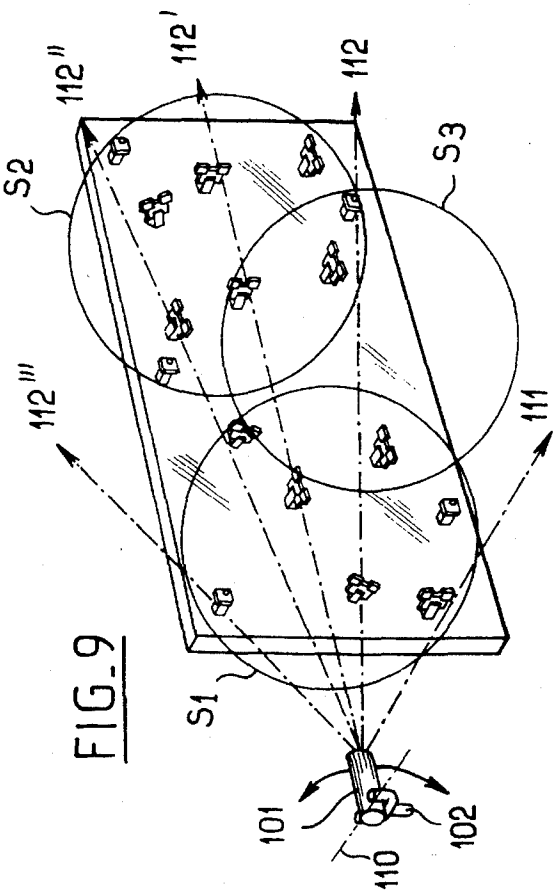


FIG_9

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