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(54) **Robot for cleaning swimming pools**

(57) The present invention relates to a robot for cleaning swimming pools, comprising driving means which can transmit movement to movement means, where the movement means comprise two wheels (2) arranged in line on each side (3, 4) of the robot, the robot having two sides (3, 4), the driving means consisting of

a drive unit (5) which is operatively connected to two wheels (2) located on a first side (3) of the robot, comprising at least one drive shaft (6) which allows transmitting the movement originating from the drive unit (5) from said first side (3) to the wheels (2) located on a second side (4).

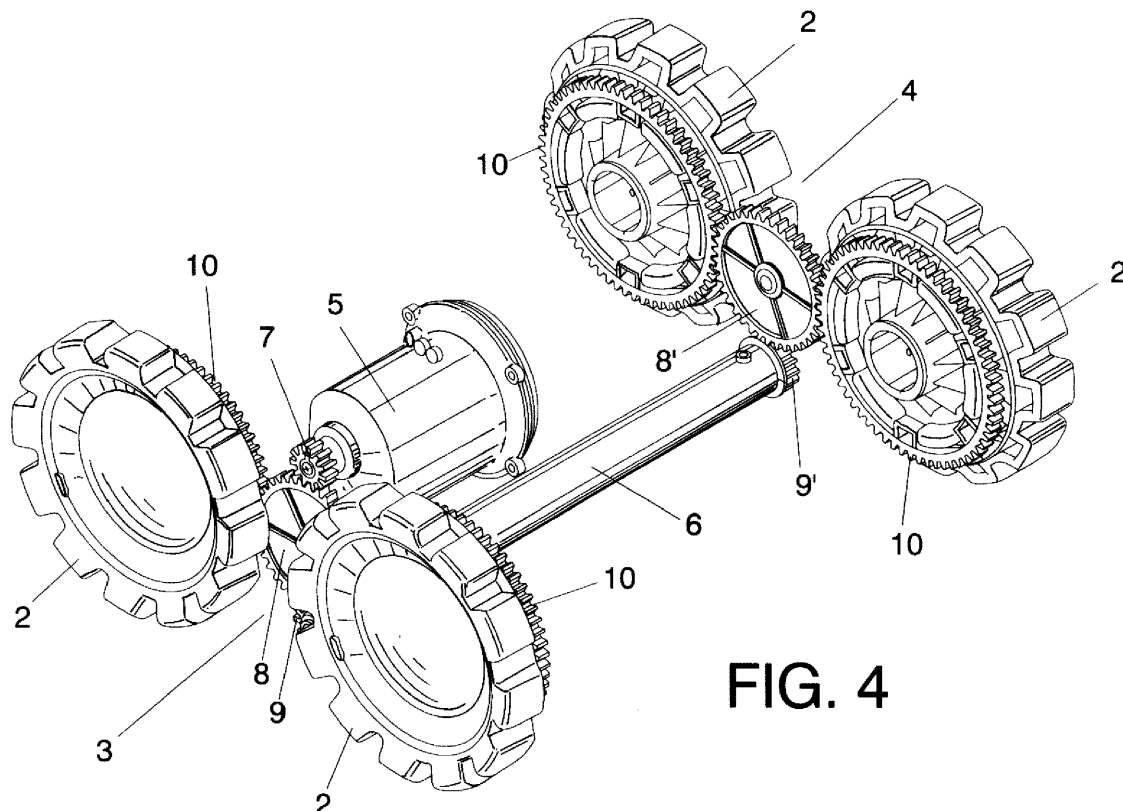


FIG. 4

Description

Technical Field of the Invention

[0001] The present invention relates to a robot for cleaning swimming pools, which can be applied to the aquatic facility maintenance industry, and more specifically in the environment of performing automated maintenance tasks in swimming pool basins.

Background of the Invention

[0002] There are robots today for automatically performing the tasks of cleaning the surfaces of swimming pool basins, both the bottom and the side walls, for which said robots have the capacity of moving autonomously along the bottom and the walls of the basin, as well as suction and storage means for sucking in and storing the dirt found in the basin, dirt being understood as any type of impurities such as leaves or solid waste which are deposited on the bottom or on the side walls of the basin.

[0003] For autonomous movement, most of these cleaning robots have movement means consisting of caterpillar tracks, usually of rubber or another elastic material for the purpose of preventing damage to the surface of the basin. One example of this type of robots can be found in French patent application no. FR-2946378-A1. Even though caterpillar tracks allow having a large contact surface for the forward movement of the robot, allowing sufficient driving capacity for forward movement, precisely because of the particularities of these movement means, in addition to having a high maintenance cost, in which the caterpillar tracks sustain high wear and when any of the caterpillar tracks must be replaced due to wear or breakage, replacement is difficult. Likewise, these devices have a high number of parts and their arrangement is complex from a mechanical point of view, implying a high manufacturing cost.

[0004] For the purpose of overcoming the drawbacks of robots with caterpillar tracks, robots for cleaning swimming pools the movement means of which consist of wheels, have recently emerged on the market, such as for example the model described in United States design patent application no. UD-D599967-S. This robot has a front cleaning roller or brush and a rear propulsion turbine, and consists of four wheels independent from one another and two geared motors, such that the robot has two drive wheels, which in the mentioned example are the front wheels. The drawbacks of these robots include the fact that given the configuration of its driving means and transmission to the movement means, its movement capacity is only in a single direction, according to one and the same direction, being able to rotate about itself to change said forward direction, which implies cleaning down times during said manoeuvres, which taking into account the size of a basin, means a lot of wasted time when cleaning the entire basin.

