

(12) **United States Patent**
Kawagoe et al.

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- (54) **MOVING APPARATUS FOR EFFICIENTLY MOVING ON FLOOR WITH OBSTACLE**
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- (*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 799 days.

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Mar. 29, 1996 (JP)	8-076953

(51) **Int. Cl.**⁷ **G01C 22/00; G05D 1/00**
(52) **U.S. Cl.** **701/23; 701/24; 15/53.3; 15/98; 15/319; 318/568.1; 318/568.12; 318/568.13; 901/1; 901/5**

(58) **Field of Search** **701/23, 24, 25, 701/26, 27, 117, 118, 301, 302; 318/587, 568.12, 580; 15/340.1, 319, 325, 49.1, 53.3, 98; 901/1, 2, 3; 180/167, 168, 279, 169**

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(57) **ABSTRACT**

A moving robot first moves straight in a first forward path. When encountering an obstacle such as shelf, the robot makes a U-turn to move straight in a backward path located with a prescribed distance away from the first forward path. When encountering another obstacle, the robot again makes a U-turn to move straight in a second forward path extending in the same direction as that of the first forward path but located with a distance away from the backward path. When the robot exceeding the point of the U-turn in the first forward path is detected during running in the second forward path, presence of a region where the robot has not run yet is recognized, and running in that region is carried out thereafter.

