

DESCRIPTION

WALKING TYPE INTELLIGENT ROBOT CLEANING DEVICE

5 Technical Field

The present invention relates to a walking type intelligent robot cleaning device and, more particularly, a walking type intelligent robot cleaning device that can very simply and intelligently remove various wastes on roads through
10 an automatic or manual mode while running in step with a worker, that allows a worker to manually clean up small spaces or corners while walking, especially, to efficiently clean up the spaces that street sweeper trucks have difficulty in reaching such as walkways, parks, and side streets, and that is
15 environmentally friendly by saving fuel and reducing noise and carbon by being operated by electricity.

Background Art

In general, waste (hereafter, referred to as 'road
20 waste'), such as fallen leaves and sand on common roads, highways, parking lots, large complexes, runways of airfields, and playing fields, is usually cleaned by street sweeper trucks equipped with cleaning equipment.

Even though road waste is cleaned up by street sweeper
25 trucks, dust or worn off pieces of vehicle tires are left on

the roads. Such dust and debris, which fly up into the air every time a vehicle passes by, are the main factors contaminating the atmosphere.

Street sweeper trucks for cleaning streets are classified
5 into a type that sprays water at high pressure and a type that cleans road waste such as dirt, soil, and fallen leaves accumulating in streets, using horizontally rotating rotary brushes mounted at both sides of a vehicle.

However, neither the spray type street sweeper nor the
10 rotary brush type street sweeper can load road waste onto the vehicle and can just push road waste to the sides of streets, so specific manpower has to be used to remove the debris, that is, two steps are needed.

Recently, a street cleaning device such as a garbage truck
15 that takes collected waste in a specific container has been proposed. For example, there is a "Cleaning device of surface cleaning vehicles" in Korean Patent Application Publication No. 10-2009-0063642. The cleaning device, as shown in FIG. 1, includes a roller brush 110, a dustpan 120, a sub-dust
20 collector 130, a main dust collector 140, a first suction fan 150, and a suction mouth 160, which are mounted on a vehicle body frame 100, in which the roller brush 110 is rotated by a driving motor to collect road waste forward and the road waste is collected onto the dustpan 120, so this configuration is
25 relatively complicated.

That is, since the structure of this cleaning device is complicated, the device is difficult to use for side streets around various public places, such as a school, and narrow streets such as the cart paths in a golf course, except for
5 common streets and cannot clean small spaces and corners. Further, it is required to manufacture a special vehicle by modifying an existing common vehicle to mount various cleaning facilities, so the manufacturing cost is very high, it is very inconvenient to handle and use the device, and the cost of
10 maintenance is increased by the cost of repairing when the device is broken due to complicated electronic equipment. Furthermore, high-power trucks are usually modified, so they consume a large amount of fuel and produce pollution and noise.

15 Disclosure

Technical Problem

In order to solve the problems in the related art, an object of the present invention is to provide a walking type intelligent robot cleaning device that can very simply and
20 intelligently take away various wastes on roads through an automatic or manual mode while running in step with a worker, that allows a worker to manually clean up small spaces or corners while walking, especially, to efficiently clean up the spaces that street sweeper trucks have difficulty in reaching
25 such as walkways, parks, and side streets, and that is

environmentally friendly by saving fuel and reducing noise and carbon by being operated by electricity.

Technical Solution

5 In order to achieve the objects of the present invention, a walking type intelligent robot cleaning device for collecting waste on a road includes: a vehicle body frame having wheels on a bottom and a steering handle for steering the wheels; a driving unit for operating the wheels; a containing unit having
10 a predetermined internal space and mounted on the vehicle body frame; a suction unit including a suction body having an intake port for sucking waste on a road and an exit port for discharging the waste sucked through the intake port, a main body housing having an air induction space therein and having
15 an inlet and an outlet communicating with the air induction space, the inlet connected to the exit port of the suction body, and supported on the vehicle body frame, a discharge pipe having a first end connected to the outlet of the main body housing and a second end extending from the containing unit, a
20 rotary fan disposed in the air induction space of the main body housing to guides a flow of air flowing inside through the intake port of the suction body to the containing unit, and a driving motor connected to the rotary fan through a rotary shaft and supplying power to rotate the rotary fan; and a
25 control unit controlling operation of the driving unit and the

