In a suction system of a cleaner, by including at least two brushes rotatively installed at a certain side of a suction hole formed at the bottom surface of a cleaner body so as to be connected to a suction pipe and suck dust and filth on a floor, and driving units for rotating the brushes separately, although a size of filth is big or there are lots of filth, it is possible to clean it sufficiently, and accordingly a cleaning performance can be improved.
FIG. 1
CONVENTIONAL ART
SUCTION SYSTEM OF CLEANER

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to a suction system of a cleaner for sucking dust, and in particular to a suction system of a cleaner which is capable of improving a cleaning performance by using two brushes.

[0003] 2. Description of the Prior Art

[0004] In general, a robot cleaner cleans while moving by itself without user’s operation. When power of the cleaner is consumed, the cleaner moves to a charger and charges by itself, after completing the charging it returns to a cleaning area and performs cleaning operation continually.

[0005] FIG. 1 is a sectional view illustrating a robot cleaner in accordance with the conventional art.

[0006] The robot cleaner includes a cleaner body 102; a suction motor 104 disposed in the cleaner body 102 and generating a suction force; a filter container 108 installed on the front of the suction motor 104 and having a filter 106 in order to collect dust or films sucked by the suction force of the suction motor 104; a suction hole 112 formed at the bottom of the cleaner body 102 and connected to the filter container 108 through the suction pipe 110 in order to suck dust or films on a floor 150; a brush 114 rotatively installed at one side of the suction hole 112; and a control unit 116 for performing cleaning operation by moving the cleaner automatically.

[0007] A supersonic waves transmitter 118 for transmitting supersonic waves in moving of the cleaner body 102 and a supersonic waves receiver 120 for receiving supersonic waves emitted from the supersonic waves transmitter 118 are installed at the front of the cleaner body 102. And, a charge terminal 122 is installed at the rear of the cleaner body 102, the charge terminal 122 is contacted to a connecting terminal 126 installed on a wall surface 124 in a room, and accordingly a battery 128 can be changed.

[0008] A luminous element 140 for guiding the charging terminal 122 to the connecting terminal 126 is installed at the rear of the cleaner body 102, and a light receiving element 142 for receiving optical signals emitted at the luminous element 140 is installed on the indoor wall surface 124 at which the connecting terminal 126 is installed.

[0009] A driving roller 130 operated according to a signal of the control unit 116 and an assist roller 132 for supporting the rear of the cleaner body 130 are installed at the bottom portion of the cleaner body 102.

[0010] A hinge shaft 136 is rotatively connected to one side of the suction hole 112 for rotatively supporting the brush 114, and receives a driving force from a driving unit (not shown).

[0011] The operation of the cleaner in accordance with the conventional art will be described.

[0012] When a user pushes an operation button, power of the battery 128 is transmitted to the suction motor 104, and the suction motor 104 is operated. By the driving force of the suction motor 104, dust and filth on the floor are sucked into the suction hole 112 and are collected in the filter 106 through the suction pipe 110. Herein, the brush 114 sweeps up dust and film on the floor into the suction hole 112. And, the driving roller 130 is operated according to a signal applied from the control unit 116, the cleaner body 102 is moved, and accordingly the cleaning operation is performed automatically.

[0013] The cleaner body 102 can avoid obstacles by the operation of the supersonic waves transmitter 118 and the supersonic waves receiver 120 arranged on the front of the cleaner body 102.

[0014] While performing the cleaning operation, when a voltage level of the battery 128 is not greater than a certain set level, the control unit 116 stops the cleaning operation, moves the cleaner body 102 to the wall surface 124 at which the contact terminal 126 is connected, connects the charge terminal 122 formed at the rear of the cleaner body 102 to the contact terminal 126, and accordingly the battery 128 can be charged.

[0015] When the charge is completed, the control unit 116 separates the charge terminal 122 from the contact terminal 126 and performs the cleaning operation again.

[0016] However, in the conventional cleaner, because it has to sweep up film on the floor with one brush, when film is big, it is difficult to sweep and suck the film. In addition, if there are lots of films, it is difficult to sweep up them all, and accordingly a cleaning efficiency may be lowered.