Description of the Invention

[0005] The present invention relates to a robot for cleaning swimming pools which allows having a four-wheel drive and bidirectional robot, all with a simple arrangement, which has a lower cost than currently existing robots. The robot of the invention allows a much simpler assembly and maintenance than the currently existing robots, precisely because of the simplicity in the number of necessary elements as well as their arrangement.

[0006] The robot proposed by the invention comprises driving means which can transmit its movement to movement means comprising two wheels arranged in line on each side of the robot, the robot having two sides.

[0007] Therefore, according to the invention the driving means consist of a single drive unit, which can consist of a geared motor which is operatively connected, with two wheels located on a first side of the robot, being able to transmit a driving force which is converted into movement. The robot comprises at least one drive shaft which allows transmitting the movement originating from the drive unit from said first side to the wheels located on a second side.

[0008] The robot of the invention thus has the particularity that it can be considered a 4x4 robot, with four-wheel drive, which allows the robot to move in any direction, i.e., it can go forwards or backwards indistinctly. This represents a huge advantage with respect to the currently existing robots, given that the working environment is under water and it must have enough driving capacity so as to climb up the side walls of the basin. Precisely because of the high manoeuvrability of the robot, and more specifically because of its driving capacity in both directions, the robot does not involve any cleaning down time during its operation, in addition to the robot being able to overcome obstacles more easily as a result of the four-wheel drive with a single traction motor.

[0009] Currently, the only robots allowing 4x4 drive are caterpillar track robots, with the aforementioned drawbacks. However, the robot of the invention allows reducing the number of necessary components, and therefore the space, which in turn facilitates its maintenance and allows reducing manufacturing, maintenance and repair costs with respect to the currently existing robots, all these determining factors being especially relevant given the robot work place conditions, requiring complete water-tightness. The invention thus allows reducing the total cost of the device by reducing the geared motors from two to one, with all this implies in terms of reducing components and risk when the device works under water.

[0010] Based on the foregoing, solutions of another type do not provide the effects achieved with the invention. In this sense, it is not possible to achieve four-wheel drive by means of a fixed shaft joining the rear and front wheels due to the lack of available space, this being the reason current robots incorporate two geared motors.

[0011] The possibility of the robot comprising at least

one cleaning roller which is located around a drive shaft is contemplated; said drive shaft is thus used to be incorporated into a cleaning brush which, though optional, is very useful.

[0012] Likewise, the drive shaft being arranged in its operating position by means of housing at least two pins in at least two holes is also contemplated, the pins being able to be located in the drive shaft and the holes in a casing which the robot comprises robot, or the other way round, which allows the drive shaft to be unlocked sequentially, first from one hole and then from another, and thus be easily removed by the user for changing the cleaning roller, without the need for a technical operator to intervene. Said pins being retractable is likewise contemplated.

[0013] The fact that the drive shaft can be removed by the user him/herself for maintenance or replacement for allowing the interchangeability both of the shaft and of the roller is a huge advantage given that current robots require said change to be done by technical services, although in recent models the cleaning rollers can be removed by the user him/herself since they are attached to the casing by means of screws. Nevertheless, the robot of the invention has the advantage that it does not require screws for locking the drive shaft in its operating position, so it can be removed to change the rollers for maintenance or replacement with a simple key, or even with a pen or the like, sequentially pressing on the pins to unlock them.

[0014] The shaft and the brush can thus be removed without the need for tools such as screwdrivers, etc.

Description of the Drawings

[0015] To complement the description which is being made and for the purpose of aiding to better understand the features of the invention according to a preferred practical embodiment thereof, a set of drawings is attached as an integral part of said description in which the following has been depicted with an illustrative and non-limiting character:

Figure 1 shows a top perspective view of the robot for cleaning swimming pools proposed by the invention, the location of the dirt storage tanks being able to be seen.

Figure 2 shows a bottom perspective view of the robot, in which the suction openings and the cleaning roller can be seen in the operating position.

Figure 3 shows a schematic side perspective view of the robot, in which some elements have been depicted in a transparent and translucent manner for the purpose of allowing the transmission means for transmitting movement from the driving means to the movement means to be seen.

Figure 4 shows a top schematic perspective view of the robot in which only the transmission means and the movement means, as well as a cleaning roller

located in the drive shaft, have been depicted, the transmission of movement to the driving means, specifically by means of sprocket wheels fixed to the inner side of the wheels, particularly being able to be seen.

Figure 5 shows a top perspective view of the robot in which the arrangement of the drive unit in the robot can be seen, for which one of the dirt storage tanks has been depicted removed.

Figure 6 shows two views of the drive shaft, with and without cleaning roller.

Figure 7 shows a bottom side perspective view of the robot, in which the manner in which the drive shaft can be removed by means of sequentially unlocking the pins located at the ends of the drive shaft can be seen.

Figure 8 shows a bottom perspective view of the robot with the drive shaft removed, the holes which the casing has for housing the pins of the drive shaft, as well as the lower space taken up by the cleaning roller when it is in an operating position, i.e., incorporated around the drive shaft when it is placed in the robot, being able to be seen, the intermediate wheels transmitting movement to the transmission wheels which the drive shaft has at its ends can also partially be seen.