suction unit in an automatic or manual mode, in which the suction body includes a suction duct that is a flexible tube and has a exit port detachably connected to the inlet of the main body housing, a caster that is supported on a side of the
5 suction duct in rolling contact with a road such that the intake port of the suction duct is spaced at a predetermined distance from the road, and a working handle that is elongated on a side of the suction duct.

The walking type intelligent robot cleaning device may
10 further include a sensor unit including a collision sensor for sensing distances from obstacles around the vehicle body frame, in which the control unit may make and display a warning about a collision with an obstacle to the outside when a distance measured by the collision sensor is a predetermined distance or
15 less, and may stop the driving unit when the distance is a predetermined distance or less.

The sensor unit may further include a limit sensor for measuring a load of waste in the containing unit, and the control unit may stop the driving motor when the waste in the
20 containing unit exceeds a predetermined load.

The vehicle body frame may further include a cradle for stowing the suction duct; the sensor unit may further include an approach sensor for sensing a distance from the intake port of the suction duct and the ground and a suction duct sensor
25 for sensing whether the suction duct is placed on the cradle;

and the control unit, in the automatic mode, may operate the driving unit and the driving motor when a distance sensed by the approach sensor is a predetermined value or less, may stop the driving unit and decelerate the driving motor to a
5 predetermined speed when a distance measured by the approach sensor is a predetermined value or more, and may stop the driving motor when the suction duct sensor senses a stowing signal.

The sensor unit may further include a range sensor
10 disposed adjacent to the intake port of the suction duct and an entering sensing unit disposed on a side of the containing unit to send a signal to the range sensor when the range sensor enters a predetermined range, and the control unit, in the automatic mode, may stop the driving unit when the entering
15 sensing unit reaches a predetermined range set in the range sensor, and may start the driving unit when the entering sensing unit comes out of a predetermined range set in the range sensor.

20 **Advantageous Effects**

According to the intelligent walking cleaning robot, it is possible to very simply take away various wastes on roads intelligently through an automatic or manual mode while running in step with a worker, to allow a worker to manually clean up
25 small spaces or corners while walking, especially, to

efficiently clean up the spaces that street sweeper trucks have difficulty in reaching such as walkways, parks, and side streets, and to save fuel and reduce noise and carbon by being operated by electricity.

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Description of Drawings

FIG. 1 is a side view showing a street sweeper truck of the related art.

FIG. 2 is a side view showing a walking type intelligent robot cleaning device according to an embodiment of the present invention.

FIG. 3 is a front view showing the walking type intelligent robot cleaning device according to an embodiment of the present invention.

15 FIG. 4 is a plan view showing the walking type intelligent robot cleaning device according to an embodiment of the present invention.

FIG. 5 is a side view showing a walking type intelligent robot cleaning device according to another embodiment of the present invention.

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<Description of the Reference Numerals in the Drawings>

1: Intellegent robot cleaning device

10: Vehicle body frame

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11: Wheel

12: Steering handle

	13: Cradle	20: Driving unit
	21: Running motor	30: Containing unit
	40: Suction unit	41: Suction body
	411: Suction pipe	412: Rotary brush
5	413: Suction duct	414: Caster
	415: Working handle	42: Main body housing
	43: Discharge pipe	44: Rotary fan
	45: Driving motor	50: Sensor unit
	51: Collision sensor	52: Limit sensor
10	53: Approach sensor	54: Suction duct sensor
	55: Range sensor	55a: Entering sensing unit
	60: Control unit	

Mode for Invention

15 Hereinafter, a walking type intelligent robot cleaning device (hereafter, referred to as 'intelligent robot cleaning device') according to the present invention will be described in detail with reference to exemplary embodiments shown in the accompanying drawings.

