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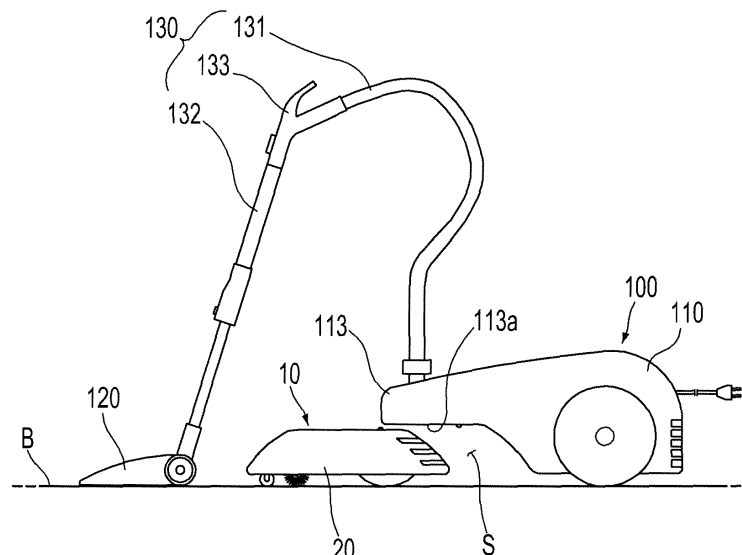
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(54) **Robot cleaning system**

(57) A robot cleaning system having a general cleaning function using a cleaner (100) and a cleaning robot (10) charging function using a cleaning robot. The robot cleaning system includes a cleaner (100) that performs manual cleaning while being moved by a user in an area to be cleaned and a charger (140) to be connected to the cleaning robot (10) that performs automatic cleaning, so

as to charge a rechargeable battery (60) mounted in the cleaning robot (10). A body of the cleaner has a space (S) for receiving the cleaning robot (10) when the cleaning robot (10) returns to the cleaner (100) for the sake of charging. A power terminal (141) is provided at a surface of the body defining the receiving space (S) to supply electric power to the cleaning robot (10).

FIG. 1



Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The invention relates to a robot cleaning system, and, more particularly, to a robot cleaning system having a cleaner for manual cleaning and a cleaning robot with a charger for charging the cleaning robot that performs automatic cleaning.

2. Description of the Related Art

[0002] A cleaner is a device used for cleaning the room and is typically used to remove dust, dirt, and debris in a room. Generally used is a vacuum cleaner for collecting dust and loose debris by a suction force generated from a low-pressure unit. Recently, a cleaning robot, which is designed to remove dust and loose debris from the floor while moving on the floor via self-traveling and without manual operation, has been developed. Hereinafter, the term "automatic cleaning" refers to a cleaning operation performed by a cleaning robot that removes dust and loose debris while moving by itself, whereas the term "manual cleaning" refers to a cleaning operation performed by a person using a vacuum cleaner.

[0003] The cleaning robot contains a rechargeable battery to supply electric power required to drive the cleaning robot, and is combined with a docking station to form a single cleaning system. The docking station is located at a specific place in a room and serves to charge the cleaning robot.

[0004] In spite of an advantage that the cleaning robot can reduce the labor of a person required for manual cleaning, the cleaning robot still has several problems. The automatic cleaning function of the cleaning robot is limited to the floor. The cleaning robot is not successful in automatic cleaning in other areas, for example, the surface of a sofa, shelf, or the like, and therefore, has a limited cleaning area. Moreover, the cleaning robot is smaller than a general vacuum cleaner, and is unable to generate a strong suction force, resulting in insufficient cleaning.

[0005] Due to the above-described problems of the cleaning robot, there still exists a need for a person to manually clean specific places with a general vacuum cleaner rather than the cleaning robot. A cleaning robot cannot reach all places. Additionally, manual cleaning is preferred over a cleaning robot because a cleaning robot lacks adequate power to sufficiently clean all areas.

[0006] Accordingly, a cleaning operation using both automatic cleaning and manual cleaning require the use of the cleaning robot, the docking station, and a general vacuum cleaner. This results in increased costs and reduces the amount of indoor space available.

SUMMARY OF THE INVENTION

[0007] Additional aspects and/or advantages of the invention will be set forth in part in the description which follows and, in part, will be apparent from the description, or may be learned by practice of the invention.

[0008] Therefore, the invention has been made in order to solve the above problems, and it is an aspect of the invention to provide a robot cleaning system having both a general cleaning function using a cleaner and a cleaning robot charging function using a cleaning robot.