Figure 9 shows a top perspective view of the robot in which the upper suspension handle has been depicted raised and one of the dirt storage tanks removed and the other raised for its removal by means of its corresponding handle, has been depicted.

Figure 10 shows a view like that of the preceding figure, in which the tank which had been depicted raised is completely removed with a side collapsed for allowing its inside to be cleaned.

Preferred Embodiment of the Invention

[0016] In view of the discussed figures, it can be seen how in one of the possible embodiments of the invention the robot for cleaning swimming pools proposed by the invention comprises a cleaning roller (1) and driving means transmitting movement to movement means.

[0017] Said movement means comprise two wheels (2) arranged in line on each side (3, 4) of the robot, the robot having two sides (3, 4).

[0018] In turn, the driving means consist of a single drive unit (5), specifically a geared motor, which is operatively connected to two wheels (2) located on a first side (3) of the robot. The robot also comprises at least one drive shaft (6) which allows transmitting the movement originating from the drive unit (5) from said first side (3) to the wheels (2) located on a second side (4).

[0019] According to a preferred embodiment, the robot comprises a drive sprocket wheel (7) directly connected to the drive unit (5), said drive sprocket wheel (7) being operatively connected to a first intermediate sprocket wheel (8) which can transmit movement to two wheels

(2) located on the first side (3) of the robot, as can be seen in Figures 3 and 4.

[0020] Said first intermediate sprocket wheel (8) can in turn be operatively connected to a first transmission sprocket wheel (9) which is fixed at a first end of the drive shaft (6), where a second end of said drive shaft has a second transmission sprocket wheel (9') fixed thereto which can be operatively connected to a second intermediate sprocket wheel (8') which can transmit movement to two wheels (2) located on the second side (4) of the robot.

[0021] For the purpose of minimising the space taken up, the output shaft of the drive unit (5) is preferably located perpendicular to the longitudinal axis of forward movement the robot.

[0022] As shown in Figure 4, the transmission of movement from the intermediate sprocket wheels (8, 8') to the wheels (2) is performed by means of sprocket wheels (10) which are fixed to the inner side of the wheels (2), said sprocket wheels (10) being operatively connected to the intermediate sprocket wheels (8, 8').

[0023] On the other hand, as shown in Figures 2, 4 and 6, the cleaning roller (1) is located around the drive shaft (6). The rotation speed of the drive shaft (6) is obviously greater than that of the wheels (2) so the cleaning roller (1) rotates at that same greater speed, thus increasing cleaning efficiency.

[0024] As shown in Figures 7 and 8, the drive shaft (6) is arranged in its operating position by means of housing two pins (11) in two holes (12) located in the casing (13) of the robot, thus allowing its sequential unlocking, as seen in Figure 7.

[0025] According to a preferred embodiment, said casing (13) or enclosure serves as a block in which the drive unit (5), as well as electronic control modules of the robot and a pump motor like those usually incorporated in robots of this type for performing cleaning tasks, are housed.

[0026] As the robot moves forward it generates a series of currents allowing the dirt to be introduced through suction openings (18) located in the lower part inside two dirt storage tanks (14) which have collapsible handles (15) for lifting and removing the robot to allow cleaning them, therefore they have a collapsible side (16) facilitating this, as seen in Figure 10. Said collapsible handles (15) allow, in addition to suspending the storage tanks (14), fixing the filter itself to the body or casing (13) of the robot, taking into account that the robot can incorporate said filters for filtering dirt in the tanks.

[0027] The robot also comprises an upper suspension handle (17), equally collapsible during the operation of the robot, which allows lifting the robot to be transported as a whole.

[0028] In view of this description and set of drawings, the person skilled in the art will be able to understand that the embodiments of the invention which have been described can be changed in many ways within of the object of the invention. The invention has been described

according to preferred embodiments thereof, but for the person skilled in the art it will be evident that multiple variations can be included in said preferred embodiments without exceeding the object of the claimed invention.

Claims

1. Robot for cleaning swimming pools, comprising driving means which can transmit movement to movement means, where said movement means comprises two wheels (2) arranged in line on each side (3, 4) of the robot, the robot having two sides (3, 4), **characterised in that** the driving means consists of a drive unit (5) which is operatively connected to two wheels (2) located on a first side (3) of the robot, comprising at least one drive shaft (6) which allows transmitting the movement originating from the drive unit (5) from said first side (3) to the wheels (2) located on a second side (4).
2. Robot for cleaning swimming pools according to claim 1, wherein it comprises a drive sprocket wheel (7) directly connected to the drive unit (5), said drive sprocket wheel (7) being operatively connected to a first intermediate sprocket wheel (8) which can transmit movement to two wheels (2) located on the first side (3) of the robot, where said first intermediate sprocket wheel (8) can in turn be operatively connected to a first transmission sprocket wheel (9) which is fixed at a first end of the drive shaft (6), where a second end of said drive shaft has a second transmission sprocket wheel (9') fixed thereto which can be operatively connected to a second intermediate sprocket wheel (8') which can transmit movement to two wheels (2) located on the second side (4) of the robot.
3. Robot for cleaning swimming pools according to claim 2, wherein the transmission of movement from the intermediate sprocket wheels (8, 8') to the wheels (2) is performed by means of sprocket wheels (10) which are fixed to the inner side of the wheels (2), said sprocket wheels (10) being operatively connected to the intermediate sprocket wheels (8, 8').
4. Robot for cleaning swimming pools according to any of the preceding claims, wherein it comprises at least one cleaning roller (1) located around a drive shaft (6).
5. Robot for cleaning swimming pools according to any of the preceding claims, wherein the drive shaft (6) is arranged in its operating position by means of housing at least two pins (11) in at least two holes (12).

