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Drive coupler for power scrubber

Abstract

A power scrubber including a telescopic shaft, a power receptacle, a handle, a power head, a pivot coupling, a first scrubber head, a second scrubber head, and a drive. The power receptacle and the handle are each positioned adjacent the first end. The pivot coupling couples the power head to the second end and is operable to adjust an angle of the power head relative to the shaft axis. The drive is coupled to and driven by the power head and extends along a longitudinal axis. The drive includes a first connector selectively engaging the first scrubber head with a center of the first scrubber head aligned with the longitudinal axis and a second connector selectively engaging the second scrubber head with a center of the second scrubber head aligned with the longitudinal axis. The first connector is connected to the first scrubber by a bayonet coupling.

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Background/Summary

CROSS-REFERENCE TO RELATED APPLICATION (1) This application is a continuation of U.S. Non-Provisional patent application Ser. No. 17/516,311, filed Nov. 1, 2021, which claims the benefit of U.S. Provisional Patent Application No. 63/109,235, filed Nov. 3, 2020, the entire contents of which are incorporated herein by reference.

TECHNICAL FIELD
(1) The present disclosure relates to drive adapters, and more particularly to drive adapters for scrubbers and the like.
BACKGROUND
(2) Hand tools and power tools are frequently connected to different sizes and/or types of tool heads. Tool heads may include bits, fasteners, and the like. In the context of powered scrubbers, tool heads may include brushes having various sizes, shapes, and stiffnesses. Connection mechanisms that are attachable to or integral with the tool permit connection between the head and the tool. The connection mechanism permits usage of the head upon actuation of the tool. Various tool heads may require different connections to the tool.
SUMMARY
(3) In one independent aspect, a power tool includes a power head receiving power from a power source and a drive coupled to and driven by the power head. The drive extends along a longitudinal axis, and the drive includes a connector for selectively engaging one of a first working tool and a second working tool. The connector includes an internal bore configured to selectively engage a shank of the first working tool, and a lobe protruding radially outward from the longitudinal axis. The lobe has a locking mechanism configured to secure the second working tool in response to relative movement between the lobe and the second working tool in both an axial direction and a rotational direction.
(4) In another independent aspect, a power scrubber includes a power head receiving power from a power source, and a drive coupled to and driven by the power head. The drive extends along a longitudinal axis, and the drive includes a connector for selectively engaging a working tool. The

connector includes an external lobe protruding radially outwardly from the longitudinal axis, and a bayonet coupling angled in a rotational direction about the longitudinal axis and extending at least partially along the longitudinal axis. The bayonet coupling is configured to couple the drive with a brush having a corresponding bayonet coupling.

(5) In yet another independent aspect, a power scrubber includes a shaft, a power source, a power head, and a drive. The shaft extends along a shaft axis between a first end and an second end, and the shaft includes a first portion adjacent the first end, and a second portion adjacent the second end. The second portion is movable relative to the first portion in a telescoping manner to adjust a length of the shaft along the shaft axis. The power source is coupled to the first end of the shaft. The power head includes a motor receiving power from the power source, and the power head is positioned adjacent the second end of the shaft. The drive is coupled to and driven by the power head, and the drive extends along a longitudinal axis. The drive includes a connector for selectively engaging one of a first working tool and a second working tool. The connector includes an internal bore configured to selectively engage a shank of the first working tool, and a lobe protruding radially outward from the longitudinal axis, the lobe having a bayonet coupling configured to engage the second working tool.

(6) Other aspects of the disclosure will become apparent by consideration of the detailed description and accompanying drawings.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

(1) FIG. **1** is a perspective view of a power scrubber including a power head.

(2) FIG. **2** is a perspective view of the power head of FIG. **1**.

(3) FIG. **3** is a top view of the power head of FIG. **1**.

(4) FIG. **4** is a cross-sectional view of the power head of FIG. **1** viewed along section **4**-**4** in FIG. **3**.

