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Bisset et al.

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- (54) **SENSORS ARRANGEMENT**
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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 0 days.

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- (22) PCT Filed: **Dec. 6, 1999**
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§ 371 (c)(1),
(2), (4) Date: **Jun. 18, 2001**

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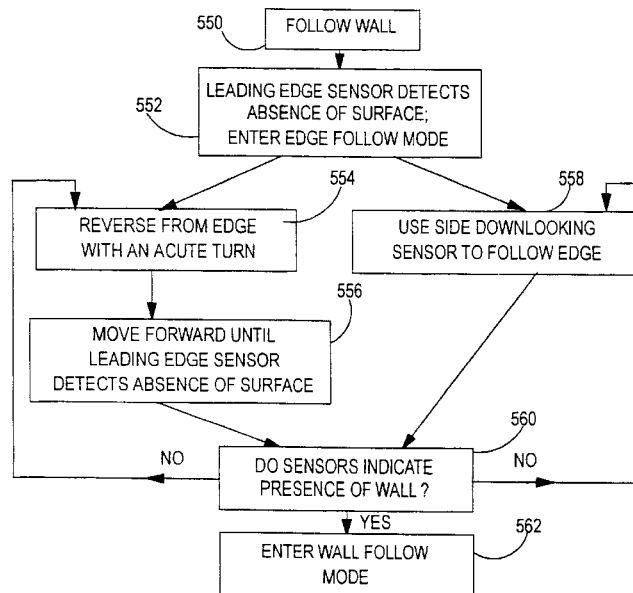
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PCT Pub. Date: **Jun. 29, 2000**
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- (51) **Int. Cl.⁷** **G01C 22/00; G05D 1/00; A47L 11/00; A47L 13/00**
- (52) **U.S. Cl.** **701/23; 701/22; 180/167; 180/168; 180/169; 180/180; 318/580; 318/587; 318/868.16; 340/943; 340/435; 15/319; 15/323; 15/339; 15/340.1; 706/905**
- (58) **Field of Search** **701/23.1, 22; 180/167, 180/168, 169, 280; 706/905; 318/580, 587, 568.16; 340/943, 435; 15/319, 323, 339, 340.1; 134/18, 21, 6**

(57) ABSTRACT

An autonomous vehicle, such as a robotic cleaning device, includes wheels which support the vehicle and allow the vehicle to traverse a surface. Downward looking wheel sensors sense the presence of a surface in front of the wheels. Another sensor is provided at or near a leading edge of the vehicle for sensing the presence beneath the leading edge of the vehicle. The vehicle is arranged so that movement of the vehicle is possible if the leading edge sensor senses that there is no surface beneath the leading edge of the vehicle, provided that the wheel sensors indicate that there is a surface adjacent to the wheel. When the leading edge sensor senses that there is no surface beneath the leading edge of the vehicle, the vehicle performs an edge following routine.

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13 Claims, 11 Drawing Sheets