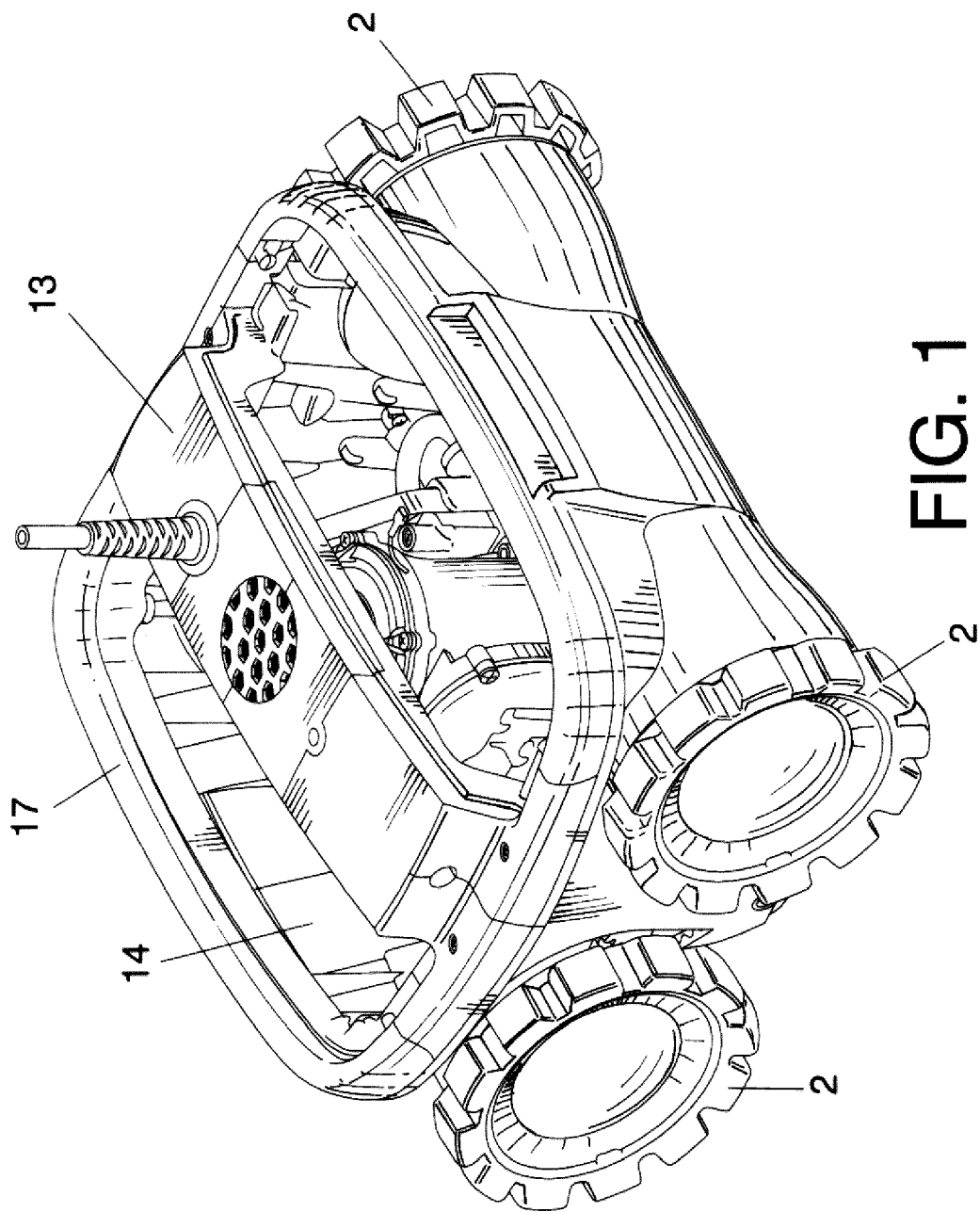


FIG. 1

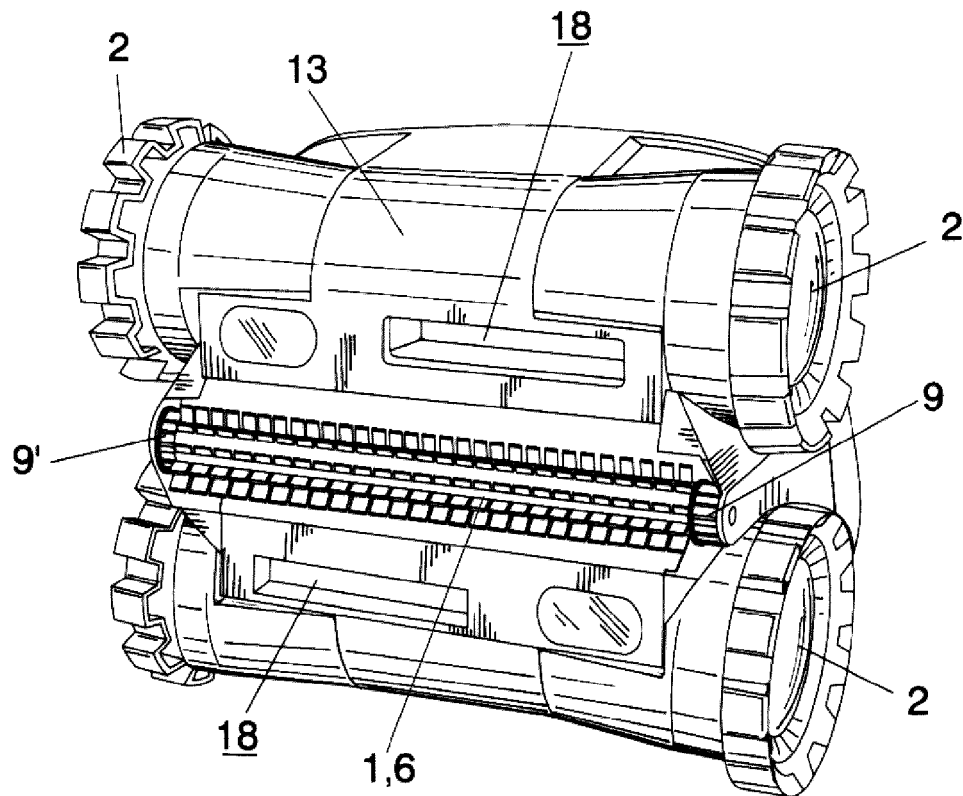


FIG. 2

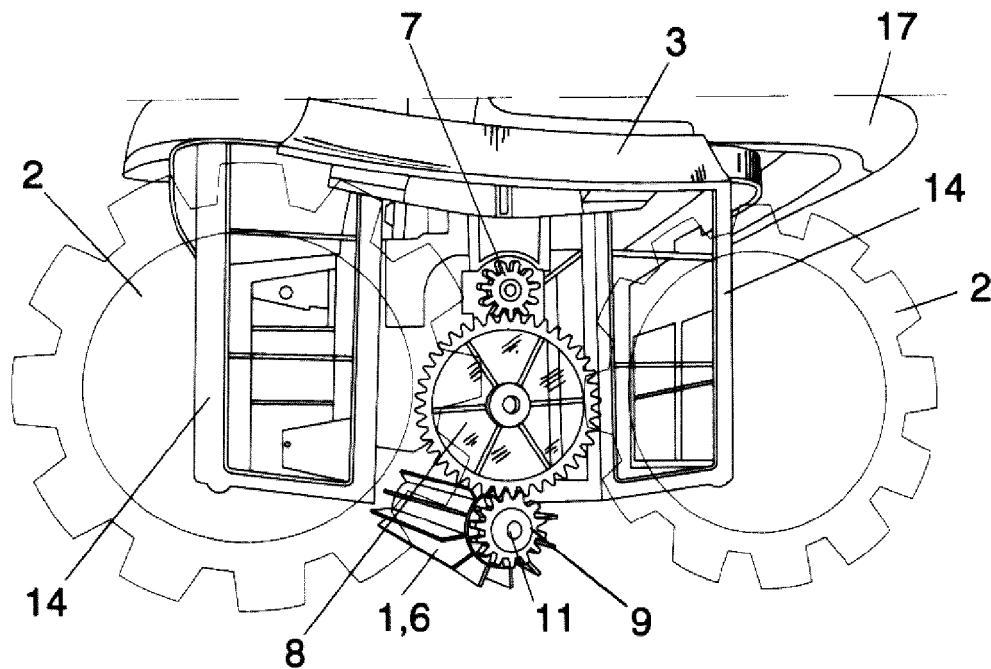


