ABSTRACT

A quick release detachable brush includes a disk having a first side and a second side. The disk has at least one brush attached to the first or the second side or both. The center of the disk has an aperture. A shaft is provided with an elongated portion and a head that is complimentary to the aperture in the disk. The shaft engages the aperture to removably secure the disk to the shaft.
FIG. 2
DETACHABLE BRUSH ASSEMBLY

TECHNICAL FIELD

[0001] The present invention relates to brushes, and in particular, a brush assembly, which is detachable from a power driven or manually driven shaft using a quick release attachment.

BACKGROUND OF THE INVENTION

[0002] Brushes are commonly used to scrub and/or abrade an underlying surface. Scrub brushes can be used either by hand or in combination with a motor driven mechanism. Using a scrub brush by hand in large applications can become difficult and exhausting to the user. One solution has been to attach scrub brushes to a motor driven mechanism, such as a power drill, for example. The motor driven mechanism can provide superior cleaning of the surface with less effort by the user.

[0003] A problem exists however, because in certain applications the scrub brush can wear out before the job is complete. Additionally, the user may want to use different scrub brushes, for example one with relatively short hard bristles to provide better cleaning. However, short hard bristles can increase the rotational resistance of the brush. Therefore, another brush with relatively long bristles may be desired for some uses. This requires a brush switching process. With prior art brush/motor driven mechanism combinations, this brush switching process may not be convenient because changing the brush is a slow and cumbersome process or because the user does not have two brushes available.

[0004] The present invention overcomes both of these difficulties by providing a brush assembly that has a quick-release attachment. Additionally, the brush assembly can be two sided. Therefore, if a second brush is either needed or desired, the user can quickly remove the brush, reverse it, and quickly re-attach it to the drive shaft of the motor driven mechanism.

SUMMARY OF THE INVENTION

[0005] A quick release detachable brush assembly is provided according to an embodiment of the invention. The quick release detachable brush assembly comprises a disk having a first side and a second side. The disk includes an aperture in the center. At least one brush is attached to the first or the second side of the disk. The quick release detachable brush assembly also includes a shaft having an elongated portion and a head. The head engages the aperture in the disk to removably secure the disk to the shaft.

[0006] A quick release detachable brush assembly is provided according to an embodiment of the invention. The detachable brush assembly comprises a disk having a first side and a second side. A brush is attached to the first side of the disk and the second side includes an attachment head projecting outward. A shaft is also included having an elongated portion and an aperture, wherein the attachment head engages the aperture to removably secure the disk to the shaft.

[0007] A method of forming a quick release detachable brush assembly is provided according to an embodiment of the invention. The method comprises providing a disk having a first side and a second side. An aperture is provided in the disk. The method further comprises attaching at least one brush to the first side of the disk. A shaft is provided having an elongated portion and a head. The head is complimentary to the aperture and engages the aperture to removably secure the disk to the shaft.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] FIG. 1 shows a quick release detachable brush assembly according to an embodiment of the invention.

[0009] FIG. 2 shows a quick release detachable brush assembly according to another embodiment of the invention.

[0010] FIG. 3 shows a cross sectional AA of a shaft for a quick release attachment according to an embodiment of the invention.

[0011] FIG. 4 shows a quick release detachable brush assembly according to another embodiment of the invention.

[0012] FIG. 5 shows a quick release detachable brush assembly according to another embodiment of the invention.

DETAILED DESCRIPTION OF THE INVENTION

[0013] FIGS. 1-5 and the following description depict specific examples to teach those skilled in the art how to make and use the best mode of the invention. For the purpose of teaching inventive principles, some conventional aspects have been simplified or omitted. Those skilled in the art will appreciate variations from these examples that fall within the scope of the invention. Those skilled in the art will appreciate that the features described below can be combined in various ways to form multiple variations of the invention. As a result, the invention is not limited to the specific examples described below, but only by the claims and their equivalents.

