A brush and vacuum assembly and its method of use are provided. The assembly has a debris box selectively located within a debris box housing. At least one arm extends from a deck that supports at least one brush motor. At least one pin extends through the at least one arm for selective engagement with the debris box housing. The layout permits the debris box to be accessed from a side of the machine.
BRUSH AND VACUUM ASSEMBLY AND METHOD OF USE

RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Patent Application Ser. No. 61/276,221 filed on Sep. 9, 2009, which is incorporated by reference in its entirety.

FIELD OF THE INVENTION

[0002] The present invention relates to a brush and vacuum assembly and its method of use. More particularly, the invention relates to a brush and vacuum assembly and method of use with floor cleaning equipment, such as a floor scrubber.

BACKGROUND OF THE INVENTION

[0003] The present invention is an improvement over known floor cleaning equipment, such as floor scrubbers. Most floor scrubbers have a water supply, a cleaning solution and outlets that apply the water and/or cleaning solution onto a floor. A set of rotary brushes works the cleaning solution into the floor to lift dirt and debris from the floor and scrub the floor clean. A squeegee and water suction device may be located at the rear of the machine to collect excess water and cleaning solution from the floor.

[0004] Those skilled in the art know that floor maintenance also typically requires vacuuming, usually before the scrubbing step. Vacuuming requires additional equipment, time and labor. Thus, it is known to associate a vacuum apparatus with a floor scrubber to accomplish both steps at once.

[0005] However, known equipment that combines a floor scrubber with a vacuum apparatus has proven to be difficult to use. More particularly, known devices locate the debris bins, which are bins that collect dirt and debris from the vacuum apparatus, in very difficult to reach places. The present invention overcomes the disadvantages of the prior art designs by locating a debris bin in a convenient location that is easily accessible.

SUMMARY OF THE INVENTION

[0006] The present invention is directed toward a brush and vacuum assembly and a method of its use. The assembly has a debris box selectively located within a debris box housing. At least one arm extends downwardly from a deck supporting at least one brush motor. At least one pin extends through the at least one arm for selective engagement with the debris box housing. The debris box is located in an easy to reach area that facilitates its removal and replacement.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] The above, as well as other advantages of the present invention, will become readily apparent to those skilled in the art from the following detailed description when considered in the light of the accompanying drawings in which:

[0008] FIG. 1 is a side view of one embodiment of a brush and vacuum assembly depicting a deck, a debris box housing and a debris box in a lowered position;

[0009] FIG. 2 is a side view of the assembly of FIG. 1 with the deck in a raised position and the debris box housing and debris box in a first, raised position and the debris box housing and the debris box in a second, alternative lowered position in dashed lines;

[0010] FIG. 3 is a perspective view of the deck in a raised position and the debris box and debris box housing in a lowered position;

[0011] FIG. 4 is a partial, front view of a pin of the present invention;

[0012] FIG. 5 is a side view of the brush and vacuum assembly with a floor scrubber;

[0013] FIG. 6 is a top view partially depicting the assembly and floor scrubber with the cover of the assembly being removed;

[0014] FIG. 7 is a side view of another embodiment of the assembly depicting the deck, the debris box housing and the debris box in a lowered position;

[0015] FIG. 8 is a side view of the assembly of FIG. 7 with the deck in a raised position.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0016] It is to be understood that the invention may assume various alternative orientations and step sequences, except where expressly specified to the contrary. It is also to be understood that the specific devices and processes illustrated in the attached drawings, and described in the following specification are simply exemplary embodiments of the inventive concepts defined in the appended claims. Hence, specific dimensions, directions or other physical characteristics relating to the embodiments disclosed are not to be considered as limiting, unless the claims expressly state otherwise.

[0017] Turning now to FIG. 1, one embodiment of a brush and vacuum assembly 10 and part of a floor scrubber 12 is depicted. The assembly 10 comprises a deck 14. The deck 14 is connected to the floor scrubber 12. More particularly, a rear portion 16 of the deck 14 is connected to a front portion 18 of the floor scrubber 12. The connection may be made via one or more hinges 20. The hinges 20 are also depicted in FIGS. 2, 5 and 6.