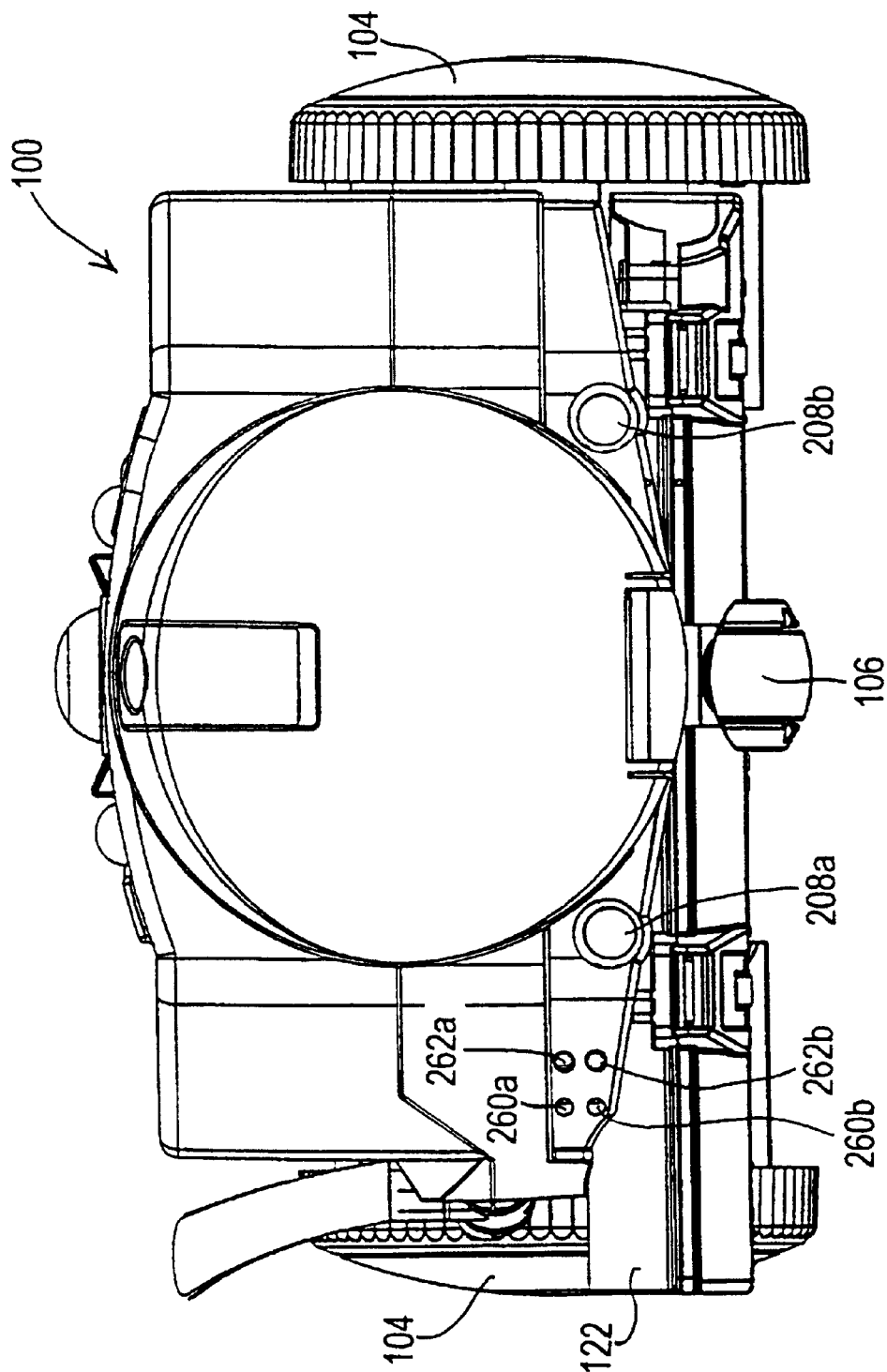


FIG. 3.