20 FIG. 2 is a side view showing a walking type intelligent robot cleaning device according to an embodiment of the present invention, FIG. 3 is a front view showing the walking type intelligent robot cleaning device according to an embodiment of the present invention, FIG. 4 is a plan view showing the
 25 walking type intelligent robot cleaning device according to an

embodiment of the present invention, and FIG. 5 is a side view showing a walking type intelligent robot cleaning device according to another embodiment of the present invention.

Referring to the figures, an intelligent robot cleaning
5 device according to an embodiment of the present invention, which is an intelligent street cleaning device for taking away waste on a road, includes a vehicle body frame 10, a driving unit 20, a containing unit 30, a suction unit 40, a sensor unit 50, and a control unit 60.

10 The vehicle body frame 10 is the frame of the intelligent robot cleaning device for supporting the driving unit 20, the containing unit 30, the suction unit 40, the sensing unit 50, and the control unit 60, which will be described below.

The intelligent robot cleaning device 1 of the present
15 invention is characterized in that a worker can clean a road by walking with the intelligent robot cleaning device since the sizes of the parts the device are reduced in comparison to the existing street sweeper trucks.

Wheels 11 for driving are coupled to the bottom of the
20 vehicle body frame 10 and a steering handle 12 that can steer the wheels 11 is disposed at the rear, so a worker can drive the robot device.

The driving unit 20 operates the wheels 11 so that the vehicle body frame 10 can be moved.

The driving unit 20 may include a running motor 21 connected to the wheels 11 and supplying power to them. The motor 21 may be operated by a battery 22 and the battery 22 operate the running motor 21 for a predetermined time by simply
5 being charged, so the intelligent robot cleaning device 1 of the present invention does not generate contaminants and noise.

The containing unit 30, which has a predetermined inside space and is mounted on the vehicle body frame 10, provides a wide rectangular space so that road waste can be collected
10 through the suction unit 30 to be described below, and it will be described in detail with the suction unit 40.

The suction unit 40 may include a suction body 41, a main body housing 42, a discharge pipe 43, a rotary fan 44, and a driving motor 45.

15 Further, the suction body 41 according to an embodiment of the present invention may include a suction pipe 411 and rotary brushes 412.

Referring to FIGS. 2 and 3, the suction pipe 311 has an intake port 411a spaced at a predetermined height from the
20 ground and an exit port 411b for discharging the waste sucked through the intake port 411a.

The rotary brushes 412 are disposed in a pair in parallel with a predetermined gap under and ahead of the front of the vehicle body frame 10 to collect various road wastes, such as

fallen leaves and sand into the intake port 411a of the suction pipe 411, and can be vertically moved and rotated.

Referring to FIGS. 2 to 4, the rotary brushes 412 collect waste on a road by rotating in opposite directions toward the
5 intake port 411a so that the road waste can be easily sucked through the suction pipe 411 while the vehicle body frame 10 moves forward or backward.

In an embodiment of the present invention, the suction pipe 411 is elongated in the direction in which the intake port
10 411a is disposed across a road, that is, in the width direction with respect to the forward direction of the vehicle body frame 10, and the inside of the suction pipe gradually narrows in a cylindrical shape toward the exit port 411b from the intake port 411a.

15 This structure is similar to the structure of a vacuum cleaner and has been designed to obtain the effect that when a pressure difference is generated between the intake port 411a and the exit port 411b by a suction force produced by the rotary fan 44 rotating, which will be described below, air
20 flows to the lower-pressure portion and road waste can be sucked together with the air.

The main body housing 42 houses the rotary fan 44 to make the inside of the suction pipe 411 vacuum when the rotary fan 44 is rotated.