(5) FIG. **5** is another perspective view of the power head of FIG. **1**.

(6) FIG. **6** is another perspective view of the power head of FIG. **1**.

(7) FIG. **7** is a section view of the power head of FIG. **1** viewed along section **7**-**7** in FIG. **3**.

(8) FIG. **8** is a perspective view of the power head with a scrubber head attached to the power head.

(9) FIG. **9** is a perspective view of the power head with the scrubber head removed from the power head.

(10) FIG. **10** is an end view of the power head and scrubber head of FIG. **8**.

(11) FIG. **11** is a cross-sectional view taken along section line **11**-**11** in FIG. **10**.

DETAILED DESCRIPTION

(12) FIG. **1** illustrates a power scrubber **10**. The illustrated power scrubber **10** may be a telescopic power scrubber extending between a first end **14** and an opposite a second end **18**. The illustrated power scrubber **10** includes a removable power source **22** (e.g., a battery). The power source **22** is operable to engage a power receptacle **26** adjacent the first end **14**. In other embodiments, the power source **22** may be integral with the power receptacle **26**, and/or may receive power from a source other than a battery. A handle **30** and a trigger **34** are positioned adjacent the first end **14** of the power scrubber **10** to facilitate a user holding the handle **30** and operating the trigger **34** to actuate a power head **58** positioned adjacent the second end **18**.

(13) The power scrubber **10** includes a shaft **38** extending along a shaft axis **42** between the first end **14** and the second end **18**. In the illustrated embodiment, the shaft **38** includes a first portion **46** and a second portion **50** coupled to the first portion **46** by a connector **54**. The connector **54** facilitates telescoping movement of the second portion **50** relative to the first portion **46** to adjust a length of the shaft **38**. In other embodiments, the shaft **38** may include more than two portions and more than one connector. In other embodiments, the power scrubber may include a fixed (i.e., non-

telescoping) shaft **38**. In such embodiments, the handle **30** is connected (e.g., directly connected) to a power head **58** to form a fixed, compact scrubber.

(14) The power head **58** may be positioned adjacent the second end **18** and include a chuck or drive **86** (FIG. **2**) extending along a longitudinal axis **62** (FIG. **1**). The longitudinal axis **62** of the drive **86** may be oriented at an angle **66** (e.g., an acute angle, an obtuse angle, angle, etc.) relative to the shaft axis **42**. A pivot coupling **70** couples the power head **58** to the shaft **38** and is operable to adjust the angle **66**. As shown in FIG. **2**, in the illustrated embodiment, the pivot coupling **70** may include pawls **74** that are configured to engage corresponding detents to fix the angle **66** in a desired position. In the exemplary embodiment, the pawls **74** are positioned on the portion attached to the power head **58**, and the detents are positioned on the portion attached to the shaft **38**. In adjusting the angle **66**, the power head **58** rotates about a pivot axis **82** (FIG. **2**). The angle **66** may be fixed by the pawls **74** in discrete positions corresponding to common angles. Such common angles may be, for example and without limitation, 0 degrees, 15 degrees, 30 degrees, 45 degrees, 60 degrees, 90 degrees, 105 degrees, etc. Although a pawl-and-detent design is illustrated in FIG. **2**, it will be understood by persons having skill in the art that other types of couplings are contemplated, including a coupling that do not utilize discrete positions. That is, the power head **58** and longitudinal axis **62** of the drive **86** may be pivoted to any desired angle or location respective to the shaft axis **42**.

(15) As shown in FIGS. **2-7**, the drive **86** of the power head **58** is operable to rotate in response to actuation of the trigger **34**. The drive **86** includes a grip **90** which can be actuated (e.g., manually rotated) about the longitudinal axis **62** of the drive **86**. The drive **86** engages a connector **94** extending along the longitudinal axis **62**. In the illustrated embodiment, an inner portion of the drive **86** engages an outer surface of the connector **94**. The connector **94** includes lobes **98** protruding radially outwardly from the longitudinal axis **62**. In the illustrated embodiment, the connector **94** includes three lobes **98** in a generally triangular pattern (see FIG. **7**) with each lobe **98** equidistant from the other lobes **98**. In other embodiments, the connector may include fewer or more lobes, and/or the lobes may be positioned in a different configuration, such as, without limitation, a connector **94** having four lobes **98** in a cross or X-shaped pattern, or configurations in which the lobes **98** are not equidistant from the other lobes **98**.