FIG. 3

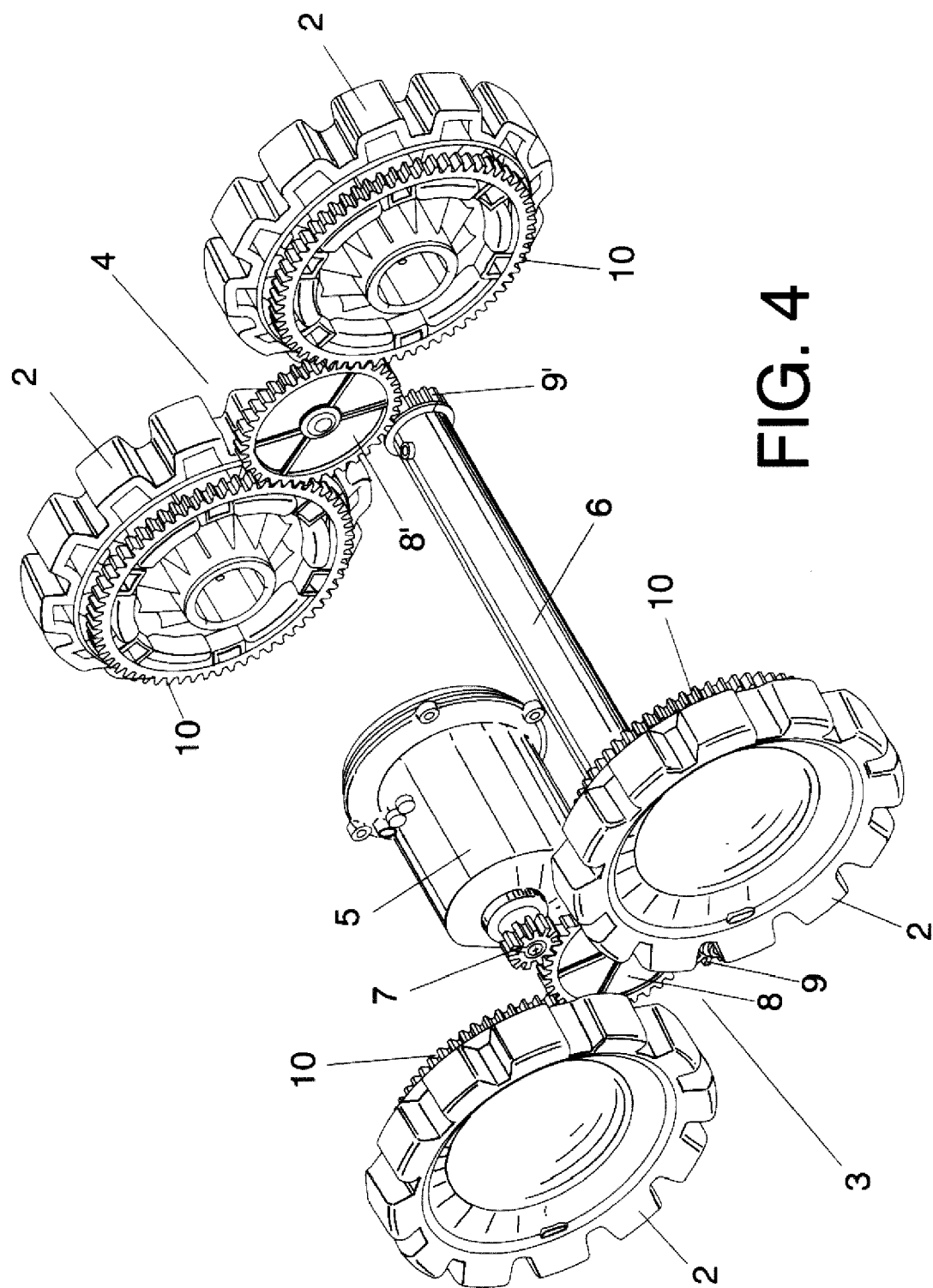


FIG. 4

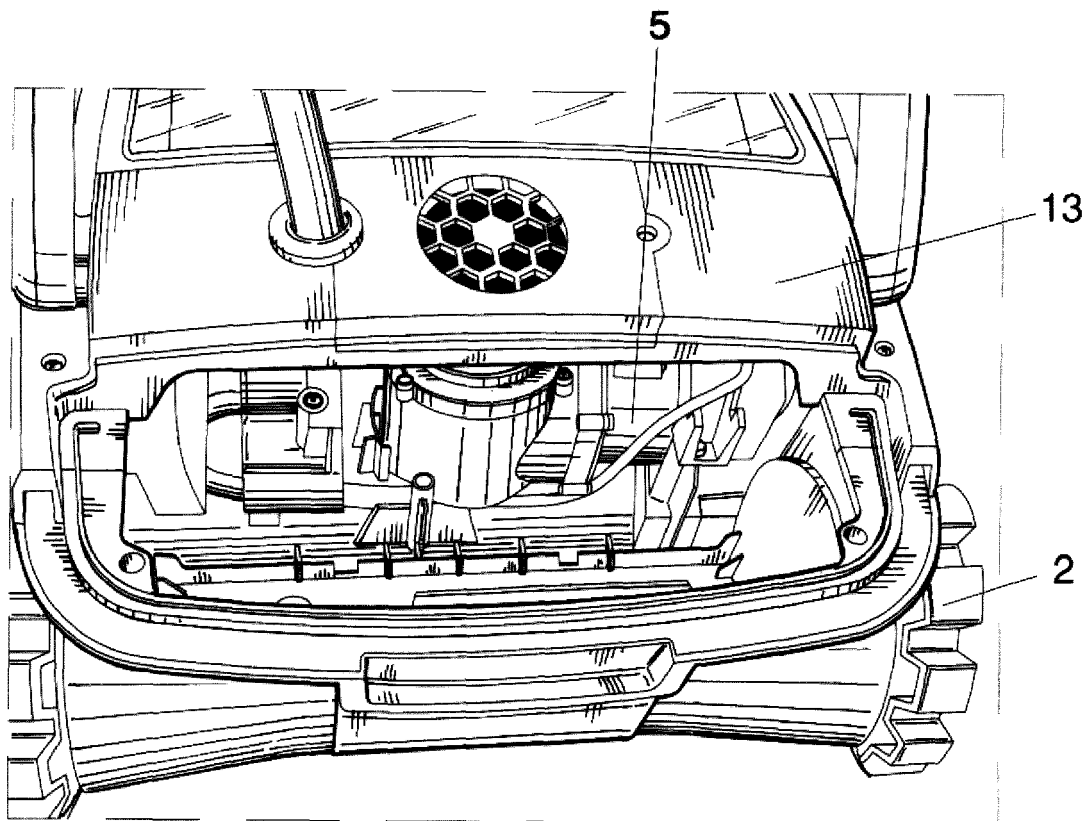