The main body housing 41, which may be fixed to the vehicle body frame 10 by brackets, covers the rotary fan 44 to protect it and has an air induction space with an inner wall 42a adjacent to the rotary fan 44 therein.

5 The main body housing 42 has an inlet 42b and an outlet 42c that communicate with the air induction space, in which the inlet 42b is connected to the exit port 511b of the suction pipe 411 and the outlet 42c is open to the side of the rotary fan 44.

10 A discharge pipe 43 for collecting waste, which is sucked through the suction pipe 411 and discharged through the outlet 42c of the main body housing 42, into the containing unit 30, has a side connected to the outlet 42c of the main body housing 42 and the other side extending into the containing unit 30
15 like an extendable corrugated pipe.

As the rotary fan 44 is disposed and rotated in the air induction space inside the main body housing 42, it generates a pressure difference between the suction pipe 411 and the discharge pipe 43 so that road waste is sucked into the suction
20 pipe 411 and airflow can be induced toward the containing unit 40.

The rotary fan 44 is vertically disposed with the center facing the front of the exit port 411b, a central shaft 44a having the same center as the exit port 411b is disposed
25 horizontally in the front-rear direction at the center, and a

plurality of blades 44b rotating around the exit port 411b is arranged around the central shaft 44a.

The blades 44b of the rotary fan 44 are rotated at a high speed to suck air into the main body housing 42 so that the
5 inside of the suction pipe 411 is made vacuum and the air sucked into the main body housing 44 by rotation of the blades 44b is guided by the inner wall 42a of the main body housing 42 and discharged to the outlet 42c. That is, the blades generate airflow around the air induction space of the main body housing
10 42.

The driving motor 45 is connected to the rotary fan 44 through a rotary shaft 45a and supplies power to rotate the rotary fan 44.

The driving motor 45 is fixed to the top of the vehicle
15 body frame 10 and can rotate the rotary fan 44 through the rotary shaft 45a coupled in the front-rear direction to the central shaft 44a of the rotary fan 44.

Further, the driving motor 45 may be electrically connected to the battery 22 to be operated, so it can be
20 electrically operated not to generate contaminants and noise along with the running motor 21

In the intelligent robot cleaning device 1 according to an embodiment of the present invention, a cutting portion 44c such as saw teeth protruding toward the exit port 411b may be formed
25 on the blades 44b of the rotary fan 44.

The cutting portions 44c may protrude toward the front from the ends of the blade 44b so that when large road waste such as fallen leaves are sucked into the air induction space of the main body housing 42b through the suction pipe 411, the
5 waste can be cut by the cutting portions 44c of the rotary blades 44b rotated at a high speed.

That is, fallen leaves etc. sucked into the main body housing 42 are guided by the inner wall 42a of the air induction space of the main body housing 42 by the airflow
10 generated by the blades 44b rotated at a high speed, and in this process, the fallen leaves 44c hit against the cutting portions 44c and are cut, so road waste collected in the containing unit 30 can be easily processed.

Further, the intelligent robot cleaning device 1 of the
15 present invention further includes the sensor unit 50 including a collision sensor 51 for detecting the distances from obstacles around the vehicle body frame 10.

The control unit 60 automatically or manually controls operation of the driving unit 20 and the suction unit 40.

20 First, the control unit 60 may include a main controller 61 at the rear of the vehicle body frame 10 and a mode switch 62 that is disposed adjacent to the steering handle 12 and is capable of switching an automatic mode and a manual mode.

The sensor unit 50 may further include a limit sensor 52,
25 an approach sensor 53, a suction duct sensor 54, and a range

sensor 55, including the collision sensor 51, and the sensors will be describe in detail below.

The collision sensor 51, which may be disposed at the front and rear of the vehicle body frame 10, senses and
5 measures the distance from an obstacle ahead of the vehicle body frame 10 and transmits the fact that there is an obstacle and a signal about the measured distance to the control unit 60.