[0014] FIG. 1 shows the quick release detachable brush assembly 100 according to an embodiment of the invention. The detachable brush assembly 100 includes a disk 101, a brush 102 attached to the disk 101, an aperture 103 formed in the disk 101, a groove 104 formed in the aperture 103, a shaft 105, and a securing member 106.

[0015] The disk 101 can be made from a substantially rigid material, such as plastic, for example. It should be understood however, that the disk 101 could be made from any material suitable for a brushing application.

[0016] Attached to the disk 101 is at least one brush 102. The embodiment shown in FIG. 1 only includes one brush 102 attached to the first side 111, however, it should be understood that a second brush could additionally or alternatively be attached to the second side 112. The brushes 102 can be attached to the disk 101 in any manner generally known in the art. In a preferred embodiment, the brushes 102 can be stapled to the disk 101. According to another embodiment, the brushes 102 are attached to the disk 101 using a hook and loop fastener, such as Velcro® sold by Velcro Industries B.V. The brushes 102 may also be attached to the disk by an adhesive or other form of bonding generally known in the art. The brushes 102 may also be formed as part of the disk 101, such as when stapled or glued to the disk 101. The brushes 102 can be attached to the disk 101 in numerous other ways and the precise means of attaching the brushes 102 to the disk 101 should not limit the scope of the invention.

[0017] In embodiments that include a brush 102 attached to both the first side 111 and the second side 112 of the disk 101, the two brushes can be substantially identical. Alternatively, the two brushes could be substantially different, including different bristle configurations and/or bristle sizes and lengths. The at least one brush 102 can include an aperture (not shown) that substantially conforms to the aperture 103 in
the disk 101. This is provided so the attachment of a brush 102 does not block the head 108 from engaging the aperture 103. [0018] The disk 101 includes the aperture 103. The aperture 103 is located in the center of the disk 101 for the purpose of balance. However, it should be understood that the aperture 103 does not have to be in the center of the disk 101. The disk 101 shown in FIG. 1 has a substantially circular aperture 103. However, it should be understood that in other embodiments, the aperture is substantially non-circular, such as rectangular (see FIG. 2), triangular (see FIG. 5), hexagonal, or any other circular or non-circular shape. The aperture 103 can be any shape and should not limit the scope of the invention. According to one embodiment, the aperture 103 has a depth of less than the thickness of the disk 101. In other embodiments, the aperture 103 has a depth equal to the thickness of the disk 101, wherein the aperture 103 creates a through hole.

[0019] The aperture 103 is provided for a quick release attachment to the shaft 105. The shaft 105 includes an elongated portion 107 and a head 108. The elongated portion 107 can connect to a motor (not shown), for example. Alternatively, the elongated portion 107 can connect to a handle (not shown) for a user to manually manipulate the brush 102. The head 108 is complementary to the aperture 103. In other words, the head 108 is substantially the same shape as the aperture 103 and has a slightly smaller diameter to allow insertion of the head 108 into the aperture 103. The elongated portion 107 can be slightly larger in diameter than both the head 108 and the aperture 103. This enlargement prevents the disk 101 from sliding beyond the head 108 of the shaft 105 when the aperture 103 comprises a through hole.

[0020] The head 108 can include one or more securing members. In the embodiment shown in FIG. 1, the head 108 includes an O-ring 106. The O-ring 106 can be held on the head 108 in any manner generally known in the art including friction, grooves, adhesives, etc. While only one O-ring 106 is shown, it should be understood that more than one O-ring 106 could be provided. The O-ring 106 provides for a friction fit by snapping into the groove 104 provided in the aperture 103. When the head 108 is substantially fully inserted into the aperture 103. This friction fit removably secures the disk 101 to the shaft 105. The friction fit can prevent the disk 101 from accidentally slipping off from the shaft 105. If the user provides enough force to overcome this friction fit, the disk 101 simply slips off the shaft 105, thereby providing a quick-release detachable brush assembly. In an alternate embodiment, the aperture 103 may be provided with the O-ring 106 and a groove may be formed on the head 108. In another alternate embodiment, both the head 108 and the aperture 103 may be provided with one or more O-rings. In this embodiment, both the head 108 and the aperture 103 would also be provided with grooves for the O-rings to engage.