27 Claims, 22 Drawing Sheets

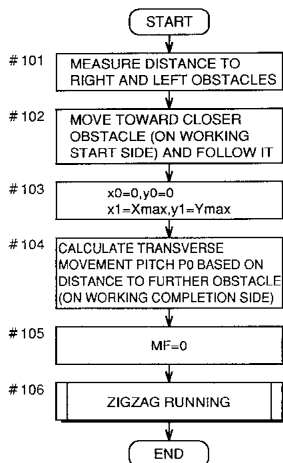


FIG. 1

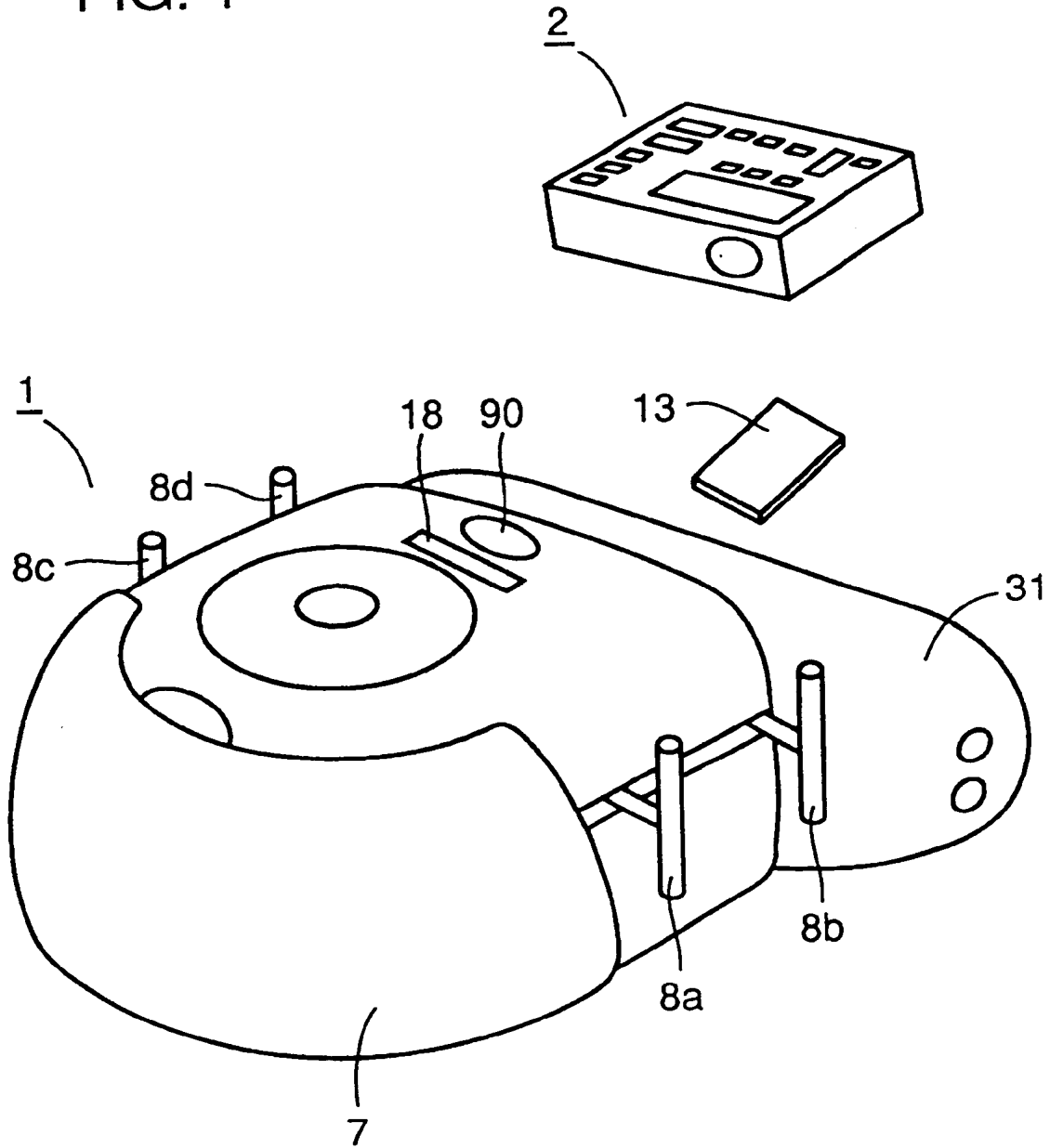


FIG. 2

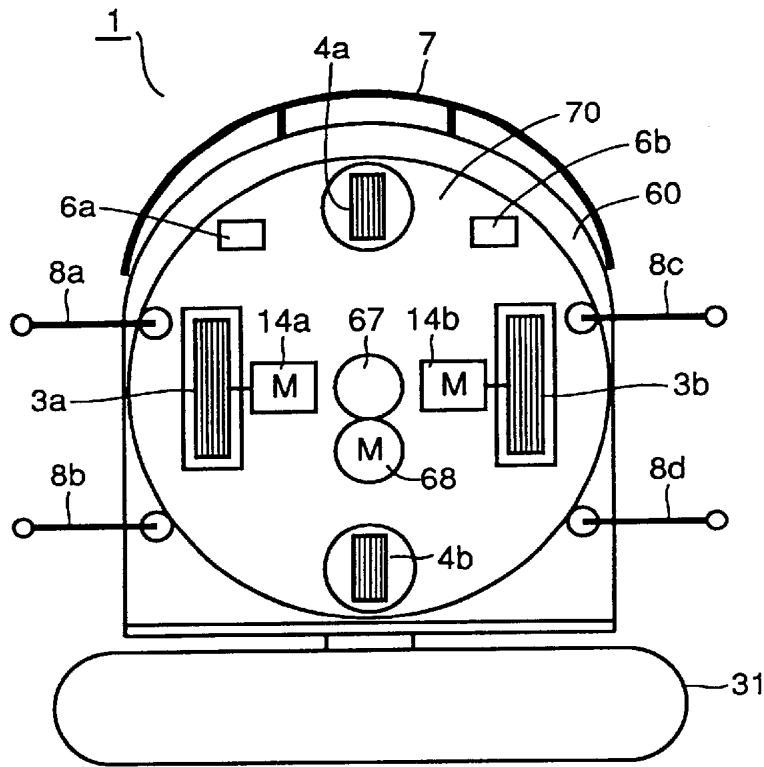