[0009] In accordance with one aspect, the invention provides a cleaner configured to perform manual cleaning while being moved by a user in an area to be cleaned, including: a charger to be connected to a cleaning robot that performs automatic cleaning, so as to charge a rechargeable battery mounted in the cleaning robot.

[0010] The cleaner may further include a body having a space for receiving the cleaning robot when the cleaning robot returns to the cleaner for the sake of charging, and the charger may include a power terminal provided at an outer surface of the body to be connected to the cleaning robot.

[0011] The body may have a protruding portion, which protrudes forward to define the cleaning robot receiving space therebelow.

[0012] The power terminal may be located at a lower surface of the protruding portion.

[0013] In accordance with another aspect, the invention provides a cleaner configured to perform manual cleaning while being moved by a user in an area to be cleaned, including: a body having a receiving space for receiving a cleaning robot that performs automatic cleaning, the body including a power terminal mounted at a surface of the body defining the receiving space to supply electric power to the cleaning robot when the cleaning robot is located in the receiving space.

[0014] The body may further include a protruding portion, which protrudes forward from an upper end of the body by a predetermined length to define the receiving space therebelow.

[0015] The power terminal may be located at a lower surface of the protruding portion.

[0016] Additional aspects and/or advantages of the invention will be set forth in part in the description which follows and, in part, will be obvious from the description, or may be learned by practice of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] These and/or other aspects and advantages of the invention will become apparent and more readily appreciated from the following description of the embodiments, taken in conjunction with the accompanying drawings, of which:

FIG. 1 is a side view schematically showing the outer appearance of a cleaner and cleaning robot that re-

turns to the cleaner for charging in accordance with the invention; and

FIG. 2 is a side sectional view showing the inner configuration of the cleaner and cleaning robot of FIG. 1.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0018] Reference will now be made in detail to the embodiment of the invention, an example of which is illustrated in the accompanying drawings, wherein like reference numerals refer to like elements throughout. The embodiment is described below to explain the invention by referring to the figures.

[0019] FIG. 1 is a side view schematically showing the outer appearance of a cleaner and cleaning robot that returns to the cleaner for charging in accordance with the invention. FIG. 2 is a side sectional view showing the inner configuration of the cleaner and cleaning robot of FIG. 1.

[0020] Prior to explaining the configuration of a cleaner in accordance with the invention, the configuration of a cleaning robot 10, which is designed to return to the cleaner when it needs to be charged during automatic cleaning, will be described in brief.

[0021] As shown in FIG. 2, the cleaning robot 10 includes a robot body 20, a suction device 30, a drive device 40, a controller 50, a recognizer (not shown), a rechargeable battery 60, and a battery charge level detector 70.

[0022] The suction device 30 is used to vacuum and collect dust and loose debris, and includes a brush 31, a suction pipe 32, a dust collector 33, and a blower 34. The drive device 40 enables self-traveling of the cleaning robot 10, and includes a driving wheel 41, a driven wheel 42, and a drive motor (not shown) to rotate the driving wheel 41. The recognizer (not shown) includes an obstacle detection sensor, a traveling distance detection sensor, and a camera, and serves to allow the cleaning robot 10 to perform efficient cleaning, traveling, and returning operations. The rechargeable battery 60 has a charging terminal 61 protruding out of the robot body 20, such that it is charged by a commercial alternator when the cleaning robot 10 is connected to a cleaner 100 in accordance with the invention. The battery charge level detector 70 is used to detect a charge level of the rechargeable battery 60 when the cleaning robot 10 returns to the cleaner 100. If the detected charge level reaches a preset lowest level, the detector 70 sends a charge request signal to the controller 50.

[0023] As shown in FIGS. 1 and 2, the cleaner 100 in accordance with the invention includes a body 110 in which a variety of elements are mounted, a suction piece 120 to vacuum dust and loose debris from the floor B, and a connection pipe 130 to connect the body 110 to the suction piece 120, to allow a suction force, generated by the body 110, to be transferred to the suction piece 120.

[0024] The connection pipe 130 includes a suction hose 131 and a suction pipe 132. A handle 133 is interposed between the suction hose 131 and the suction pipe 132. The handle 133 is provided with a variety of buttons to enable easy manipulation. The suction hose 131 is a flexible wrinkled hose having a first end connected to the handle 133 and a second end connected to the body 110. The suction pipe 132 has a first end connected to the suction piece 120 and a second end connected to the handle 133. With this arrangement, a user is able to perform manual cleaning to remove dust and loose debris from the floor while moving freely in a standing posture.