[0021] The head 108 and/or aperture 103 may also have alignment grooves 130. The alignment grooves 130 are provided to engage corresponding alignment projections (not shown) formed on the opposite component. The alignment projections are provided opposite the alignment grooves 130 on the aperture 103 and/or the head 108 and engage the alignment grooves 130 to prevent the disk 101 from rotating relative to the shaft 105. According to one embodiment, the alignment projections must engage the alignment grooves 130 for the head 108 to engage the aperture 103.

[0022] In the embodiments described above, the user can simply pull the disk 101 off from the shaft 105, reverse the disk 101, and replace the disk 101 with the second side 112 facing away from the shaft 105. Alternatively, if the disk 101 does not have a second brush attached to the second side 112, the user can remove the disk 101 and replace it with another brush assembly. The embodiments described above provide for quick release detachable brush assembly that does not require the use of tools.

[0023] FIG. 2 shows a quick release detachable brush assembly 200 according to an embodiment of the invention. The quick release detachable brush assembly 200 shown in FIG. 2 includes a disk 201, a brush 202 attached to a first side 211 of the disk 201, an aperture 203 formed in the disk 201, a groove 204 formed in the aperture 203, and a shaft 205.

[0024] In the embodiment shown in FIG. 2, the head 208 and the aperture 203 are similar to that shown in FIG. 1 with the difference being that they are substantially non-circular. Although the non-circular head 208 and aperture 203 are shown to be substantially rectangular, it should be understood that any non-circular shape may be used. While one of the advantages of the friction fit provided by the O-rings is to prevent the disk 101 from rotating relative to the shaft 105, a non-circular aperture 203 can provide an alternate approach to preventing this rotation of the disk 201 relative to the shaft 205. Although the non-circular head 208 and aperture 203 prevent the disk 201 from rotating relative to the shaft 205, the O-rings may still be provided on the shaft 205 to prevent the disk 201 from slipping off from the shaft 205.

[0025] In the embodiment shown in FIG. 2, the securing member comprises a ball bearing system instead of using O-rings. However, it should be understood that the O-rings could be used as the securing member in addition to or as an alternative to the ball bearing system. The ball bearing system is further explained below.

[0026] FIG. 3 is a cross-sectional view AA of the shaft 205. The shaft 205 uses a ball bearing system as a way to removably secure the disk 201 to the shaft 205. The shaft 205 includes ball bearings 209, stem 220 with recesses 221, biasing members 225 and 226, and actuator 215.

[0027] In the embodiment shown, the ball bearings 209 are in the locked position. In this position, the side of the stem 220 applies a force on the ball bearings 209 and a portion of the ball bearings 209 extend out of the side of the head 208 through openings 210. The openings 210 can be tapered or substantially smaller than the diameter of the ball bearings 209 to prevent the ball bearings 209 from fitting completely through the openings 210. The portion that extends through openings 210 engages with the groove 204 in the aperture 203 when the head 208 is inserted into the aperture 203.

[0028] During insertion, the actuator 215 is pressed against the biasing member 226. In the embodiment shown, the biasing member 226 comprises a spring. However, it should be understood that the biasing member 226 could comprise any type of device that would provide a force against the actuator 215. When enough pressure is applied to the actuator 215 to overcome the force of the biasing member 226, the actuator 215 moves toward the stem 220, in this case, to the right. The stem 220 is positioned in the chamber 213 and is biased to remain in the position shown in FIG. 3 by the biasing member 225. The biasing member 225 is shown as a spring, but could comprise any type of biasing member. When the actuator 215 contacts the stem 220, the projection 216 presses down on the stem 220. In response, the stem 220 moves in a downward direction. As this occurs, the recesses 221 are aligned with the ball bearings 209 and the force from the side of the stem 220...
is removed. The ball bearings 209 are then free to move into an unlocked position. In the unlocked position, the ball bearings 209 disengage the groove 204 and move inside the head 208. The disk 201 can then be removed from the head 208 and either reversed and returned or replaced with another disk.