[0018] A first part 22 of a hinge 20 is connected to the rear portion 16 of the deck 14.

[0019] The second part 24 of the hinge 20 is connected to the front portion 18 of the scrubber 12. This arrangement permits the deck 14 to pivot upwardly and downwardly with respect to the scrubber 12. A hinge axis 26 is created between the first part 22 of the hinge 20 and the second part 24 of the hinge 20.

[0020] An actuator mount 28 may also be located at the front portion 18 of the scrubber 12. The actuator mount 28 may have an upper portion 30 and a lower portion 32. The lower portion 32 is preferably connected to the front portion 18 of the scrubber 12. The upper portion 30 is adapted to pivotally mount an actuator shaft 34 therewith. More particularly, an actuator shaft 34 may be pivotally mounted to the upper portion 30 of the mount 28.

[0021] The actuator shaft 34 selectively extends into a shaft housing 36. The shaft housing 36 is pivotally mounted to the deck 14. Preferably, a deck actuator mount 38 is provided that pivotally connects the shaft housing 36 with the deck 14, as shown in FIG. 6. The deck actuator mount 38 may be located at a central portion 40 of the deck 14, but other locations are permissible.

[0022] While a single actuator shaft 34 is depicted, it is permissible to include additional actuators. The additional actuators may be spaced from one another along the scrubber
The actuators may be identical to one another or they may be of various sizes and capacities.

Regardless of the number or size of the actuator shaft 34, the actuator shaft 34 provides for a controlled raising and lowering of the deck 14. More particularly, the deck 14 and its associated components, which are described below, can be heavy. It is preferred that the deck 14 be raised and lowered with at least the assistance of the actuator shaft 34 so that it is slowly moved to permit workers time to remove themselves from the moving deck 14, to ensure the machine is not damaged by a dropped deck 14 and to ensure that the machine does not damage the floor.

As best seen in FIG. 6, at least one brush motor 42 is mounted on an upper side 44 of the deck 14. Preferably, two brush motors 42 are located on a first side 46 and a second side 48 of the upper side 44 of the deck 14. The brush motors 42 are drivenly connected to two brushes 50 located beneath a lower side 52 of the deck 14. The brush motors 42 are connected to a source of electrical energy, such as a battery (not shown) located on the deck 14. It may be readily appreciated that greater or fewer brush motors 42 and brushes 50 may be used and that they may be located anywhere on or in the deck 14.

The brushes 50 have long bristles 54 designed to contact the floor. When turned by the brush motors 42, the bristles 54 move in a circular pattern and collect dirt and debris from the floor. The bristles 54 deposit collected dirt and debris onto a ramp 56. In the depicted embodiment, the ramp 56 is located between the brishes 50, but other orientations are permissible.

The ramp 56 has a leading edge 50 separated from the floor surface by a small gap 60. The ramp 56 inclines at a predetermined angle from the leading edge 58 to a trailing edge 62, as shown in FIG. 3.

A vacuum motor 64 is mounted on the deck 14. The vacuum motor 64 may be such as an electric motor, depicted in FIGS. 1, 2 and 6, powered by the battery located on the deck 14. The vacuum motor 64 may be connected to a vacuum filter 66 for filtering out dirt and debris from a vacuum stream, which is described below.

A first tube 68 may connect a suction side of the motor 64 with the filter 66 so as to draw air through the filter. A second tube 70 may be connected from the filter to a cavity 72 defined by the ramp 56. The cavity 72 is defined by the ramp 56 and two side portions 74 extending downwardly from the ramp 56. A gap 76, similar to the gap 60 between the leading edge 58 of the ramp 56 and the floor, is provided between the side portions 74 and the floor.

The second tube 70 draws air, which includes dirt and debris, from the cavity 72 to the filter where it collects and/or falls into a debris box 78. The bristles 54 assist in collecting and directing debris to the cavity 72.