(16) With reference to FIG. **4**, each lobe **98** may include a sloping surface or ramp **102** located on an external face of the lobe **98** and extending at least partially along the longitudinal axis **62**. In the illustrated embodiment, the ramp **102** extends along the longitudinal axis **62** in a rearward direction towards the drive **86**. As best shown in FIG. **5**, the ramp **102** may be angled in the rotational direction of the drive **86**, and coupling the connector **94** to the drive **86** may require movement of at least one of the components in an axial direction and a rotational direction about the axis. For example, the connector **94** may include a bayonet coupling in which one component includes one or more pins that protrude radially and that engage and move along the ramp **102** to secure the connector. The ramp **102** may be angled relative to the longitudinal axis **62**. In the illustrated embodiment, the angle of the ramp **102** extends rearwardly away from the lobe **98** and towards the drive **86**. The ramp **102** is configured to couple the connector **94** with a working tool (not shown) having a corresponding bayonet coupling for engaging the ramp **102**. The ramp **102** may releasably lock the position of the working tool relative to the connector **94**. As such, power is at least partially transmitted from the drive **86** through the ramp **102** of the connector **94** to power the working tool. In the illustrated embodiment, the working tool may be, without limitation, a brush, pad, a scrubber, a polisher, and/or the like (not shown).

(17) In the illustrated embodiment, the ramp **102** is a projection provided on the lobe **98** operable to engage a corresponding notch of the brush. In other embodiments, this configuration may be reversed, with the ramp **102** provided on the brush, and the corresponding notch being provided on the lobe **98**. Accordingly, both the projection and the notch function as corresponding bayonet couplings.