[0017] In order to solve the problems, when a capacity of a suction motor is increased to enforce a suction force, it may cause increase of energy consumption, fabrication cost and noise.

SUMMARY OF THE INVENTION

[0018] In order to solve the above-mentioned problem, it is an object of the present invention to provide a suction system of a cleaner which is capable of improving a cleaning performance by sweeping up filth sufficiently even if the film is big or there are lots of filth by operating plural brushes separately.

[0019] In order to achieve the above-mentioned object, a suction system of a cleaner in accordance with the present invention includes a suction motor disposed in a cleaner body for generating a suction force; a filament connected to the suction motor for collecting dust and film; a suction hole formed at the bottom of the cleaner body and connected to the filter through the suction pipe in order to suck dust and film on a floor; at least two brushes rotatively installed at a certain side of the suction hole for sweeping up film on the floor into the suction hole; and driving units for rotating the brushes separately.

[0020] The brushes consist of a first brush and a second brush arranged at the suction hole so as to face each other with a certain interval.

[0021] A first hinge shaft and a second hinge shaft are fixed in the length direction of the first and second brushes, the both ends of the first and second hinge shafts are rotatively installed at the certain side of the suction hole, and the first and second hinge shafts are respectively connected to the driving units.

[0022] The driving units consist of a first driving unit for rotating the first hinge shaft and a second driving unit for rotating the second hinge shaft.
The first and second driving units respectively include a first and a second driving motors operated in a forward direction and a reverse direction according to a signal applied from a control unit; and a power transmitting unit connected between the first and second driving motors and the first and second hinge shafts in order to transmit the rotational force of the first and second driving motors to the first and second hinge shafts.

The power transmitting unit includes driving pulleys respectively fixed to the rotational shafts of the first and second driving motors; driven pulleys respectively fixed to the first and second hinge shafts; and belts wound between the driving pulleys and the driven pulleys.

The belt is a timing belt.

The power transmitting unit includes driving gears respectively fixed to the rotational shafts of the first and second driving motors; and driven gears respectively engaged with the driving gears and fixed to the first and second hinge shafts.

In a robot cleaner having a suction hole for sucking dust and filth and performing cleaning operation while moving by itself, a suction system of a cleaner includes at least two brushes rotatively installed at a certain side of a suction hole and sweeping up filth into the suction hole; and a driving unit for rotating the brushes separately.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this specification, illustrate embodiments of the invention and together with the description serve to explain the principles of the invention.

In the drawings:

FIG. 1 is a sectional view illustrating a robot cleaner in accordance with the conventional art;

FIG. 2 is a sectional view illustrating a robot cleaner in accordance with the present invention;

FIG. 3 is a bottom view illustrating the robot cleaner in accordance with the present invention;

FIG. 4 is a sectional view illustrating a suction system of the robot cleaner in accordance with the present invention;

FIGS. 5 and 6 are sectional view illustrating an operation state of the suction system of the robot cleaner in accordance with the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Hereinafter, embodiments of a suction system of a robot cleaner in accordance with the present invention will be described with reference to accompanying drawings.

There can be plural embodiments, hereinafter the preferred embodiment will be described.

FIG. 2 is a sectional view illustrating a robot cleaner in accordance with the present invention.

The robot cleaner in accordance with the present invention includes a cleaner body 2 having a certain space; a suction system 4 disposed in the cleaner body 2 in order to suck and collect dust on a floor; and a control unit 6 disposed in the cleaner body 2 and controlling the cleaner.

A driving roller 2 operated according to a signal of the control unit 6 and an assist roller 10 for supporting the rear of the cleaner body 2 are installed at the bottom portion of the cleaner body 2.

And, a supersonic waves transmitter 12 for transmitting supersonic waves in moving of the cleaner body 2 and a supersonic waves receiver 14 for receiving supersonic waves from the supersonic waves transmitter 118 are installed at the front of the cleaner body 2. And, a charging terminal 18 is installed at the rear of the cleaner body 2, the charging terminal 18 is contacted to a connecting terminal 20 installed on a wall surface in the room, and accordingly a battery 16 can be charged.