The trailing edge 62 of the ramp 56 is located directly adjacent the debris box 78. More particularly, the debris box 78 is located directly behind the trailing edge 62 of the ramp 56.

The ramp 56 may be directly connected to a housing 80 for the debris box 78. In the depicted embodiment, two arms 82 on either side 74 of the ramp 56 extend to the housing 80 and are secured thereto with mechanical fasteners and/or welding.

The arms 82 position the ramp 56 so that at least a central portion 84 of it is aligned with an opening 86 in the housing 80. The opening 86 is defined by a first side portion 88 of the housing 80, a second side portion 90 of the housing 80, and a vertical portion 92 of the housing 80. The vertical portion 92 of the housing 80 comprises a first side member 94, a second side member 96 and a top member 98.

The opening 86 in the housing 80 communicates with the debris box 78. The debris box 78 has a first side wall 100, a second side wall 102, a front wall 104, a rear wall 106 and a bottom wall 108. At least a portion of the top of the debris box 78 is left open. Thus, debris that is swept up the ramp 56 by the brushes 50 and which falls through the housing opening 86 falls directly into the debris box 78, where it may be temporarily stored until the debris box 78 is emptied.

The debris box 78 is slidable and removable from the debris box housing 80. Preferably, the debris box 78 is positioned within the housing 80 so that it is substantially oriented transverse to a debris path 110 of the ramp 56. The debris box 78 direction of motion within the housing 80 is also aligned with the hinge axis 26.

Based on the foregoing, the debris box 78 may be accessed, removed and replaced all from one side 112 of the floor scrubber 12. Further, the debris box 78 may be accessed with the deck 14 in either the lowered or the raised position.

At least one track is located along either the first side member 94 or the second side member 96. Preferably, a first track 114 is located along the first side member 94 and a second track 116 is located along the second side member 96. Each track 114, 116, preferably extends from a lower, inner corner 118 of each side member 94, 96, and extends in a curvilinear fashion across the side member 94, 96, to an upper, outer corner 120 of each side member 94, 96. Preferably, each track 114, 116, defines a central continuous groove 122 from the lower inner corner 118 to the upper outer corner 120.

At least one pin arm 124 extends from the deck 14. The pin arm 124 is connected at a first end 126 to the deck 14. The pin arm 124 extends downwardly from the deck 14, when the deck 14 is in the lowered position, toward the debris box 78. The first end 126 of the pin arm 124 may be fixed to the deck 14 so that it moves with the deck 14. A second end 128 of the pin arm 124, opposite the first end 126, has an aperture 130 extending therethrough.

A pin 132, having a body portion 134 and a head portion 136, is slidably located within each groove 122. The body portion 134 has a smaller outer diameter than the head portion 136. The body portion 134 of the pin 132 extends into the groove 122, while the head portion 136 functions as a stop from the pin 132 extending beyond a predetermined point into the groove 122.

A lower, inner corner aperture 138 is provided in the first side member 94. The aperture 138 is aligned with the groove 122 in the first track 114. An upper, outer corner aperture 140 is provided in the first side member 94. This aperture 140 is also aligned with the groove 122 in the first track 114. Similar apertures are provided in the second side member 96.

The body portion 134 of the pin 132 extends through the pin aperture 130 in the arm 124, through the track groove 122 where it is designed to be selectively located in the lower, inner corner aperture 138 to secure the deck 14 and the debris box housing 80 together. A biasing member, such as a coil spring 142, may be located about the pin body 134 so that the pin body 134 is biased inwardly into the lower, inner corner aperture 138.
The head portion 136 of the pin 132 can be grasped and the head portion 136 and the body portion 134 of the pin 132 can be withdrawn from the lower, inner corner aperture 138. The pin body 134 is now able to slide along the groove 122 of the track 114, 116. The curvilinear upward nature of the groove 122 causes the pin 132, and thus the pin arm 124, to move in an upward motion. This motion results in the deck 14 being raised.

