US006076025A

United States Patent [19]

Ueno et al.

[11] Patent Number: 6,076,025

[45] Date of Patent: Jun. 13, 2000

[54] **MOBILE ROBOT STEERING METHOD AND CONTROL DEVICE**

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[73] Assignee: **Honda Giken Kogyo K.K.**, Tokyo, Japan

[21] Appl. No.: **09/015,312**

[22] Filed: **Jan. 29, 1998**

[30] **Foreign Application Priority Data**

Jan. 29, 1997 [JP] Japan 9-029768

[51] **Int. Cl.**[7] **G06F 165/00**

[52] **U.S. Cl.** **701/23**; 701/25; 701/26

[58] **Field of Search** 701/23, 25, 26

[56] **References Cited**

U.S. PATENT DOCUMENTS

4,939,650	7/1990	Nishikawa	364/424.02
5,081,585	1/1992	Kurami et al.	364/424.02
5,377,106	12/1994	Drunk et al.	364/424.02
5,548,511	8/1996	Bancroft	364/424.02
5,570,285	10/1996	Asaka et al.	364/424.02
5,925,080	6/1999	Shimbara et al.	701/23

Primary Examiner—Tan Nguyen
Assistant Examiner—Dalena Tran
Attorney, Agent, or Firm—Armstrong, Westerman, Hattori, McLeland& Naughton

[57] **ABSTRACT**

A robot is provided to run so that a trace of the robot efficiently covers a given area according to the detection of a boundary of the area. A spiral pattern running, wherein a radius of the spiral is gradually increased, is started at a desired location in the area and is paused upon the detection of a boundary wall by sensors. Then, a random pattern running, which includes turning to depart from the wall and running forward, is conducted. After the turning has been repeated a predetermined number of times through simulations, the spiral pattern running is resumed at a location spaced from the last turning spot by a predetermined distance or a predetermined length of running time.