The suction system 4 includes a suction motor 22 disposed in the cleaner body 2 for generating a suction force; a filter container 26 connected to the suction motor 22 and having a filter 24 to collect dust and filth; a suction hole 30 formed at the bottom of the cleaner body 2 and connected to the filter container 26 through the suction pipe 28 in order to suck dust and filth; at least two brushes 32, 34 installed at a certain side of the suction hole 30, taking off filth stuck onto a floor and sweeping up them into the suction hole 30; and driving units 36, 38 installed at a certain side of the cleaner body 2 for driving the brushes 32, 34 separately.

The first brush 32 and the second brush 34 are arranged at a certain side of the suction hole 30 so as to face each other with a certain interval, a first hinge shaft 40 and a second hinge shaft 42 are fixed in the length direction of the first and second brushes 32, 34. And, the both ends of the first and second hinge shafts 40, 42 are rotatively installed at the both sides of the suction hole 30 respectively.

And, as depicted in FIG. 3, the first driving unit 36 for rotating the first hinge unit 40 and the second driving unit 38 for driving the second hinge shaft 42 drive the first and second brushes 32, 34 respectively.

Herein, the first and second driving units 36, 38 respectively include a first and a second driving motors 46, 48 operated in a forward direction and a reverse direction according to a signal applied from the control unit 6; and a power transmitting unit connected between the first and second driving motors 46, 48 and the first and second hinge shafts 40, 42 in order to transmit the rotational force of the first and second driving motors 46, 48 to the first and second hinge shafts 40, 42.

The power transmitting unit includes driving pulleys 50, 52 respectively fixed to the rotational shafts of the first and second driving motors 46, 48; driven pulleys 54, 56 respectively fixed to the first and second hinge shafts 40, 42; and timing belts 58, 60 wound between the driving pulleys 50, 52 and the driven pulleys 54, 56.

The operation of the suction system of the cleaner in accordance with the present invention will be described.

When a user turns on an operation switch of the cleaner, power of a battery 16 is applied to the suction motor 22, the suction motor 22 is operated, a suction force is generated in the suction motor 22 driven by the battery 16, and then the filth and dust are sucked up into the suction hole 30 by the suction motor 22 through the filter 24.

The suction hole 30 is connected to the filter container 26, the filter 24 of the filter container 26 is separated from the suction hole 30 by a filter cover 70, and the dust and filth sucked up into the suction hole 30 are sent into the filter 24 and are stored in the filter container 26 through the filter cover 70.
generated by the operation of the suction motor 22, and accordingly dust and filth on the floor are sucked and collected into the filter 24 through the suction pipe 28.

[0048] And, as depicted in FIG. 4, when the control unit 6 applies power to the first and second driving motors 46, 48, the first and second driving motors 46, 48 are operated. When a driving force is transmitted to the first and second hinge shafts 40, 42 by the power transmitting unit, the first brush 32 is rotated in a P direction, the second brush 34 is rotated in a Q direction, and accordingly filth on the floor is taken away and is sucked into the suction hole 30. The filth sucked into the suction hole 30 is collected in the filter 24 through the suction pipe 28 by the suction force of the suction motor 22.

[0049] Herein, the first and second brushes 32, 34 are operated separately by the first and second driving units 36, 38 and are controlled separately by the control unit 6, and accordingly each driving direction is adjusted according to cleaning conditions.

[0050] In case of cleaning a carpet, as depicted in FIG. 5, tangle of the carpet can be prevented by rotating the first and second brushes 32, 34 in the same direction as the R direction.

[0051] And, as depicted in FIG. 6, when filth is stuck between the first and second brushes 32, 34 due to large volume thereof, the first brush 32 is rotated in a S direction, the second brush 34 is rotated in a T direction, and accordingly the filth can be taken off.

[0052] As described above, it is possible to control the first and second brushes 32, 34 separately according to cleaning conditions and circumstances.

[0053] In another embodiment, the power transmitting unit consists of driving gears respectively fixed to the rotational shafts of the first and second driving motors; and driven gears respectively engaged with the driving gears and fixed to the first and second hinge shafts.

[0054] The above-described suction system of the cleaner is not limited for the robot cleaner but can be used for a general cleaner within its spirit and scope as defined in the appended claims.