The deck 14 may be locked into a raised position by permitting the pin body 134 to extend through the aperture 130 in the pin arm 124, through the groove 122 and into the upper, outer corner aperture 140. As shown in FIGS. 2 and 3, the ramp 56 and the debris box 78 and its housing 80 remain on the floor and are not elevated with the deck 14.

The present invention also permits the deck 14, the ramp 56, the debris box 78 and the housing 80 to be elevated simultaneously with each other, as depicted in FIG. 2. In this embodiment, the pin 132 is extended through the pin arm 124, through the groove 122 and into the lower, inner corner aperture 138. The pin 132 locks into the lower, inner corner aperture 138 and connects the deck 14 with the ramp 56, debris box 78 and debris box housing 80 together.

FIGS. 7-8 depict yet another embodiment of the present invention. The embodiment depicted in FIGS. 7-8 has many of the features discussed above, thus identical reference numbers will be used for the same features where discussion is required; where no additional discussion is required for the description of FIGS. 7-8, it can be appreciated that the two designs have the same features. Different features are provided with new reference numbers.

At least one pin arm 144 extends downwardly, substantially perpendicularly, from the lower side 52 of the deck 14. A first end 146 of the pin arm 144 is connected, such as welding and/or mechanical fasteners or the like, to the deck 14. Preferably, the first end 146 of the pin arm 144 is in a fixed, non-moving relationship with the deck 14.

Preferably, two pin arms (only one shown) extend downward from the deck 14. In a preferred embodiment, the pin arms both extend along the first and second side members 94, 96, respectively. While two pin arms exist, the following describes just one of the pin arms as the two are identical and function in the same way.

The pin arm 144 has a second end 148, opposite the first end 146. In the preferred embodiment, two apertures are located through the second end 148 of the pin arm 144. The apertures may be vertically aligned with one another on the arm 144.

A first pin 150 is located through one of the apertures. In the figures, the first pin 150 is located through the upper aperture 152, but it may be located through either one. The pin 150 extends through the upper aperture 152 where it engages the first side member 94.

The first pin 150 may selectively engage the first side member 94 in a number of ways, but in each it is preferred that the pin 150 selectively secure the pin arm 144 and the side member 94 together. By way of example only, the pin 150 may extend into an aperture, housing or recess within or on the side member 94. Preferably, as shown in FIG. 8, an aperture 154 is used.

Regardless of the manner in which the pin 150 engages the side member 94, it is preferred that when the pin 150 engages the side member 94 that it locks the two together. More particularly, it is preferred that when the two are engaged, it prevents the pin arm 144 from pivoting with respect to the side member 94, and/or with respect to the ramp 56, the debris box 78 or the debris box housing 80.

In the depicted embodiment, a lower aperture 156 is located below the upper aperture 152 in the pin arm 144. A second pin 158 is located through the lower aperture 156. The second pin 158 connects with the first side member 94 to permit selective pivotal movement of the pin arm 144 with respect to the side member 94 and/or with respect 56 to the ramp, the debris box 78 or the debris housing 80.

FIG. 7 depicts a brush and vacuum assembly 160 in a lowered position, where the debris box 78 is located substantially parallel to the floor. The lowered position is the position used for floor cleaning.

The first pin 150 is engaged with the aperture 154 in the side member 94 to maintain the debris box 78 substantially parallel to the floor. It can be appreciated that the debris box 78 can be easily accessed from a side 162 of the assembly 160, as the debris box 78 is oriented substantially perpendicular to the ramp 56. In other words, the debris box 78 opens parallel with the hinge axis 26.

FIG. 8 depicts the brush and vacuum assembly 160 in a raised position. The raised position might be used for maintenance or repair of the assembly 160. For example, the raised position may be helpful in changing or repairing the brushes 50.

The raised position can be achieved by pulling the first pin 150 from the aperture 154 in the side member 94. Preferably, the first pin 150 has a stop (not shown) that prevents it from being entirely withdrawn from the aperture 154. Once the first pin 150 is removed from the aperture 154, the side member 94, and the components connected to it, such as the debris box housing 80, the debris box 78 and the ramp 56, are free to pivot about the second pin 158.