[0025] The body 110 contains a blowing device 111 to provide a suction force required to vacuum dust and loose debris during manual cleaning, and a dust collector 112 to store dust and debris vacuumed. The dust collector 112 may be a dust envelope, or cyclone dust collector that is widely used. Although not shown, the blowing device 111 includes a suction motor, and a fan to be rotated by the suction motor.

[0026] In particular, the cleaner 100 in accordance with the invention is designed to serve as a docking station for charging the rechargeable battery 60 mounted in the cleaning robot 10 that performs automatic cleaning. Accordingly, there is no need for a separate docking station for the cleaning robot 10 that performs automatic cleaning. This prevents an increase in the number of cleaning devices,. The invention reduces costs and the space needed to store and operate the cleaning devices.

[0027] To serve as a docking station, the body 110 of the robot cleaning system 100 in accordance with the invention is configured to have a space S, which is utilized to house the cleaning robot 10 when the cleaning robot 10 returns to the robot cleaning system 100 for the sake of charging. Also, the body 110 contains a charger 140 to charge the rechargeable battery 60 of the cleaning robot 10. The body 110 may have an internal shape selected from among a variety of shapes suitable to receive the cleaning robot 10. In one embodiment, the body 110 may have a protruding portion 113 that protrudes forward by a predetermined length to define the receiving space S therebelow.

[0028] The charger 140 has a power terminal 141 provided at an outer surface of the body 110. The lower terminal 41 is positioned to be connected to the charging terminal 61 of the cleaning robot 10 when the cleaning robot 10 returns to the cleaner 100. Specifically, the power terminal 141 may be located at a lower surface 113a of the protruding portion 113.

[0029] The power terminal 141 is connected to a power cord 150 via an internal transformer and power cable, such that it supplies power to the rechargeable battery 60 as it is connected to the charging terminal 61 of the cleaning robot 10. The power cord 150 is connected to an external commercial alternator when the cleaner 100 serves to charge the cleaning robot 10,.

[0030] Hereinafter, the operation of the cleaning robot and cleaner associated with the subject of the invention

will be explained with reference to the accompanying drawings. In an initial state, the power cord 150 of the cleaner 100 is connected to the external commercial alternator. Also, the cleaning robot 10 is received in the receiving space S that is defined below the protruding portion 113 of the body 110 of the cleaner 100, such that the charging terminal 61 is in a waiting state while being connected to the power terminal 141 of the cleaner 100. Then, if a signal for directing a cleaning operation is transmitted to the cleaning robot 10, the cleaning robot 10 acts to remove dust and loose debris from the floor while moving by itself in an area to be cleaned.

[0031] During the automatic cleaning, the battery charge level detector 70 of the cleaning robot 10 checks the rechargeable battery 60 periodically, so as to send a charge request signal to the controller 50 when the rechargeable battery 60 needs to be charged. If the charge request signal is transmitted to the controller 50, the controller 50 controls the drive device 40 to cause the cleaning robot 10 to return to the receiving space S of the cleaner 100. In this case, the recognizer (not shown) acts to collect a variety of information and to send the information to the controller 50, in order to guide the cleaning robot 10 to a predetermined position. After the cleaning robot 10 returns to the receiving space S, the charging terminal 61 of the cleaning robot 10 is connected to the power terminal 141 that is connected to an external power source via the power cord 150. Thereby, the external power source supplies electric power to charge the rechargeable battery 60 of the cleaning robot 10.

[0032] Meanwhile, to perform manual cleaning, after the cleaning robot 10 is separated from the cleaner 100, the cleaner 100 is moved and steered by a user to remove dust and loose debris from the floor through the suction piece 120.

[0033] As apparent from the above description, the invention provides a cleaner having both a general cleaning function and a cleaning robot charging function. Such a dual function cleaner has the effect of improving effectiveness of both automatic and manual cleaning devices thereof. Accordingly, as compared to the conventional case wherein a plurality of devices required to perform both automatic cleaning and manual cleaning must be prepared, a reduced economic burden and improved space utility can be accomplished.

[0034] Although an embodiment of the invention has been shown and described, it would be appreciated by those skilled in the art that changes may be made in this embodiment without departing from the principles and spirit of the invention, the scope of which is defined in the claims and their equivalents.

Claims

1. A robot cleaning system, comprising:
a cleaner that performs manual cleaning while

being moved by a user in an area to be cleaned;
and
a charger to be connected to a cleaning robot that performs automatic cleaning, so as to charge a rechargeable battery mounted in the cleaning robot.