(18) With reference to FIG. **4**, a drive mount **106** of the power head **58** is rotatably connected to the drive **86** by a drive fastener **110**. As such, the drive fastener **110** can couple the drive **86** to the power head **58**. In some embodiments, the drive fastener **110** may be a reverse threaded fastener.
(19) With continued reference to FIG. **4**, the connector **94** may include a drive bore **114** positioned within the connector **94** and receiving a shank **122** of a working tool to couple the working tool to the drive **86**. In the illustrated embodiment, the drive bore **114** is hexagonal for engaging a hexagonal shank **122**. In other embodiments, the drive bore **114** may have a different cross-sectional shape.
(20) In the illustrated embodiment, the working tool is a scrubber head **118** having a shank **122**. The shank **122** has a first end **126** and a second end **130**. As shown in FIG. **4**, a body **134** of the scrubber head **118** is attached at the first end **126** of the shank **122**. The body **134** further includes bristles **138** for scrubbing a surface. The shank **122** includes a recess **142** for facilitating engagement with the drive **86**. The drive **86** further includes a retaining ring **146** within the drive bore **114**. The retaining ring **146** is configured to circumscribe the shank **122** at the recess **142** to retain the axial position of the shank **122** along the longitudinal axis **62**. The recess **142** and retaining ring **146** can releasably lock the axial position of the shank **122** along the longitudinal axis **62**. In other embodiments, the shank **122** may be retained in another manner.
(21) Other embodiments may include, without limitation, an additional retention mechanism RM (FIG. **4**). The retention mechanism RM may include a ball detent mechanism or a magnet. The ball detent mechanism may include a biased ball retainer configured to engage the recess **142**. The magnet may be otherwise positioned on or within the shank **122** to provide magnetic force with a corresponding magnet of the connector **94** to retain the axial position of the shank **122**. The corresponding magnet of the connector **94** may be positioned radially adjacent the first end **126** of the shank **122**.
(22) The cross-sectional shapes of the shank **122** and the drive bore **114** can releasably inhibit the rotation of the shank **122** about the longitudinal axis **62**. The drive bore **114** is configured to couple the connector **94**, and thus the drive **86**, with a working tool (e.g., the scrubber head **118**) having a shank (e.g., the shank **122**). As such, power is transmitted from the drive **86** through the drive bore **114** of the connector **94** and the shank **122** to power the scrubber head **118**.
(23) Notably, the internal drive bore **114** and/or the external lobe **98** may both be used to transmit power from the drive **86** through the connector **94** to different types of scrubber heads (e.g., **118**, **200** (FIG. **9**), and/or the like). In the illustrated embodiment, the scrubber head **118** includes a shank **122** configured to receive power from the internal drive bore **114**. In other embodiments (see e.g., FIG. **9**), the scrubber head **118** may have bayonet couplings configured to engage the lobes **98**. In this way, scrubber heads having either shanks **122** or bayonet couplings may be removably coupled with the same connector **94**. In this way, the power head **58** may be coupled to and employ different types of scrubber heads, thus, improving the usability and adaptability of the powered scrubber **10**. In other embodiments, scrubber heads **118** may be configured to receive power from both the internal drive bore **114** and the external lobe **98** simultaneously. Such scrubber heads **118** may include both a shank **122** configured to receive power from the internal drive bore **114** and a connector as discussed above (e.g., a bayonet coupling configured to engage the ramp **102** of the lobe **98**). As previously noted, other types of locking mechanisms may be used, and the other types of locking mechanisms may include relative movement both axially and radially to secure the scrubber head **118** to the drive **86**.
(24) FIGS. **8-11** illustrate the power head **58** attached to a scrubber head **200**. With reference to FIG. **8**, the scrubber head **200** is generally dimensioned to engage the external lobes **98** and the ramps **102** of the power head **58**. The scrubber head **200** includes a body **204** including bristles **208** for scrubbing a surface. The scrubber head **200** further includes an annular ring **212** at the center of the body **204** and aligned with the longitudinal axis **62**. Triangular shoulders **216** extend radially inwardly from the annular ring **212** towards the longitudinal axis **62**. The shoulders **216** are

dimensioned to correspond with the lobes **98**. Accordingly, as the drive **86** is rotated, the lobes **98** press upon the shoulder **216** to transmit torque from the drive **86** to the scrubber head **200**, the bristles **208**, and ultimately a work surface.
(25) FIG. **9** illustrates the scrubber head **200** removed from the power head **58**. The scrubber head **200** includes a plate **220** which extends radially inwardly from the annular ring **212** and generally perpendicular from the longitudinal axis **62**. The plate **220** is located circumferentially between the shoulders **216**. There is a radial gap between the plates **220** and the shoulders **216**. Accordingly, the plate **220** is dimensioned to receive the lobes **98** such that the scrubber head **200** can be translated (e.g., pushed, pulled, slid, etc.) along the longitudinal axis **62** to an axial position where the scrubber head **200** is axially aligned with the lobes **98**.
(26) The plate **220** may include one or more detents **224** which correspond to the dimensions of the ramps **102**. The detents **224** function as bayonet couplings, and engage the ramps **102**. Each detent **224** may be configured to receive one ramp **102** of one lobe **98**. Each detent **224** may include a plurality of surfaces which are angled relative to a plane perpendicular to the longitudinal axis **62**. Accordingly, the angled ramps **102** may be wedged in the detents **224** to secure the lobes **98** to the scrubber head **200**. While in the above-described axial position, the scrubber head **200** can be rotated to a radial position in which at least one of the plurality of surfaces of the detents **224** receive the ramps **102**. Accordingly, the detents **224** can lock the scrubber head **200** to the drive **86** for co-rotation therewith.
(27) Although aspects of the disclosure have been described in detail with reference to certain embodiments, variations and modifications exist within the scope and spirit of one or more independent aspects as described. Various features and advantages are set forth in the following claims.