FIG. 3

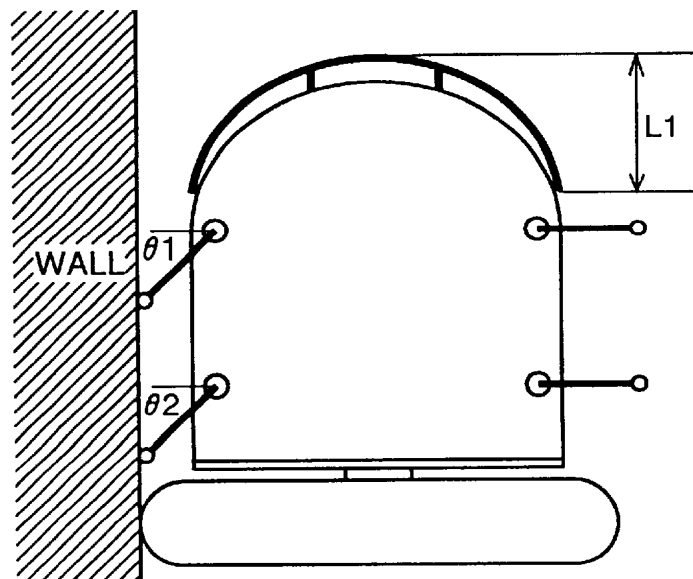


FIG. 4

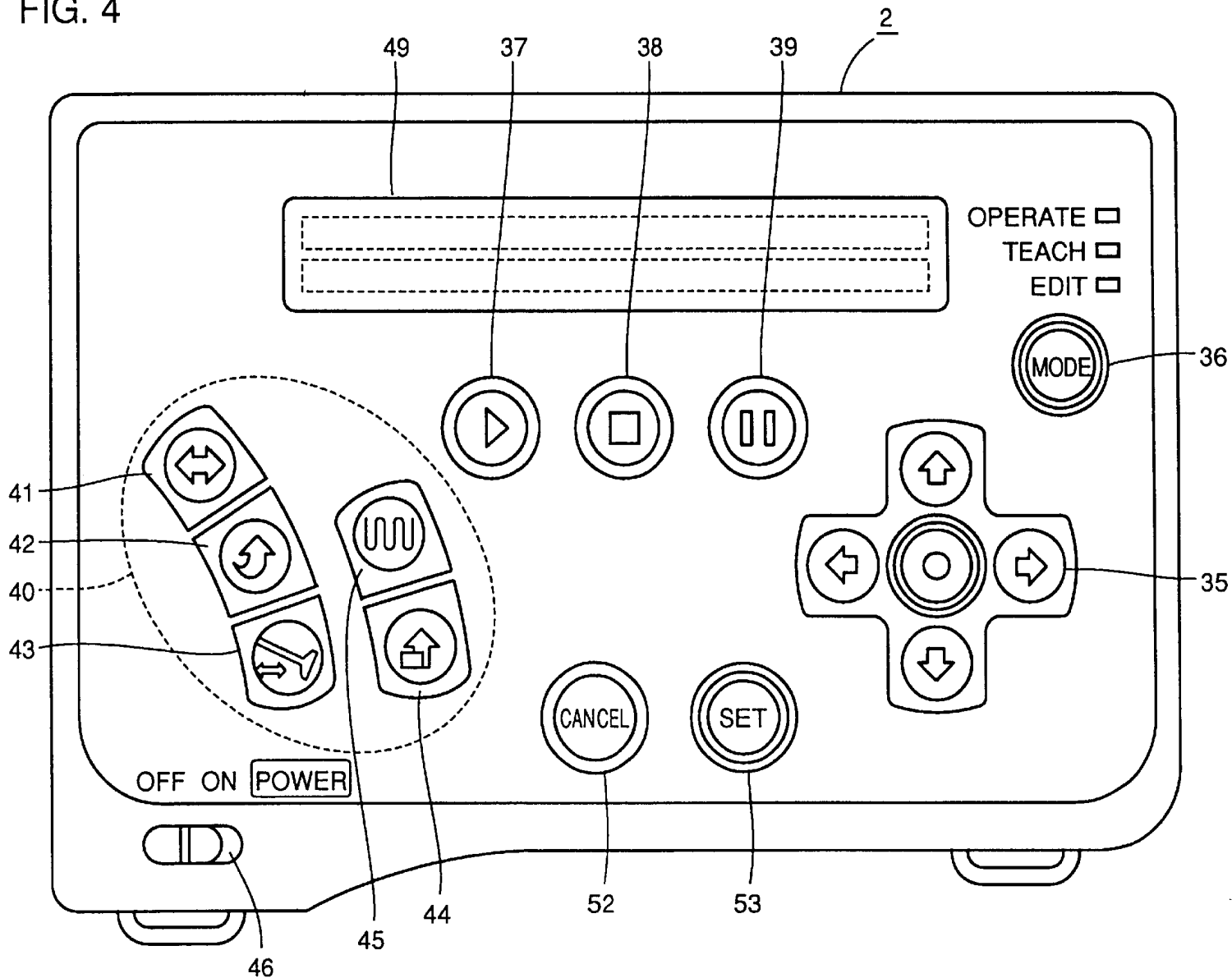
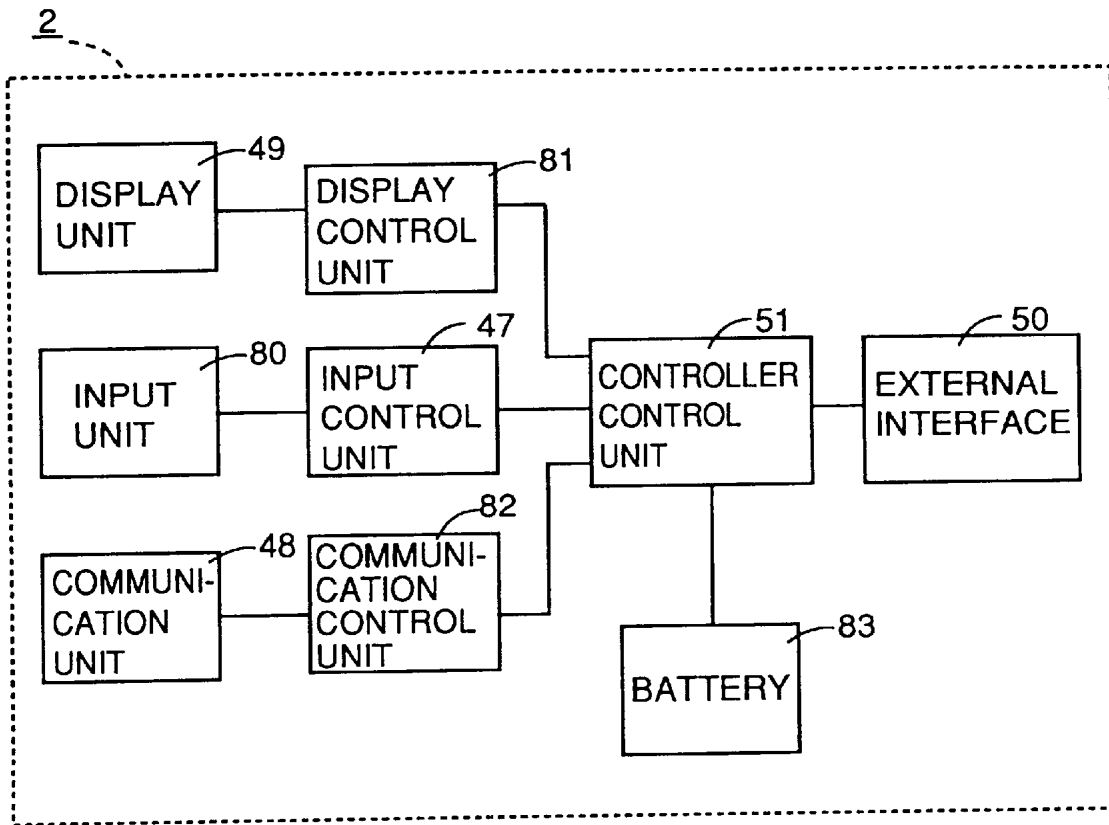


FIG. 5

START RUNNING BY SETTING "ZIGZAG"
LONGITUDINAL 300 cm TRANSVERSE **300** cm END ↓

FIG. 7



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