19 Claims, 13 Drawing Sheets

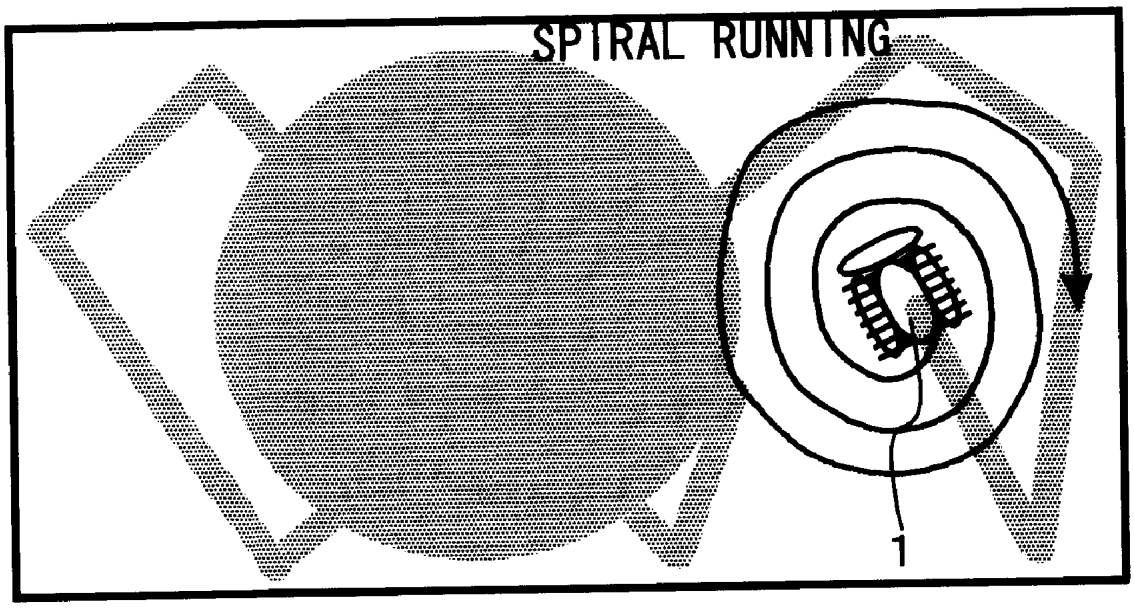


FIG. 1

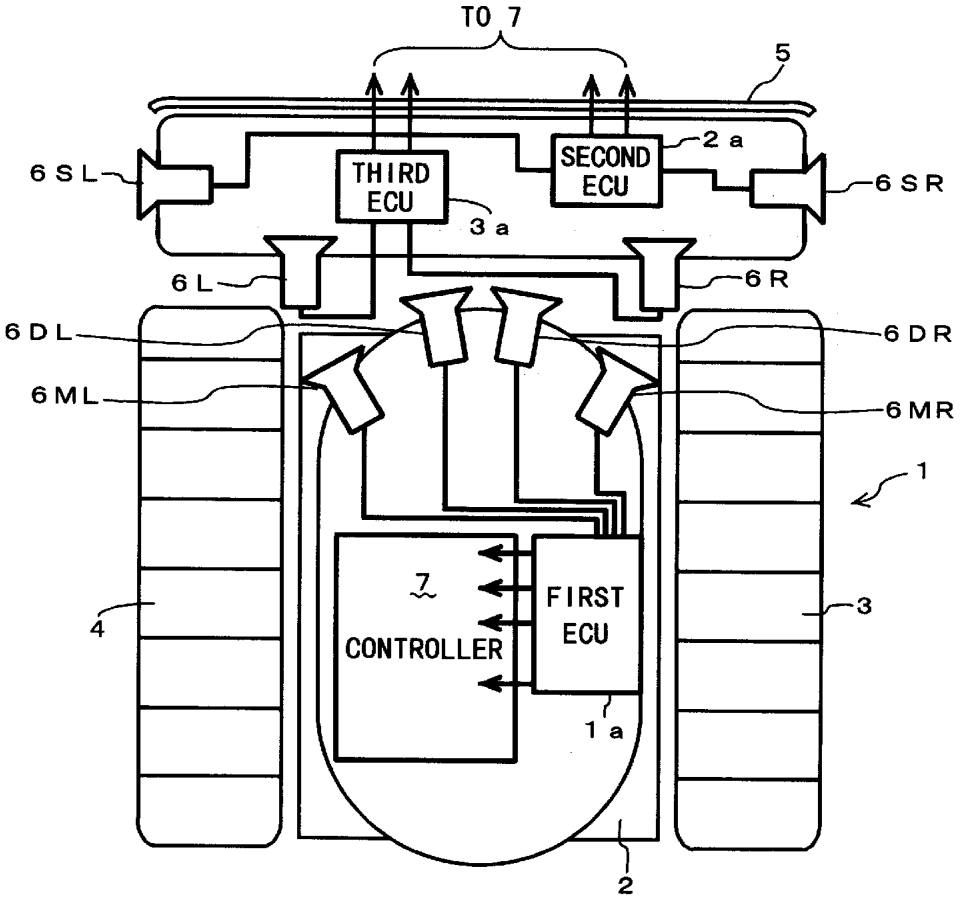


FIG. 2

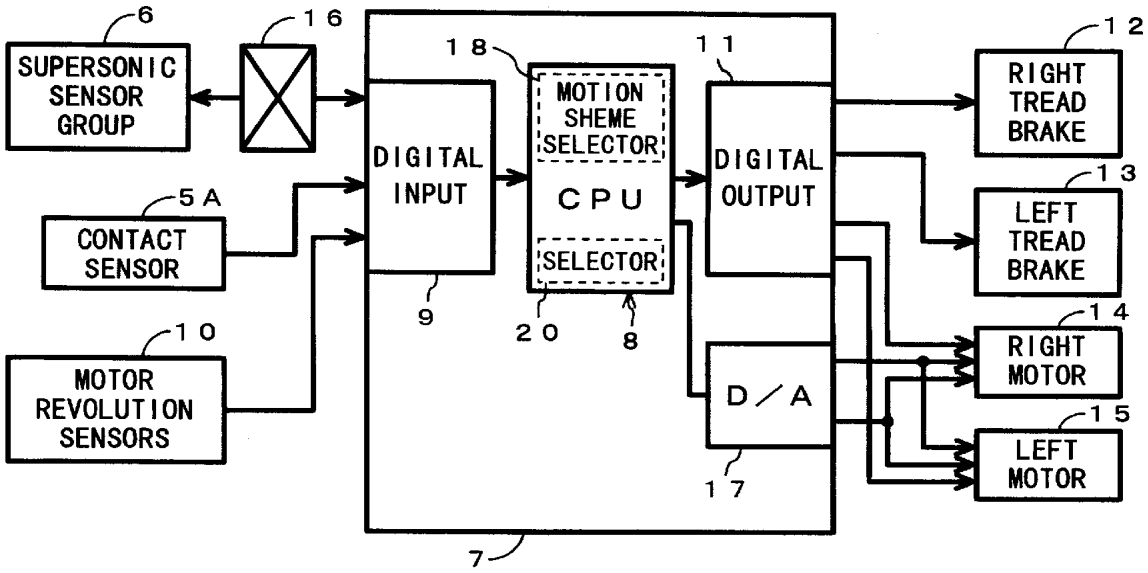


