DEVICE AND METHOD FOR CLEANING A LANDSCAPE SURFACE

Inventor: David N. Nelson, Commerce City, CO (US)

Correspondence Address:
THE REILLY INTELLECTUAL PROPERTY LAW FIRM, P.C.
1554 Emerson Street
Denver, CO 80218 (US)

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ABSTRACT
A new and useful device and method for cleaning a landscape surface of debris and/or dirt, which enables landscape rock to be substantially maintained on the landscape surface as the landscape surface is being cleaned, is provided, having an intake portion and an outlet portion in fluid communication with each other. The outlet portion is configured for attachment to a vacuum source and the intake portion has a distal end with an opening through which landscape material can be drawn into the intake portion from the surface of the landscape.
DEVICE AND METHOD FOR CLEANING A LANDSCAPE SURFACE

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a Continuation-In-Part of U.S. Ser. No. 10/649,978, filed Aug. 26, 2003, entitled “DEVICE AND METHOD FOR CLEANING A LANDSCAPE SURFACE,” which claims priority from U.S. Provisional Application Ser. No. 60/406,433, filed Aug. 28, 2002, entitled “DEVICE AND METHOD FOR CLEANING A LANDSCAPE SURFACE,” which applications are incorporated by reference herein.

BACKGROUND

[0002] This invention relates to a novel and improved device and method designed to clean a landscape surface of dirt and debris, while enabling landscape rock to be substantially maintained on the landscape surface as the landscape is being cleaned.

[0003] Landscape surfaces often include landscape rock, which is designed to enhance the look of the landscape surface, but over time may accumulate dirt and debris (e.g., from tree seeds, wind blown sources etc.), which can detract from the look of the landscape surface. To manually clean the landscape surface, it may be necessary or desirable to rake or otherwise remove the entire layer of surface material, which can mean that a lot of the landscape rock gets removed as the landscape surface is cleaned. Even if the removed rock is then replaced, the process of separating the rock from the debris and dirt is tedious and time-consuming, and may only recover a modest amount of the landscape rock. Thus, the landscape rock may have to be regularly replaced with new rock.

SUMMARY

[0004] The present invention provides a cleaning device and method for cleaning a landscape surface of debris and/or dirt, which enables the landscape rock to be substantially maintained on the landscape surface as the landscape surface is being cleaned. This should result in less frequent need to replace the landscape rock.

[0005] A method and apparatus for separating debris from rock on a surface free of standing water are claimed. The apparatus comprises a power vacuum source, an elongated tubular intake portion of a first constant diameter throughout having a single open entrance end and an opposite end wall, and excluding any openings between the entrance end and the end wall, an elongated tubular outlet portion of a second constant diameter throughout, smaller than the first diameter of the intake portion including an entrance end portion extending through the end wall into fluid communication with the interior of the intake portion and an outlet end having a single exit opening in communication with a vacuum source, the intake portion being of a length substantially greater than that of the outlet portion, and means for grasping the apparatus in the hands of a user to facilitate advancing in a slightly raised position above the surface to permit the introduction of air, debris and rock into the intake portion whereupon any debris lighter than rock will be drawn upwardly through the outlet portion into the vacuum source and any rock lifted from the surface will return to the landscape surface.

[0006] Essentially, the cleaning device and method is capable of applying a vacuum to the landscape rock, in a manner that removes debris and dirt from the surface, but enables the landscape rock to be separated from the debris and dirt and redeposited on the landscape surface as part of the cleaning process. Thus, the landscape rock is essentially maintained on the landscape surface as the landscape surface is being cleaned of debris and dirt.

[0007] Exemplary embodiments are illustrated in reference to Figures of the drawings. It is intended that the embodiments and Figures disclosed herein are to be considered illustrative rather than limiting. In addition to the article of manufacture described above, further aspects and embodiments will become apparent by reference to the drawings and by study of the following descriptions.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] FIG. 1 is a perspective view of a device for use in cleaning a landscape surface;

[0009] FIG. 2 is a schematic front view of the device of FIG. 1, in an upright position in relation to a landscape surface;

[0010] FIG. 3 is a sectional view of the device of FIG. 2, taken from the direction 3-3;

[0011] FIG. 4 is an enlarged view of the area 4 in FIG. 2, with portions of the posts to which the stove bolts are connected broken away; and

[0012] FIG. 5 is a perspective view of another form of the device of FIG. 1.