Claims

1. A power scrubber comprising: a shaft extending along a shaft axis between a first end and a second end, the shaft including a first portion and a second portion, the second portion movable relative to the first portion in a telescoping manner to adjust a length of the shaft along the shaft axis; a power receptacle configured to receive power from a power source, the power receptacle being positioned adjacent the first end of the shaft; a handle positioned adjacent the first end of the shaft; a power head including a motor receiving power from the power source, the power head positioned adjacent the second end of the shaft; a pivot coupling that couples the power head to the second end of the shaft, the pivot coupling operable to adjust an angle of the power head relative to the shaft axis; a first scrubber head including a body having bristles; a second scrubber head including a body having bristles; and a drive coupled to and driven by the power head, the drive extending along a longitudinal axis, the drive including a first connector configured to selectively engage the first scrubber head such that a center of the first scrubber head is aligned with the longitudinal axis, the first connector connected to the first scrubber by a bayonet coupling, and a second connector configured to selectively engage the second scrubber head such that a center of the second scrubber head is aligned with the longitudinal axis.
2. The power scrubber of claim 1, wherein, as viewed along the longitudinal axis, one of the first connector and the second connector is positioned within a periphery of the other of the first connector and the second connector.
3. The power scrubber of claim 1, wherein the first scrubber head includes a plurality of shoulders extending radially inwardly towards the longitudinal axis, wherein the first connector includes a plurality of lobes protruding radially outwardly from the longitudinal axis, and wherein each of the plurality of lobes engages one of the plurality of shoulders to drive the first scrubber head.
4. The power scrubber of claim 3, wherein the second scrubber head includes a shank, wherein the second connector includes a drive bore, and wherein the drive bore receives the shank.

5. The power scrubber of claim 1, wherein the power head includes a drive mount connected to the drive and the motor, and wherein the drive mount is aligned with the longitudinal axis.
6. The power scrubber of claim 1, wherein the first connector is configured to drive the first scrubber head in a rotational direction about the longitudinal axis, and wherein the second connector is configured to drive the second scrubber head in the same rotational direction about the longitudinal axis.
7. The power scrubber of claim 1, wherein the first scrubber head and the second scrubber head are configured to receive power from the both the first connector and the second connector simultaneously.
8. The power scrubber of claim 1, wherein the pivot coupling is operable adjust the power head to a plurality of angles relative to the shaft axis, wherein one of the plurality of angles orients the longitudinal axis parallel with the shaft axis, and wherein another one of the plurality of angles orients the longitudinal axis perpendicular with the shaft axis.
9. The power scrubber of claim 1, wherein the bayonet coupling comprises one or more pins that protrude radially and that move along a ramp to secure the first connector to the first scrubber.
10. The power scrubber of claim 1, wherein the bayonet coupling comprises a detent on the first scrubber that engages with a ramp on the drive to secure the drive to the first scrubber.
11. A power scrubber comprising: a power head receiving power from a power source; and a drive coupled to and driven by the power head, the drive extending along a longitudinal axis, the drive including a first connector of a first type configured to selectively engage a first scrubber head such that a center of the first scrubber head is aligned with the longitudinal axis, and a second connector of a second type different than the first type, the second connector configured to selectively engage a second scrubber head such that a center of the second scrubber head is aligned with the longitudinal axis.
12. The power scrubber of claim 11, wherein the first connector and the second connector are rotatable about and coaxial along the longitudinal axis.
13. The power scrubber of claim 11, wherein at least a portion of the second connector is offset from the first connector in a direction parallel to the longitudinal axis.
14. The power scrubber of claim 11, wherein the first connector functions as a bayonet coupling.
15. The power scrubber of claim 14, wherein the second connector includes a ball detent mechanism configured to retain a shank of the second scrubber head.