FIG. 3

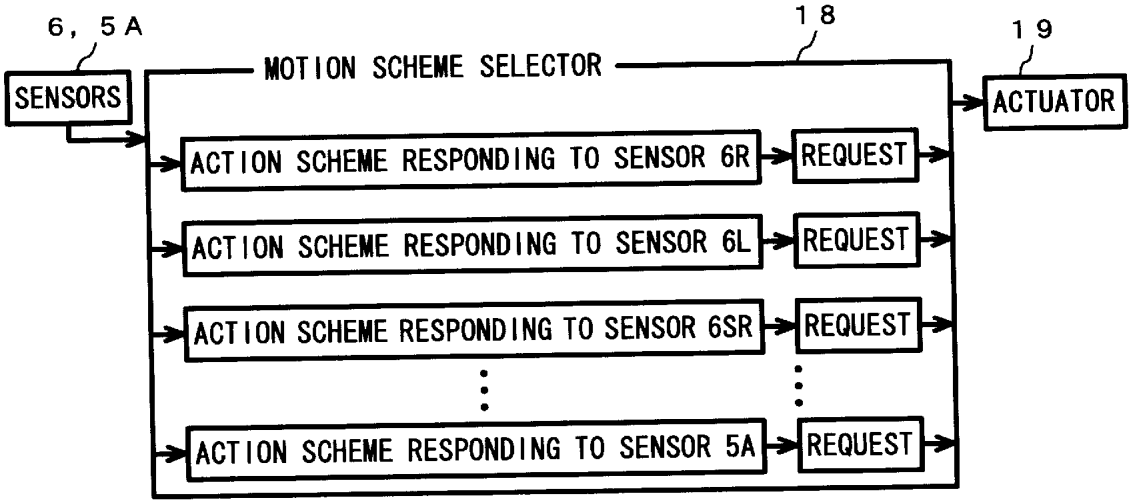


FIG. 4

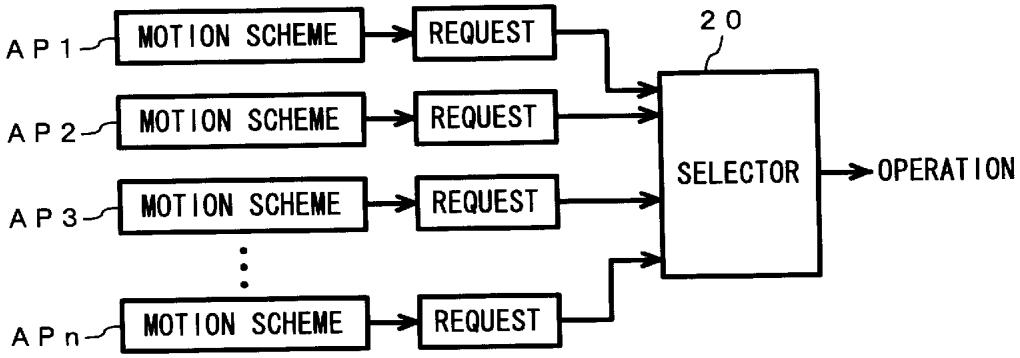


FIG. 5A

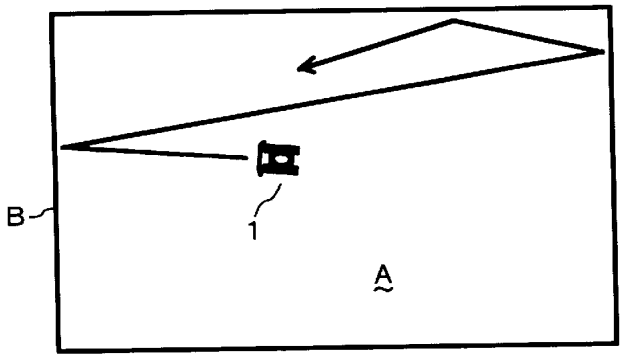


FIG. 5B