DETAILED DESCRIPTION

[0013] Referring in detail to the drawings, there is shown in FIGS. 1 to 4 a method and device for cleaning a landscape surface. The principles of the device are described below in connection with the cleaning of a landscape surface that includes landscape rock that forms a decorative part of the landscape, and dirt and debris that if left on the landscape surface would detract from the appearance of the landscape.

[0014] In the figures, the cleaning device 100 has an outlet portion 108 that is configured for attachment to a vacuum source (shown schematically at 102 in FIG. 3). The power vacuum source 102 comprises a wet-dry vacuum source or any other type of vacuum power source sufficient to create advancement of the debris upwardly through the cleaning device 100. Specifically, the cleaning device 100 comprises a conduit system with an elongated tubular intake portion 106 having a single open entrance end or intake opening 118 and an outlet 117, which is closed by an end wall 104 with the exception of a central opening 105a for connection to the entrance end of the tubular outlet portion 108. The intake portion 106 excludes any other openings between the intake opening 118 and the outlet 108. The intake portion 106 has a first constant diameter throughout the intake portion. The elongated tubular outlet portion 108 is in fluid communication with and has a diameter approximately one-half that of the intake portion 106. The outlet portion 108 may include an integrally formed conduit 105 that is shaped as a bent elbow with entrance and discharge portions 105a and 105b, respectively, that extend at an angle X relative to each other. The outlet portion 108 has a second constant diameter
throughout the outlet portion that is smaller than the diameter of the intake portion 106 and has a single exit opening, 1056. The outlet portion 108 also may have a coupling structure, described more fully below, for coupling the outlet portion 108 to the intake portion 106, and a hose coupling 109 configured for attachment to the vacuum source 102. When the intake portion 106 is attached to the outlet portion 108, the outlet 108 is in direct fluid communication with the inlet portion 105a of the conduit 108, the entrance portion 105e extending through an end wall 104, and the intake portion 106 extends at a predetermined angle to the discharge portion 105f of conduit 105. Since the conduit 105 is in fluid communication with the vacuum source 102 and the intake portion 106, a vacuum applied to the conduit 105 is also in communication with the intake portion 106.

[0015] The cleaning device has a pair of handles 110, 112. A rear handle 110 is connected with an exterior surface of the outlet portion 108. A front handle 112 is connected to a location on an exterior surface of the intake portion 106 that is near the junction of the outlet portion 108 and the intake portion 106. The handles 110, 112 are preferably formed in one piece with the intake portion 106 and the outlet portion 108, but can also be secured to the exterior of the cleaning device by any type of connection device (e.g., the handles can be bolted, strapped or otherwise secured to the cleaning device). Provision of more than one handle enables the cleaning device to be conveniently held by an operator in an advantageous position for cleaning a landscape surface 114, in the manner contemplated by the present embodiment. For example, handles 110, 112 facilitate advancement of the apparatus in a slightly raised position above a surface to permit the introduction of air, debris and rock into the intake portion 106. As shown in FIGS. 1, 2 and 3, the handle 110 extends parallel to the longitudinal axis of the intake portion 106 and handle 112 extends in a perpendicular plane to the first handle member 110. Any debris lighter than rock will be drawn upwardly through the outlet portion 108 into the vacuum source 102 and any rock lifted from the surface will return to the landscape surface.