When the mode switch 62 of the control unit 60 is set in
10 the automatic mode, the control unit 60 can make and display a warning about a collision with the obstacle to the outside when the distance measured by the collision sensor 51 is a predetermined distance or less, and can stop the driving unit 20 when the distance is a predetermined distance or less.

15 That is, it is possible to warn a worker that there is an obstacle close to the device by making a sound or displaying a warning, using an alarm or a display (not shown) that may be separately disposed on a side of the vehicle body frame 10 or on the main controller 61 of the control unit 60, and it is
20 possible to automatically stop the vehicle body frame 10 at a distance where the device is likely to collide with the obstacle.

The collision sensor 51 may be an ultrasonic sensor or an infrared sensor that can sense the distance from an obstacle,
25 and according to this configuration of the intelligent robot

cleaning device 1 of the present invention, it is possible to automatically clean a road by simply steering the vehicle body frame 10 without specific operation for maneuvering the vehicle body frame 10 from obstacles while cleaning the road.

5 In order to perform the functions that can be controlled by the main controller 61, the control unit 60 may further include a remote controller 63 that can send a remote signal to a processor of the control unit 60 through Zigbee wireless communication with a Zigbee communication module (not shown)
10 that may be separately installed on the intelligent robot cleaning device 1 of the present invention.

The sensor unit 50 includes the limit sensor 52 for sensing a load of waste in the containing unit 30.

The limit sensor 52 may be disposed at an upper end of a
15 side in the containing unit 30, and when the containing unit 30 is fully filled with road waste, the limit sensor 52 senses it and transmits a signal saying overload to the control unit 60.

Accordingly, when the load of waste in the containing unit 30 exceeds a predetermined level, the control unit 60
20 automatically stops the driving motor 45, so the rotary fan 44 stops and road waste is no longer sucked into the intake pipe 411.

Further, the control unit 60 receives and keeps the sensed and measure data from the sensors of the sensor unit 50 through
25 Zigbee communication with the Zigbee communication module (not

shown), manages stream data from the kept data, and executes a program for processing data including algorithm data about avoidance of a collision, automatic running, and signal processing.

5 Accordingly, when the mode switch 62 is set in the automatic mode, the control unit 60 can automatically perform automatic running of the intelligent robot cleaning device 1 of the present invention, recognizing and avoiding of an obstacle, automatic sucking, and automatic measuring of a speed and a
10 cleaning area.

 In an intelligent robot cleaning device 1 according to another embodiment of the present invention, the suction body 41 includes a suction duct 413, a caster 414, and a working handle 415.

15 Referring to FIG. 5, the suction duct 413 may replace the suction pipe 411 in the embodiment of the present invention, that is, the suction duct 413 is a flexible tube, unlike the suction pipe 411, and extends such that an exit port 413b is detachably connected to the inlet 42b of the main body housing
20 42.

 Existing street sweeper trucks collect waste and clean streets through cleaning parts or suction parts that are simply operated by power that is separately provided, but in this case, it is difficult to clean corners or steps on roads, so
25 cleaning cannot be efficiently performed.

Accordingly, in this embodiment of the present invention, the intake port 413a of the suction duct 413 can be freely moved, so a worker W can directly visually check waste on a road and collect the waste, with the vehicle body frame 10
5 running forward or backward in an automatic mode or a manual mode.

Further, the exit port 413b of the suction duct 413 is detachably connected to the inlet 42b of the main body housing 42, so it can be simply replaced by the suction pipe 411 in a
10 street without detailed work, as described above.

So, it would be natural that the exit port 411b of the suction pipe 411 of an embodiment of the present invention is detachably connected to the inlet 42b of the main body housing 42.

15 Referring to FIG. 5, the caster 414 and the working handle 415 are provided to help the suction duct 413 move so that a worker W can easily clean with the suction duct 413, in which the caster 414 is supported on a side of the suction duct in rolling contact with a road so that the intake port 413a of the
20 suction duct 413 is spaced at a predetermined height from the road.