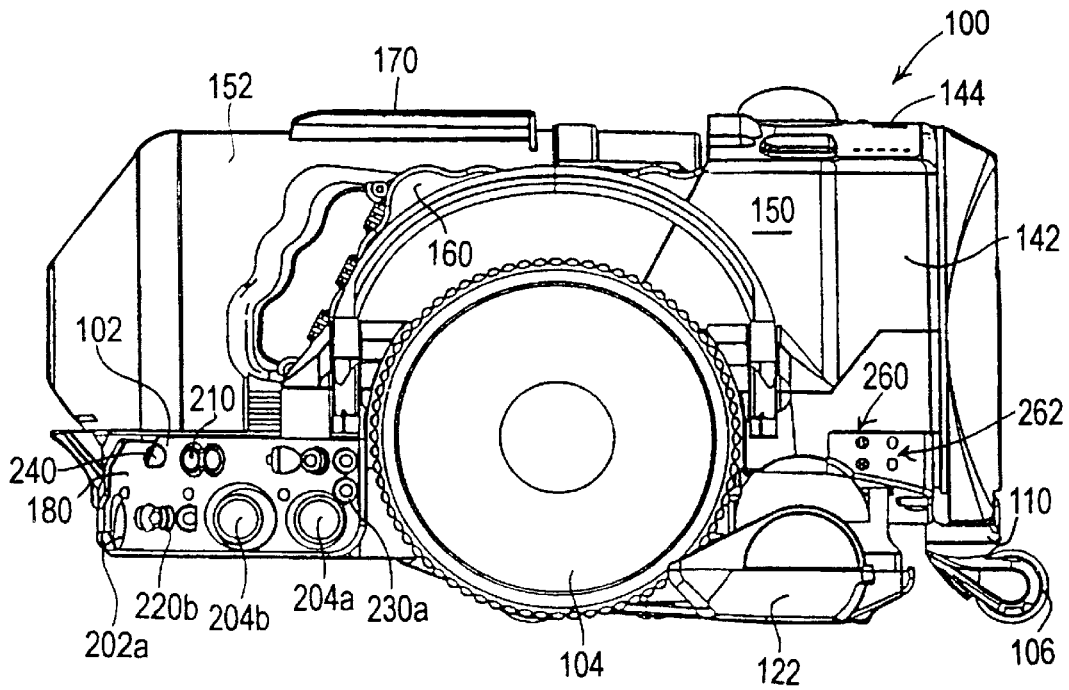


FIG. 4a.

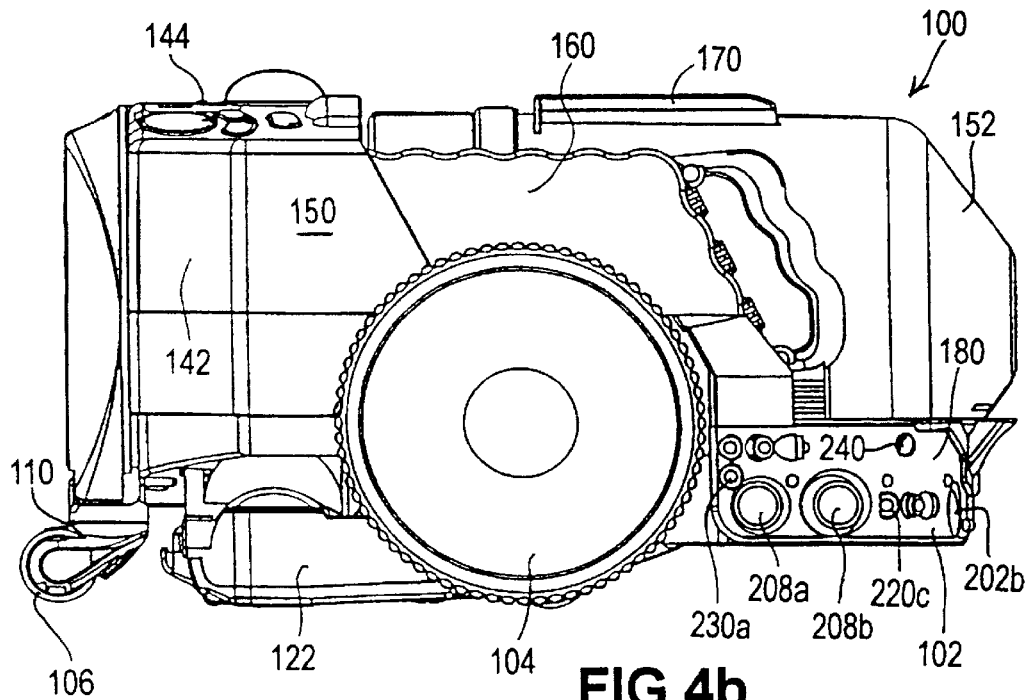


FIG. 4b.

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