[0016] The intake portion 106 has a distal end 116 at the opening 118 through which landscape material can be drawn into the intake portion 106 from the surface of the landscape. When the cleaning device is being used to clean a landscape surface 114, the cleaning device is held by one or both handles 110, 112 in an orientation with the intake portion 106 directed downwardly and the distal end 116 in close proximity to the landscape surface 114, so that the distal end 116 is essentially in contact with the landscape surface 114. The angle X that is formed in the conduit 105, and thereby extends between the intake and outlet portion is preferably not more than 135 degrees. The angle X is more preferably about 75-135 degrees, and even more preferably about 90-105 degrees. Currently, it is preferred that the angle X is about 90 degrees. The device is preferably held in an upright position, so that the intake portion 106 extends essentially at 90 degrees to the landscape surface 114 (see FIGS. 2, 3). Moreover, the device is configured such that it can be conveniently lifted vertically from the landscape surface 114. The concept of the cleaning device being "lifted vertically" from the landscape surface means that the cleaning device can be lifted in a substantially vertically upward direction (as shown by the arrow 115 in FIGS. 2, 3), if the landscape surface is substantially level and horizontal (as schematically illustrated in FIGS. 2, 3), or if the landscape surface has a slight slope.

[0017] Additionally, as illustrated in FIG. 3 and described earlier, the conduit 105 has a smaller constant inside diameter 119 than the inside diameter 121 of the intake portion 106 and is of a length such that the handles to be described will be at waist level on a person of medium height. Also, the hose coupling 109 in the head assembly has a tapered configuration, so that it can frictionally mate with a tapered coupling on a vacuum source, to frictionally couple the conduit 105 to a vacuum source. Thus, as the vacuum source 102 produces a low pressure in the conduit portion 105, air carrying dirt and debris is drawn into the intake portion 106 and through the conduit 105. The dirt and debris that is relatively small in mass is likely to be carried through the conduit 105 along with the fluid flow through the conduit 105. However, if any landscape rock is drawn into the intake portion 106 along with the dirt and debris, the change in direction as the material approaches the end wall 104 together with the change in velocity in accordance with Bernoulli’s theorem, as the air flows from the larger intake portion 106 into the smaller outlet portion 108 and the mass of the landscape rock that does reach the end wall 104 and is deflected downwardly makes it very difficult for the landscape rock to pass from the intake portion 106 to the conduit 105 and eventually will drop back down to the ground. Thus, such landscape rock is not likely to be carried through the outlet portion 108 as the air flows through the outlet portion 108 and carries with it the dirt and debris.

[0018] Landscape rock that is drawn into the intake portion 106 is likely to remain in the intake portion 106 until the intake portion 106 is lifted up and off the landscape surface 114. When the intake portion is lifted straight upward from the landscape surface 114 (i.e. straight vertically in FIGS. 2 and 3), the pressure state in the cleaning device will be changed (i.e. it will go from a pressure state that caused the landscape rock to be drawn into the intake portion 106, to a pressure state that causes landscape rock in the intake portion 106 to fall by gravity out of the intake portion 106). Since the intake portion 106 is lifted vertically off the landscape surface 114, the landscape rock in the intake portion 106 should be substantially redeposited in situ onto the landscape surface 114.

[0019] Accordingly, the configuration of the intake and outlet portions of the cleaning device is designed to (a) enable the intake portion 106 to be conveniently held in a downward orientation with the intake opening 118 disposed against the landscape surface 114, (b) allow dirt and debris to be drawn into the intake portion 106 and transmitted through the outlet portion 108 while restricting transmission of landscape rock through the outlet portion, and (c) provide a pressure state within the cleaning device such that when the intake portion 106 is lifted off the landscape surface 114, landscape rock in the intake portion 106 will be deposited in situ on the landscape surface 114.

[0020] As explained above, the current version of the device (FIG. 1) has an intake portion 106 oriented at about 90 degrees to the outlet part 105e of the conduit 105, and the opening 118 is configured such that when the intake portion 106 is held at about 90 degrees to the landscape surface, the opening 118 can be disposed directly against the landscape.
surface 114. This helps maintain a favorable pressure gradient within the cleaning device as material (e.g. dirt and debris) from the landscape surface is being drawn into the cleaning device.