FIG. 4 shows the quick release detachable brush assembly 400 according to an embodiment of the invention. In this embodiment, the assembly 400 includes a disk 401, a brush 402 attached to a first side 411 of the disk 401, an attachment head 408 projecting from the center of the second side 412 of the disk 401, and a shaft 405.

The attachment head 408 is shown as a square block. However, it should be understood that the attachment head 408 could be any circular or non-circular shape and should not limit the scope of the invention. The attachment head 408 is provided to engage an aperture 403 in the shaft 405. The aperture could also be provided in some type of hand tool. The disk 401 attaches to the shaft 405 in a similar manner as disk 101 attached to shaft 105 in FIG. 1 or in a similar manner as disk 201 attached to shaft 205 in FIG. 2. The difference being that the head and aperture are located on the opposite components.

The head 408 is provided with a securing member 406. As shown in FIG. 4, the securing member 406 comprises an O-ring. When the securing member 406 comprises an O-ring, the complimentary aperture 403 is provided with corresponding grooves to accept the O-ring and provide a friction fit, as described above. It should be understood that a single O-ring is shown for the purpose of clarity and the securing member 406 could include any of the above mentioned securing members or a combination of the above mentioned securing members.

FIG. 5 shows the quick release detachable brush assembly 500 according to an embodiment of the invention. In this embodiment, the assembly 500 includes a disk 501, a brush 502 attached to a first side 511 of the disk 501, an aperture 503 formed in the disk 501, a groove 504 formed in the aperture 503, and a shaft 505. The shaft 505 comprises an elongated portion 507, a head 508, and a securing member 506.

In the embodiment shown in FIG. 5, the head 508 and the aperture 503 are similar to that shown in FIG. 1 with the difference being that they are substantially non-circular. Although the non-circular head 508 and aperture 503 are shown to be substantially triangular, it should be understood that any circular or non-circular shape may be used.

The disk 501 attaches to the shaft 505 in a similar manner as disk 101 attached to shaft 105 in FIG. 1 or in a similar manner as disk 201 attached to shaft 205 in FIG. 2. The difference being the shape of the aperture 503 and the shaft 505.

The head 508 is provided with a securing member 506. As shown in FIG. 5, the securing member 506 comprises an O-ring. When the securing member comprises an O-ring, the complimentary aperture 503 is provided with a corresponding groove 504 to accept the O-ring and provide a friction fit, as described above. It should be understood that a single O-ring is shown for the purpose of clarity and the securing member 506 could include any of the above mentioned securing members or a combination of the above mentioned securing members.

The detailed descriptions of the above embodiments are not exhaustive descriptions of all embodiments contemplated by the inventors to be within the scope of the invention. Indeed, persons skilled in the art will recognize that certain elements of the above-described embodiments may variously be combined or eliminated to create further embodiments, and such further embodiments fall within the scope and teachings of the invention. It will also be apparent to those of ordinary skill in the art that the above-described embodiments may be combined in whole or in part to create additional embodiments within the scope and teachings of the invention.

Thus, although specific embodiments of, and examples for, the invention are described herein for illustrative purposes, various equivalent modifications are possible within the scope of the invention, as those skilled in the relevant art will recognize. The teachings provided herein can be applied to other brush assemblies, and not just to the embodiments described above and shown in the accompanying figures. Accordingly, the scope of the invention should be determined from the following claims.