When the actuator is engaged, it draws the deck 14 upwardly and backward, via the hinge 20, toward the floor scrubber 12. At a first predetermined point, the pin arm 144 pivots about the second pin 158 on the side member 94. At a second predetermined point, the pin arm 144 lifts the side member 94 and the components associated with it, off of the floor. Those components may include the debris box 78, the debris box housing 80 and at least a portion of the ramp 56. This causes the debris box 78 to assume a downward angle.

In accordance with the provisions of the patent statutes, the present invention has been described in what is considered to represent its preferred embodiments. However, it should be noted that the invention can be practiced otherwise than as specifically illustrated and described without departing from its spirit or scope.

What is claimed is:

1. A brush and vacuum assembly, comprising:
   a debris box selectively located within a debris box housing;
   a deck extending downwardly from a deck supporting at least one brush motor thereon;
   at least one pin extending through said at least one arm for selective engagement with an aperture in said debris box housing.
2. The assembly of claim 1, wherein a debris ramp is attached to said debris box housing.
3. The assembly of claim 1, wherein said debris box housing has an opening for receiving debris from said ramp.
4. The assembly of claim 1, wherein said debris box is removably located within said housing transverse to said ramp.
5. The assembly of claim 1, wherein said arm is fixed with respect to said deck.

6. The assembly of claim 1, wherein a first pin extends through said aperture and a second pin extends through said arm and into said housing is a pivot point for said housing.

7. The assembly of claim 1, wherein said track arm is located behind said ramp and above said debris box.

8. The assembly of claim 1, wherein said pin is biased inwardly by a spring.

9. The assembly of claim 1, further comprising a hinge pivotally connecting said deck with a floor scrubber frame.

10. The assembly of claim 9, wherein a first part of said hinge is located on a rear edge of said deck and a second part of said hinge is located on front edge of said floor scrubber frame.

11. The assembly of claim 10, wherein an actuator flange is secured to said front edge of said floor scrubber frame, said actuator flange having an upper portion that is pivotally connected to a first end of an actuator, wherein a second end of said actuator is connected to said deck.

12. A brush and vacuum assembly, comprising:
   a deck portion supporting at least one brush motor and a vacuum motor thereon, said brush motor selectively driving at least one brush below said deck portion;
   at least one arm rigidly connected to and extending downwardly from said deck portion;
   a debris ramp, a debris box housing, and at least one curvilinear track all located below said deck portion; and
   at least one pin slidably engaged with said at least one arm and selectively engagable with said debris box housing through said arm.

13. The assembly of claim 12, wherein said debris box housing has a debris box slidable within said debris box housing transverse to said debris ramp.

14. The assembly of claim 13, wherein a debris opening is provided in said debris box housing and a first arm is located on one side of said housing and a second arm is located on the other side of said housing.

15. A brush and vacuum assembly, comprising:
   a deck pivotally connected to a floor scrubbing machine via at least one hinge;
   a pin arm extending substantially perpendicularly downward from said deck, said arm having at least one aperture therethrough;
   a pin movable within said pin arm;
   a side member of a debris box housing having at least one aperture for selectively receiving said pin wherein, said debris box housing having a debris box selectively movable parallel to said pin;
   a debris ramp oriented transverse to said debris box housing and located in front of said housing.

16. The apparatus of claim 15, wherein a trailing edge of said ramp terminates adjacent a debris aperture in said debris housing.

17. The apparatus of claim 15, wherein a pivot pin is provided in said pin arm and into said debris box housing.

18. The apparatus of claim 15, wherein said debris box is oriented parallel to a hinge axis from said hinge.

19. The apparatus of claim 15, wherein an actuator selectively moves said deck with respect to said floor scrubbing machine.

20. The assembly of claim 1, wherein said debris box has two side walls, a front wall, a rear wall, a bottom wall and a top portion that is at least partially open and defined by the side walls, the rear wall and the front wall.

* * * * *