[0021] The outlet portion 108 is configured to be conveniently coupled to the intake portion 106. The outlet portion 108 may have an outer skirt 120 that is configured to receive the upper end of the intake portion 106. The outer skirt 120 has slits at select locations, to form the skirt into sections that are flexible enough to be clamped (tightened) against the intake portion. In the figures, a pair of slits 124, 126 are shown in the skirt 120, and cause skirt sections 126a and 126b to be formed in the skirt 120. The skirt sections are flexible enough to be clamped (tightened) against the intake portion. The skirt sections have posts that are formed in one piece with the skirt sections (see e.g. posts 130 in FIGS. 3, 4) and fasteners such as stove bolts 132 and nuts 134 (FIG. 4) that are tightened against the posts 130, to enable the skirt sections to be clamped (tightened) against the intake portion 106. The outlet portion 108 also includes the central opening 105 extending through the end wall 104 into fluid communication with the interior of the intake portion 106. The inlet portion 106 and outlet portion 108 may also be manufactured as a continuous unit without necessity for the skirt sections. Further, any other type of securing mechanism, including bonding materials, may be used to secure the intake portion 106 to the outlet portion 108. See FIG. 5.

[0022] The cleaning device is preferably made of materials that are as lightweight as possible, to enable the cleaning device to be manipulated by hand, but both sturdy and rugged enough to enable the device to be coupled to a vacuum source, and to withstand the environmental conditions of the outdoor environment in which the device is expected to operate. For example, the intake portion 106 of the conduit may be made of polypropylene; the outlet portion 108 with the handle 110, the skirt 120 and the conduit 105 can be formed in one piece from ABS plastic. Of course, other suitable materials will also become apparent to those in the art.

[0023] Also, the current, preferred dimensions for the various components are determined by the particular application for which the device is configured. As shown in FIG. 3, the intake portion 106 has a constant inner diameter 121 throughout the intake portion and the outlet portion 108 has a smaller constant diameter 119 throughout the outlet portion. For example, a smaller version of the cleaning device of the invention, which would be e.g. for home use, would include an intake portion 106 with an inner diameter 121 from 3.75 inches to 4.75 inches, an outer diameter tube that enables the outlet portion to be conveniently clamped (tightened) against the intake portion, the outlet portion 106 with a conduit 105 having an inner diameter 119 of about 2 inches, and a bend X in the conduit 105 of up to 135 degrees (90 degrees is currently preferred), and a tapered hose coupling 109 that will conveniently attach to the vacuum source (a wet/dry vacuum of about 16 gallons capacity generally has a 2 inch inside diameter hose coupling). The reason the range of the inner diameter works best with larger mass landscape materials, and a larger inner diameter works best with lighter mass landscape material. A larger version of the device of the invention (intended more for commercial use) would include, e.g., an intake portion 106 with an inner diameter 121 of about 6 inches, and an outlet portion 108 with a conduit 105 having an inner diameter 119 of about 3 inches. The bend X in the conduit 105 would be similar to the bend in the smaller version. In either version, it is contemplated that the inner diameter 119 of the conduit 105 will be smaller than the inner diameter 121 of the intake portion 106. This results in an acceleration of the air flow in the outlet portion 108, encouraging rocks and debris to pass upwardly along the flow passage 120. End wall 104 acts as a deflection surface preventing rocks from entering the outlet portion 108. In addition, it is contemplated that the vacuum source 102 would be a wet/dry vacuum source. Also, the height of the intake portion 106 will be designed such that the cleaning device can be conveniently held by an operator with the intake portion 106 in a vertical position relative to the landscape surface 114, and such that the cleaning device can be conveniently lifted vertically from the landscape surface. Necessarily, the intake portion 106 is of a length substantially greater than that of the outlet portion 108. In one embodiment, the intake portion 106 is at least twice the length of the outlet portion 108. The combination of the intake portion 106 and the outlet portion 108 is of a length to extend to the waist level of a user.

[0024] Additionally, while an outlet portion with a bent elbow for the outlet is shown, it is possible to practice the present apparatus with an outlet that is bent in a different form, or even an outlet that is not bent.

[0025] Accordingly, the foregoing description provides a device and a method for cleaning a landscape surface in a manner designed to remove dirt and debris from the landscape surface, while enabling landscape rock to be maintained substantially in situ on the landscape surface. With the foregoing disclosure in mind, it is believed that various applications of the principles of the present embodiments, to provide a device and method for cleaning a landscape surface, will become apparent to those in the art.