We claim:
1. A quick release detachable brush assembly comprising: a disk having a first side and a second side, wherein the center of the disk includes an aperture; at least one brush attached to the first side or second side of the disk; and a shaft having an elongated portion and a head, wherein the head is complementary to the aperture and engages the aperture to removably secure the disk to the shaft.
2. The quick release detachable brush assembly of claim 1, wherein the aperture in the center of the disk comprises a through hole.
3. The quick release detachable brush assembly of claim 1, wherein the at least one brush comprises a brush attached to both the first side and the second side of the disk and the brushes include apertures in the center that substantially conform to the aperture in the disk.
4. The quick release detachable brush assembly of claim 1, wherein one or both of the aperture and the head includes one or more securing members and one or more grooves are formed opposite the one or more securing members on one or both of the aperture and the head, wherein the one or more securing members engage the one or more grooves to removably secure the disk to the shaft.
5. The quick release detachable brush assembly of claim 4, wherein the one or more securing members comprise one or more O-rings.
6. The quick release detachable brush assembly of claim 4, wherein the one or more securing members comprise one or more ball bearings.
7. The quick release detachable brush assembly of claim 6, further comprising a means for applying and removing a force on the one or more ball bearings to engage and disengage the one or more ball bearings from the one or more grooves.
8. The quick release detachable brush assembly of claim 1, wherein the aperture and the head are substantially non-circular.
9. The quick release detachable brush assembly of claim 1, wherein one or both of the head and the aperture include one or more alignment projections and one or more alignment grooves are formed opposite the one or more alignment projections on one or both of the head and aperture, wherein the alignment projections must engage the alignment grooves for the head to engage the aperture.
10. A quick release detachable brush assembly comprising: a disk having a first side and a second side, wherein the second side includes an attachment head projecting from the center of the second side; a brush attached to the first side of the disk; and a shaft having an elongated portion and an aperture, wherein the attachment head engages the aperture to removably secure the disk to the shaft.

11. The quick release detachable brush assembly of claim 10, wherein one or both of the attachment head and the aperture includes one or more securing members and one or more grooves are formed opposite the one or more securing members on one or both of the attachment head and the aperture, wherein the one or more securing members engage the one or more grooves to removably secure the disk to the shaft.

12. The quick release detachable brush assembly of claim 11, wherein the one or more securing members comprise one or more O-rings.

13. The quick release detachable brush assembly of claim 11, wherein the one or more securing members comprise one or more ball bearings.

14. The quick release detachable brush assembly of claim 13, further comprising a means for applying and removing a force on the one or more ball bearings to engage and disengage the one or more ball bearings from the one or more grooves.

15. The quick release detachable brush assembly of claim 10, wherein the attachment head and the aperture are substantially non-circular.

16. The quick release detachable brush assembly of claim 10, wherein one or both of the attachment head and the aperture include one or more alignment projections and one or more alignment grooves are formed opposite the one or more alignment projections on one or both of the attachment head and aperture, wherein the alignment projections must engage the alignment grooves for the attachment head to engage the aperture.

17. A method of forming a quick release detachable brush assembly comprising:

- providing a disk having a first side and a second side;
- providing an aperture in the disk;
- attaching at least one brush to the first side or the second side of the disk;
- providing a shaft having an elongated portion and a head, wherein the head is complementary to the aperture and engages the aperture to removably secure the disk to the shaft.

18. The method of claim 17, wherein the aperture in the center of the disk comprises a through hole.

19. The method of claim 17, wherein attaching at least one brush to the first side or second side of the disk further comprises attaching a brush to both the first side and the second side of the disk, wherein the brushes include apertures in the center that substantially conform to the aperture in the disk.

20. The method of claim 17, further providing one or both of the aperture and the head with one or more securing members and forming one or more grooves opposite the one or more securing members on one or both of the aperture and the head, wherein the one or more securing members engage the one or more grooves to removably secure the disk to the shaft.

21. The method of claim 20, wherein the one or more securing members comprise one or more O-rings.

22. The method of claim 20, wherein the one or more securing members comprise one or more ball bearings.

23. The method of claim 22, further providing a stem for applying and removing a force on the one or more ball bearings to engage and disengage the one or more ball bearings from the one or more grooves.

24. The method of claim 17, wherein the aperture and the head are substantially non-circular.

25. The method of claim 17, further providing one or both of the head and the aperture with one or more alignment projections and forming one or more alignment grooves opposite the one or more alignment projections on one or both of the head and the aperture, wherein the alignment projections must engage the alignment grooves for the head to engage the aperture.