[0055] In the suction system of the cleaner in accordance with the present invention, a first and a second brushes are arranged at a suction hole so as to face each other and be operated respectively by a first and a second driving units, although a size of filth is big or there are lots of filth, it is possible to clean it sufficiently, and accordingly a cleaning performance can be improved.

[0056] In addition, by operating the first and second brushes separately with the first and second driving units, rotation direction of the first and second brushes can be differently controlled according to cleaning conditions, and accordingly it is possible to cope with cleaning circumstances appropriately and facilitate cleaning.

What is claimed is:

1. A suction system of a cleaner, comprising:

   a suction motor disposed in a cleaner body for generating a suction force;

   a filter connected to the suction motor for collecting dust and filth;

   a suction hole formed at the bottom of the cleaner body and connected to the filter through the suction pipe in order to suck dust and filth on a floor;

   at least two brushes rotatively installed at a certain side of the suction hole for sweeping up filth on the floor into the suction hole; and

   driving units for rotating the brushes separately.

2. The suction system of claim 1, wherein the brushes consist of a first brush and a second brush arranged at the suction hole so as to face each other with a certain interval.

3. The suction system of claim 2, wherein a first hinge shaft and a second hinge shaft are fixed in the length direction of the first and second brushes, the both ends of the first and second hinge shafts are rotatively installed at the certain side of the suction hole, and the first and second hinge shafts are respectively connected to the driving units.

4. The suction system of claim 3, wherein the driving units consist of a first driving unit for rotating the first hinge shaft and a second driving unit for rotating the second hinge shaft.

5. The suction system of claim 4, wherein the first and second driving units respectively include a first and a second driving motors operated in a forward direction and a reverse direction according to a signal applied from a control unit; and a power transmitting unit connected between the first and second driving motors and the first and second hinge shafts in order to transmit the rotational force of the first and second driving motors to the first and second hinge shafts.

6. The suction system of claim 5, wherein the power transmitting unit includes driving pulleys respectively fixed to the rotational shafts of the first and second driving motors; driven pulleys respectively engaged with the driving gears and fixed to the first and second hinge shafts; and belts wound between the driving pulleys and the driven pulleys.

7. The suction system of claim 6, wherein the belt is a timing belt.

8. The suction system of claim 5, wherein the power transmitting unit includes driving gears respectively fixed to the rotational shafts of the first and second driving motors; and driven gears respectively engaged with the driving gears and fixed to the first and second hinge shafts.

9. In a robot cleaner having a suction hole for sucking dust and filth and performing cleaning operation while moving by itself, a suction system of a cleaner, comprising:

   at least two brushes rotatively installed at a certain side of a suction hole and sweeping up filth into the suction hole; and

   a driving unit for rotating the brushes separately.

10. The suction system of claim 9, wherein the brushes consist of a first brush and a second brush arranged on the suction hole so as to face each other with a certain interval.

11. The suction system of claim 10, wherein a first hinge shaft and a second hinge shaft are fixed in the length direction of the first and second brushes, the both ends of the first and second hinge shafts are rotatively installed at the certain side of the suction hole, and the first and second hinge shafts are respectively connected to the driving units.
12. The suction system of claim 11, wherein the driving units consist of a first driving unit for rotating the first hinge shaft and a second driving unit for rotating the second hinge shaft.

13. The suction system of claim 12, wherein the first and second driving units respectively include a first and a second driving motors operated in a forward direction and a reverse direction according to a signal applied from a control unit; and a power transmitting unit connected between the first and second driving motors and the first and second hinge shafts in order to transmit the rotational force of the first and second driving motors to the first and second hinge shafts.

14. The suction system of claim 13, wherein the power transmitting unit includes driving pulleys respectively fixed to the rotational shafts of the first and second driving motors; driven pulleys respectively fixed to the first and second hinge shafts; and belts wound between the driving pulleys and the driven pulleys.

15. The suction system of claim 14, wherein the belt is a timing belt.

16. The suction system of claim 13, wherein the power transmitting unit includes driving gears respectively fixed to the rotational shafts of the first and second driving motors; and driven gears respectively engaged with the driving gears and fixed to the first and second hinge shafts.