I claim:

1. Apparatus for separating debris from rock on a surface free of standing water comprising:

   a power vacuum source;

   an elongated tubular intake portion of a first constant diameter throughout having a single open entrance end and an opposite end wall and excluding any openings between said entrance end and said end wall;

   an elongated tubular outlet portion of a second constant diameter throughout, smaller than said first constant diameter of said intake portion including an entrance end portion extending through said end wall into fluid communication with the interior of said intake portion and an outlet end having a single exit opening in communication with said vacuum source, said intake portion being of a length substantially greater than that of said outlet portion; and

means for grasping said apparatus in the hands of a user to facilitate advancement in a slightly raised position above said surface to permit the introduction of air, debris and rock into said intake portion whereby any debris lighter than rock will be drawn upwardly through said outlet portion into said vacuum source and rock lifted from the surface will return to said surface.
2. The apparatus according to claim 1 wherein said intake portion and said outlet portion in combination are of a length to extend substantially to the waist level of a user.

3. The apparatus according to claim 1 wherein said grasping means includes at least one handle member.

4. The apparatus according to claim 3 wherein said at least one handle member includes a first handle member that extends parallel to a longitudinal axis of said intake portion.

5. The apparatus according to claim 4 wherein said at least one handle member includes a second handle member that extends in a perpendicular plane to said first handle member.

6. The apparatus according to claim 5 wherein said first handle member is located on an exterior surface of said intake portion and said second handle member is located on an exterior surface of said outlet portion.

7. The apparatus according to claim 1 wherein a pressure state is created within said intake portion such that when the intake portion is lifted off of the surface, said rock in said intake portion returns to said surface.

8. The apparatus according to claim 1 wherein said intake portion is at least twice as long as said outlet portion.

9. The apparatus according to claim 1 wherein said outlet portion is disposed in a head assembly configured for attachment to the intake portion with the outlet portion in direct fluid communication with said intake portion.

10. Apparatus for separating debris from rock on a landscape surface in a dry environment comprising:

   an elongated tubular intake portion having a constant first diameter throughout said intake portion;

   an elongated tubular outlet portion having a constant second diameter throughout said outlet portion, said first diameter being approximately twice as great as said second diameter;

   said intake portion having an open entrance end and means defined by an end wall opposite said entrance end for deflecting rocks from entering said outlet portion, said outlet portion including an end portion extending from said deflecting means into fluid communication with an interior of said intake portion;

   a power vacuum source in communication with an outlet end of said outlet portion; and

   means for grasping and maneuvering said intake portion and said outlet portion in the hands of a user to facilitate advancement and positioning of said apparatus along the landscape surface.

11. The apparatus according to claim 10 wherein said outlet portion is substantially elbow shaped.

12. The apparatus according to claim 10 wherein a diameter of said open entrance end is substantially equal to a diameter of said opposite end wall.

13. The apparatus according to claim 10 wherein said deflecting means includes an end wall opposite said open entrance end with a central opening, said end wall extending at a substantially right angle to the direction of flow through said intake portion.

14. A method of separating debris from landscape rock in a dry environment by providing an apparatus with a vacuum power source at one end of an outlet portion and an intake portion at an opposite end having a first constant diameter throughout, an open entrance and an opposite end wall, said outlet portion of a smaller constant diameter throughout than said first constant diameter of said intake portion and handle members attached to said apparatus, the method comprising:

   attaching said power vacuum source to said elongated tubular outlet portion of said apparatus;

   grasping said outlet portion and said intake portion that is in fluid communication with said outlet portion, by said handle members;

   positioning said apparatus above said landscape rock, said apparatus being of a length to extend substantially to the waist level of a user;

   permitting the introduction of air, debris and rock into said intake portion;

   deflecting said landscape rock from entering said outlet portion through contact with said end wall of said intake portion;

   returning said rock to a landscape surface; and removing debris through said outlet portion.

15. The method according to claim 14 wherein said steps further include maintaining the intake portion in a downward orientation with said open entrance in contact with said landscape surface.

16. The method according to claim 35 wherein the step of returning said rock to a landscape surface includes lifting said intake portion off said surface causing said rock to be returned to said surface.

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