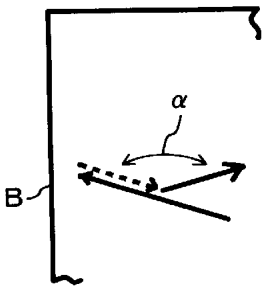


FIG. 6A

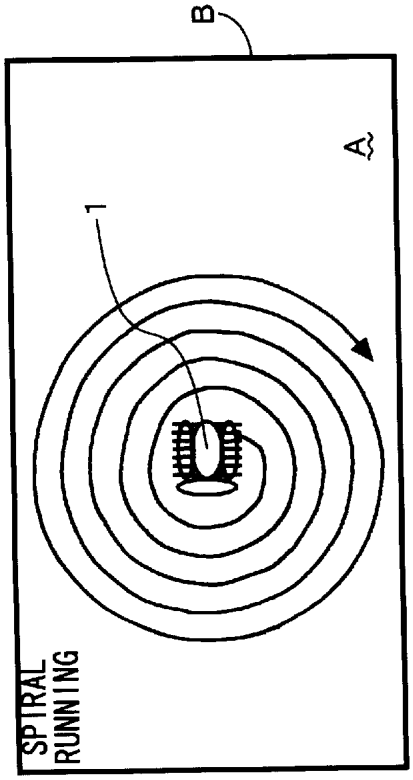


FIG. 6B

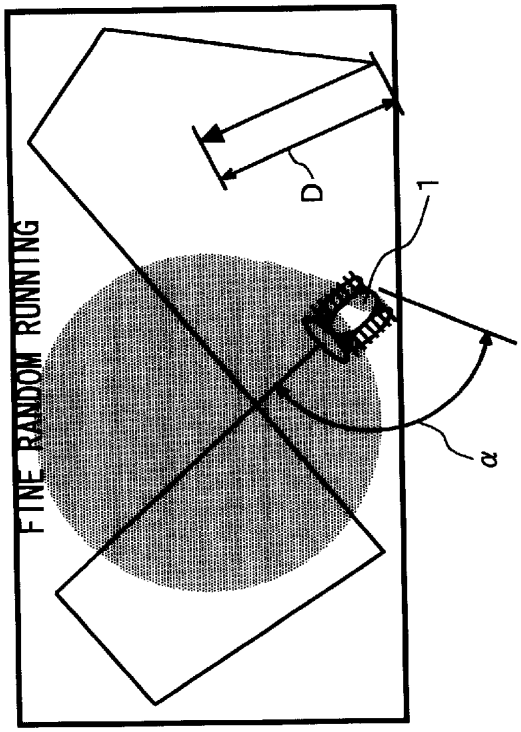


FIG. 6C

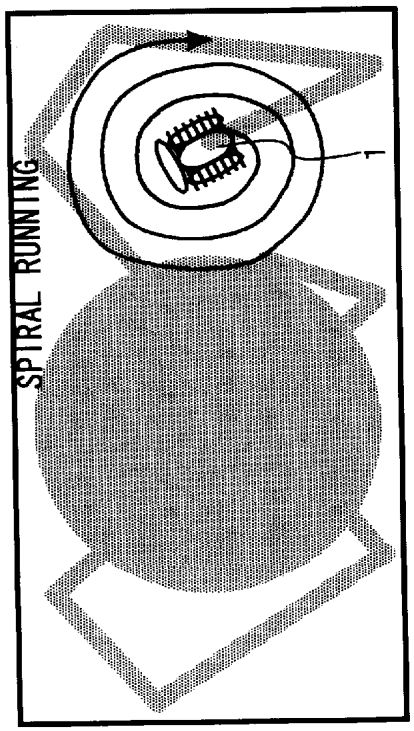