The working handle 415 is a part that a worker W holds to easily move the suction duct 413, so the working handle 415 is elongated at a side of the suction duct 413 to appropriately

correspond to the height of the worker W so that the worker can easily hold it.

Accordingly, the suction duct 413 can be very conveniently moved and changed in direction on a road by the caster 414 and
5 the working handle 415.

Accordingly, in another embodiment of the present invention, it is possible to very conveniently take away various wastes on a road in an automatic mode or a manual mode of the control unit 60 while the vehicle body frame 10 runs at
10 a low speed, through the organic relationships of the components described above, and a worker W can manually carefully clean small spaces or corners while walking. Therefore, it is possible to achieve very efficient cleaning in comparison to existing street sweeper trucks.

15 It is not required to collect waste on a road when the worker W manually cleans the road with the suction duct 413, so the control unit 60 may be configured to stop and lift up the rotary brush 412.

The intelligent robot cleaning device 1 according to
20 another embodiment of the present invention further includes a cradle 13 for stowing the suction duct 1413 on the vehicle body frame 10 and the sensor unit 50 further includes the approach sensor 53 for sensing the distance between the intake port 413a of the suction duct 413 and the ground and the suction duct

sensor 54 for sensing whether the suction duct 413 is placed on the cradle 13.

The approach sensor 53, as shown in FIG. 5, is fixed adjacent to the intake port 413a of the suction duct 413, and
5 senses the distance from the ground and sends a sensing signal to the control unit 60.

When the worker W puts the intake port 413a of the suction duct 413 on the ground to clean the road and the distance sensed by the approach sensor 53 is a predetermined level or
10 less (for example 100mm or less) in the automatic mode, the control unit 60 operates the driving unit 20 and the driving motor 45, but when the distance sensed by the approach sensor 53 is a predetermined level or more (for example, 100mm or more), the control unit 60 stops the driving unit 20 and
15 decelerates the driving motor 45 to a predetermined speed.

That is, the rotary fan 44 can be automatically rotated and the vehicle body frame 10 can be automatically driven with the suction duct 413 stood up approximately vertically by the worker W for cleaning. Further, when the worker W takes
20 his/her hands off the suction duct 413 for other work, the suction duct 413 is laid approximately horizontally and the intake port 413a is lifted, in which the control unit 60 determines that cleaning is not being performed, so it stops the vehicle body frame 10 by stopping the wheels 12 and

decelerates the rotary fan 44, thereby maintaining a standby state.

The cradle 13 is preferably disposed at the front of the vehicle body frame 10 so that the worker W can easily stow the suction duct 413 after finishing work, and the suction duct sensor 54 is disposed in the cradle 13, senses that a holder 413b formed adjacent to the intake port 413a of the suction duct 413 is placed on the cradle 13, and sends a sensing signal to the control unit 60.

10 When receiving the sensing signal from the suction duct sensor 54, the control unit 60 determines that cleaning is finished and stops the driving motor 45.

Therefore, according to the intelligent robot cleaning device 1 of the present invention, when the worker W finishes manually cleaning a road, it is possible to simply stop the rotary fan 42 only by putting the suction duct 413 onto the cradle 13 without specific operation, so it is possible to simply complete cleaning.

The sensor unit 50 may further include a range sensor 55 disposed adjacent to the intake port 413a of the suction duct 413 and an entering sensing unit 55a disposed on a side of the containing unit to transmit a signal to the range sensor 55 when it enters a predetermined range set in the range sensor 55.

Accordingly, when the entering sensing unit 55a approaches a predetermined range set in the range sensor 55 in the automatic mode, the control unit 60 stops the driving unit 20, and when the entering sensing unit 55a comes out of the range set in the range sensor 55, the control unit starts the driving unit 20.