FIG. 5

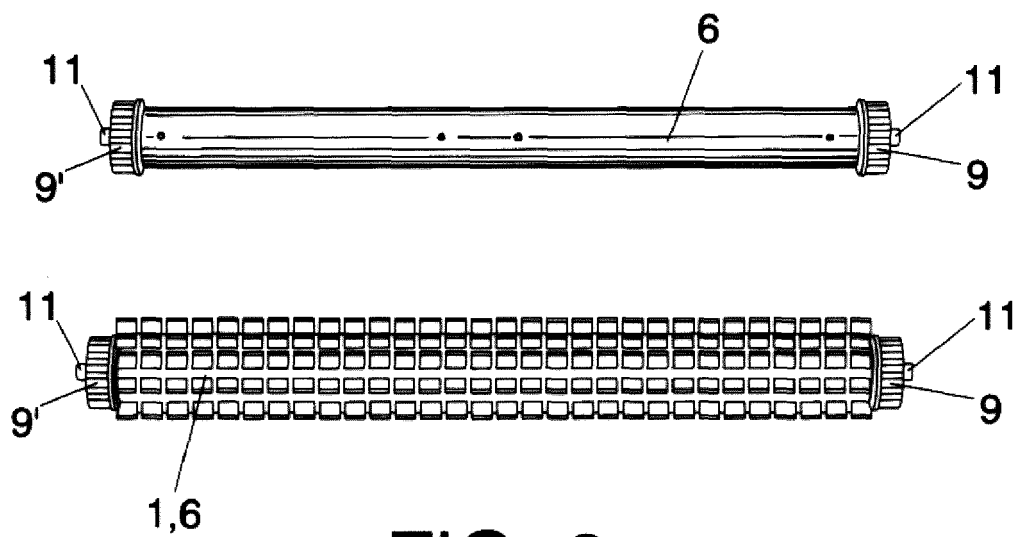


FIG. 6

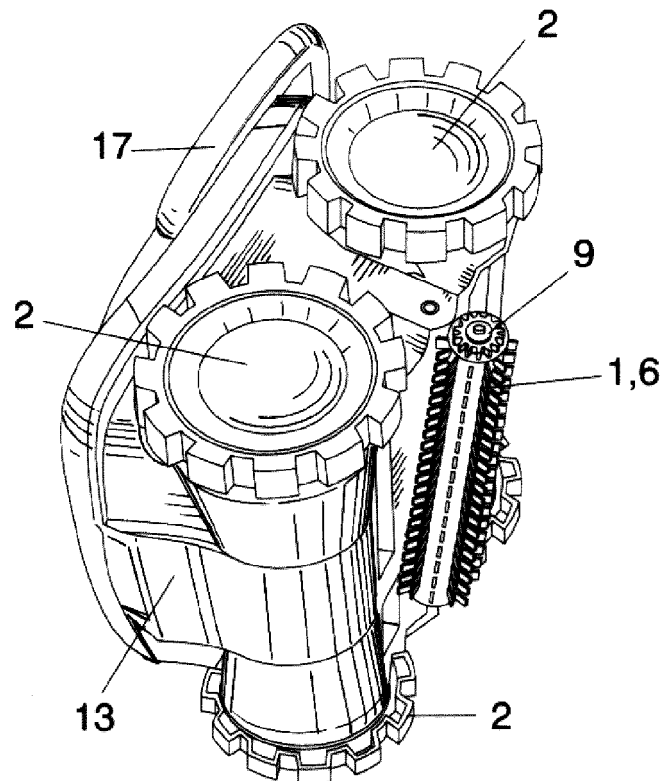


FIG. 7