2. The robot cleaning system according to claim 1, further comprising:

a body having a space for receiving the cleaning robot when the cleaning robot returns to the cleaner for charging,

wherein the charger includes a power terminal provided at an outer surface of the body to be connected to the cleaning robot.

3. The robot cleaning system according to claim 2, wherein the body has a protruding portion, which protrudes forward to define the cleaning robot receiving space therebelow.

4. The robot cleaning system according to claim 3, wherein the power terminal is located at a lower surface of the protruding portion.

5. A cleaner configured to perform manual cleaning while being moved by a user in an area to be cleaned, comprising:

a body having a receiving space receiving a cleaning robot that performs automatic cleaning, the body including a power terminal mounted at a surface of the body defining the receiving space to supply electric power to the cleaning robot when the cleaning robot is located in the receiving space.

6. The cleaner according to claim 5, wherein the body further comprises:

a protruding portion, which protrudes forward from an upper end of the body by a predetermined length to define the receiving space therebelow.

7. The cleaner according to claim 6, wherein the power terminal is located at a lower surface of the protruding portion.

8. The robot cleaning system according to claim 2, wherein the body of the cleaning robot is coupled to the cleaner to perform manual cleaning and automatic cleaning simultaneously.

9. The cleaner according to claim 5, wherein the cleaning robot further comprises:

a battery charge level detector detecting a charge level of a rechargeable battery and transmitting a charge request signal; and a controller receiving the charge request signal indicating a charge level of the rechargeable battery. 5

10. The cleaner according to claim 9, wherein the controller controls a drive device to drive the cleaning robot to the receiving space when the transmitted charge request signal indicates that the charge level is insufficient. 10

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FIG. 1

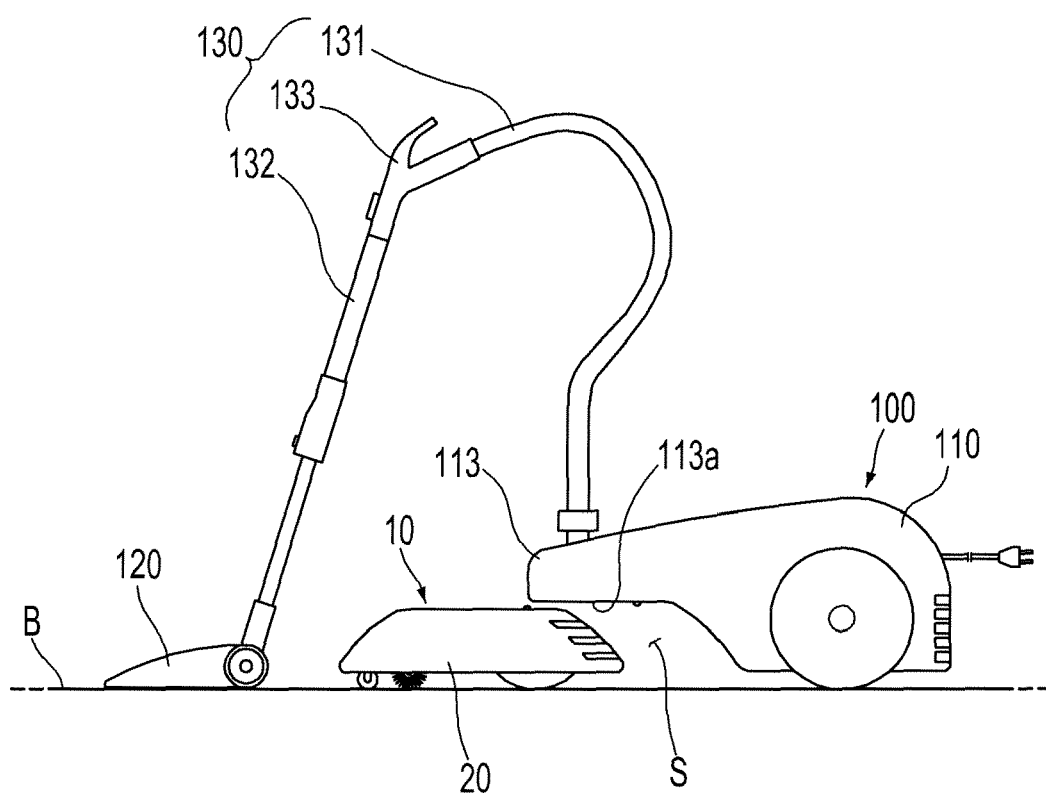


FIG. 2