That is, by using the range sensor 55, when the vehicle body frame 10 runs toward the suction duct 413 that is cleaning a road and the distance between the vehicle body frame 10 and the intake port 413a of the suction duct 413 reduces into a predetermined range, the vehicle body frame 10 is stopped in order not to interfere with the worker who is working with the suction duct 413 to clean the road, so a safety accident can be prevented.

The intelligent robot cleaning devices described above and shown in the figures are just example for achieving the present invention and should not be construed as limiting the spirit of the present invention. The protection range of the present invention is determined only by the claims and embodiments changed and modified without departing from the scope of the present invention are included in the protection range of the present invention as long as they are apparent to those skilled in the art.

Industrial Applicability

As described above, an intelligent robot cleaning device according to the present invention can very conveniently take away various wastes on roads through an automatic or manual mode, can efficiently clean up especially the spaces that
5 street sweeper trucks have difficulty in reaching such as walkways, parks, and side streets, and makes it possible to save fuel and reduce noise and contaminants such as carbon by being operated by electricity, so it has industrial applicability.

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CLAIMS

1. A walking type intelligent robot cleaning device for collecting waste on a road, the device comprising:

5 a vehicle body frame having wheels on a bottom and a steering handle for steering the wheels;

 a driving unit for operating the wheels;

 a containing unit having a predetermined internal space and mounted on the vehicle body frame;

10 a suction unit including a suction body having an intake port for sucking waste on a road and an exit port for discharging the waste sucked through the intake port; a main body housing having an air induction space therein and having an inlet and an outlet communicating with the air induction
15 space, the inlet connected to the exit port of the suction body, and supported on the vehicle body frame; a discharge pipe having a first end connected to the outlet of the main body housing and a second end extending from the containing unit; a rotary fan disposed in the air induction space of the main body
20 housing to guide a flow of air flowing inside through the intake port of the suction body to the containing unit; and a driving motor connected to the rotary fan through a rotary shaft and supplying power to rotate the rotary fan; and

 a control unit controlling operation of the driving unit
25 and the suction unit in an automatic or manual mode,

wherein the suction body includes a suction duct that is a flexible tube and has a exit port detachably connected to the inlet of the main body housing, a caster that is supported on a side of the suction duct in rolling contact with a road such
5 that the intake port of the suction duct is spaced at a predetermined distance from the road, and a working handle that is elongated on a side of the suction duct.

2. The device of claim 1, further comprising a sensor unit
10 including a collision sensor for sensing distances from obstacles around the vehicle body frame,

wherein the control unit, in the automatic mode, makes and displays a warning about a collision with an obstacle to the outside when a distance measured by the collision sensor is a
15 predetermined distance or less, and stops the driving unit when the distance is a predetermined distance or less.

3. The device of claim 2, wherein the sensor unit further includes a limit sensor for measuring a load of waste in the
20 containing unit, and the control unit stops the driving motor when the waste in the containing unit exceeds a predetermined load.

4. The device of claim 2, wherein the vehicle body frame
25 further includes a cradle for stowing the suction duct; the

sensor unit further includes an approach sensor for sensing a distance between the intake port of the suction duct and the ground and a suction duct sensor for sensing whether the suction duct is placed on the cradle; and the control unit, in
5 the automatic mode, operates the driving unit and the driving motor when a distance sensed by the approach sensor is a predetermined value or less, stops the driving unit and decelerates the driving motor to a predetermined speed when a distance measured by the approach sensor is a predetermined
10 value or more, and stops the driving motor when the suction duct sensor senses a stowing signal.

5. The device of claim 2, wherein the sensor unit further includes a range sensor disposed adjacent to the intake port of
15 the suction duct and an entering sensing unit disposed on a side of the containing unit to send a signal to the range sensor when the range sensor enters a predetermined range, and the control unit, in the automatic mode, stops the driving unit when the entering sensing unit reaches a predetermined range
20 set in the range sensor, and starts the driving unit when the entering sensing unit comes out of a predetermined range set in the range sensor.