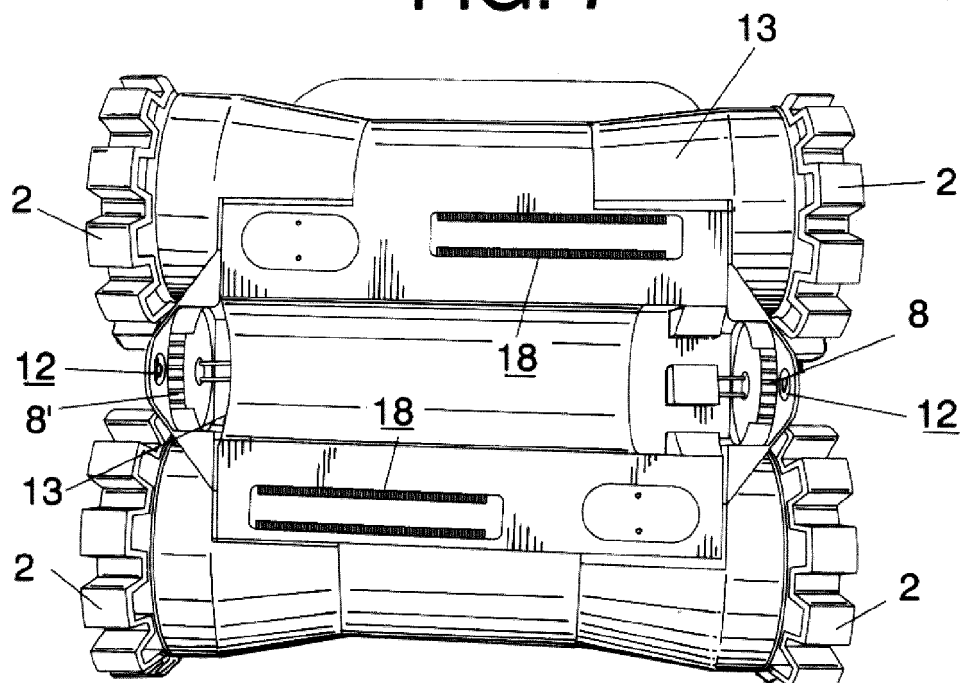


FIG. 8

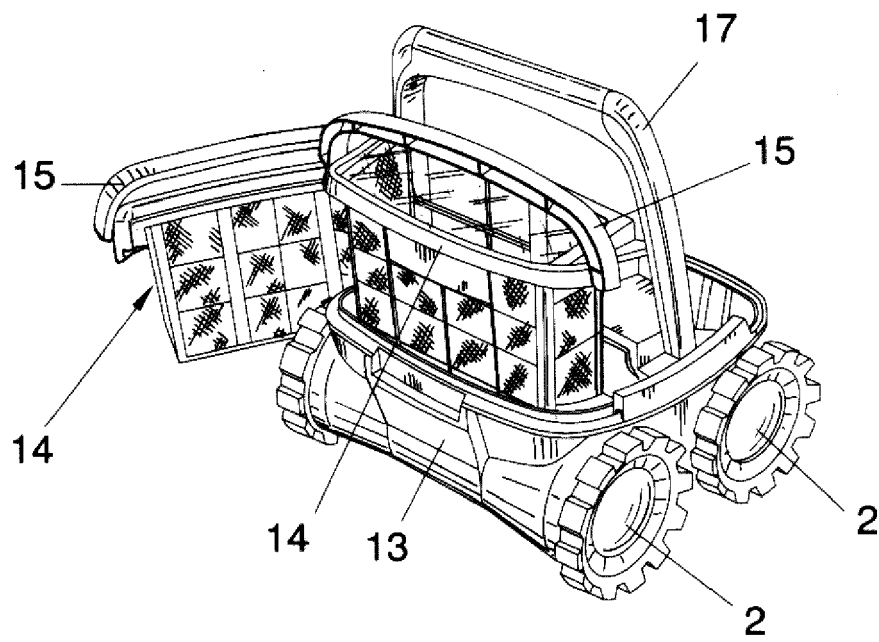


FIG. 9

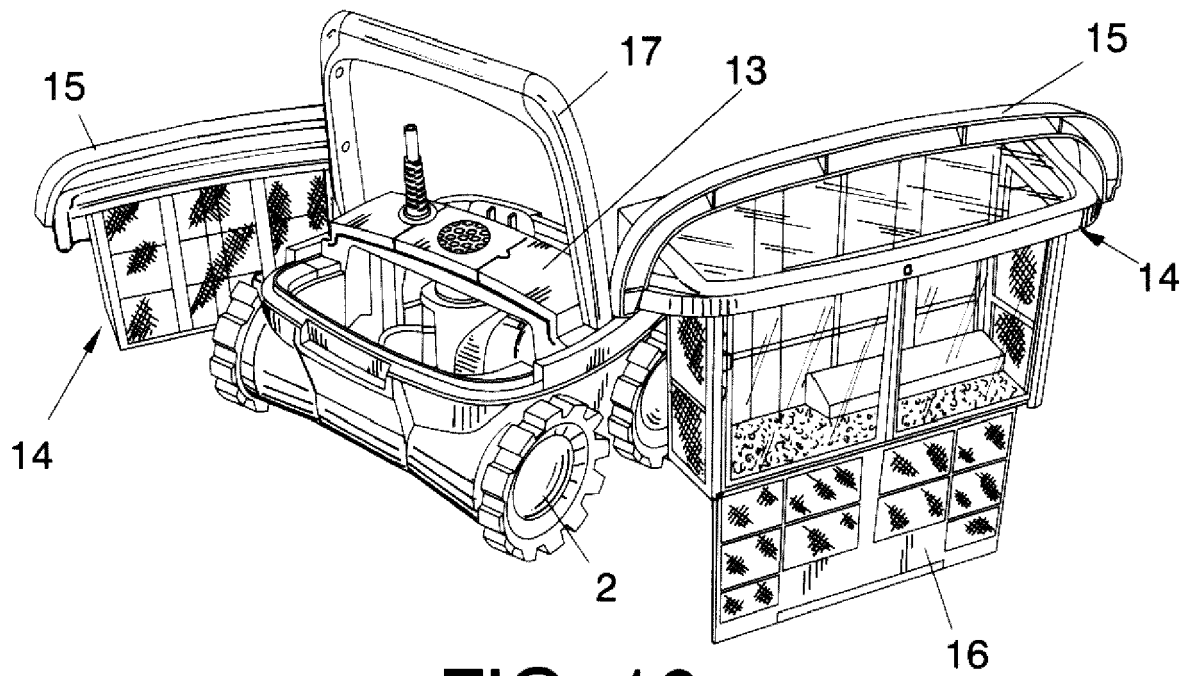


FIG. 10

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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