FIG. 7A

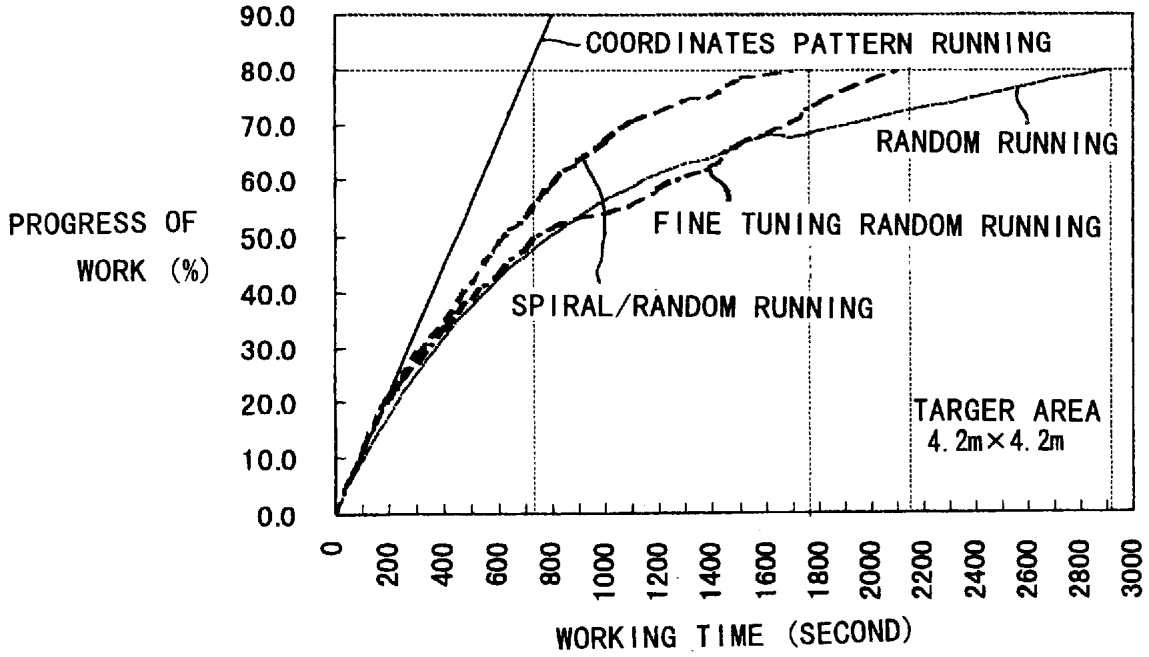
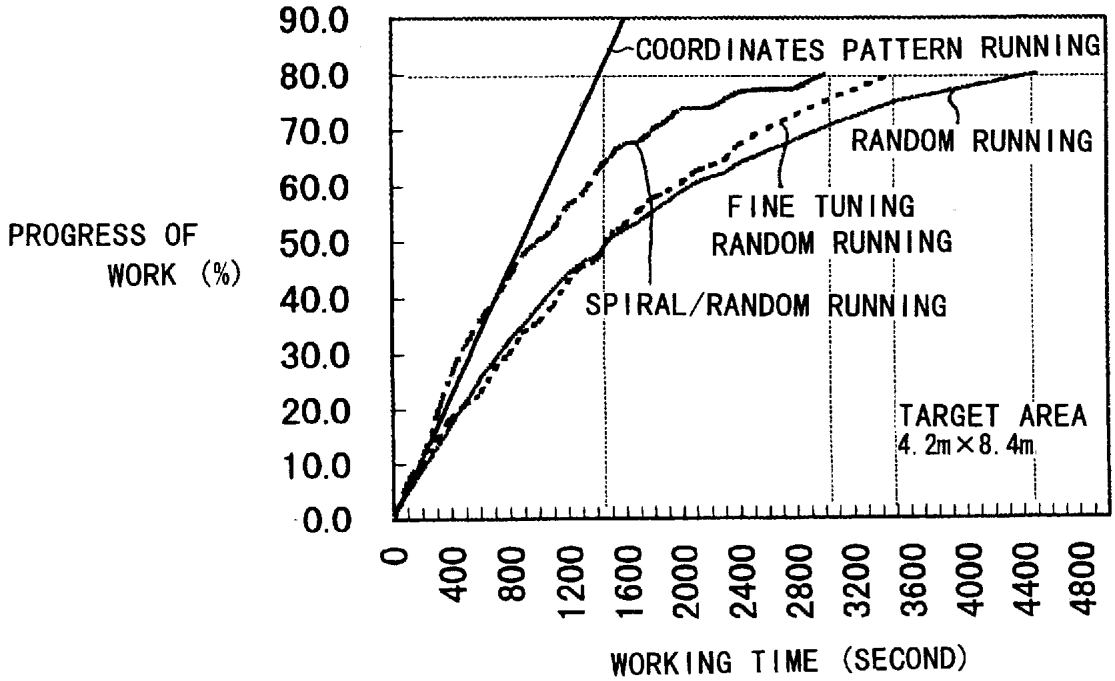


FIG. 7B



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