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United States Patent	12390697
Kind Code	B1
Date of Patent	August 19, 2025
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Carbon fiber putter golf shaft and tip with one or more bends

Abstract

A carbon fiber tip to connect a straight carbon fiber golf shaft with a golf club head includes: a first end that is cylindrical and that is configured to be joined with the golf club head; a second end that opposite the first end, that is cylindrical, and that is configured to be joined with a tip end of the straight carbon fiber golf shaft; and a bend disposed between the first end and the second end that changes an axis along which the carbon fiber tip extends.

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Appl. No.: **18/983252**

Filed: **December 16, 2024**

Related U.S. Application Data

us-provisional-application US 63677586 20240731

Publication Classification

Int. Cl.: **A63B53/02** (20150101); **A63B53/00** (20150101); **A63B53/04** (20150101); **A63B53/10** (20150101)

U.S. Cl.:

CPC **A63B53/02** (20130101); **A63B53/007** (20130101); **A63B53/0487** (20130101); **A63B53/10** (20130101); A63B2209/02 (20130101)

Field of Classification Search

CPC: A63B (53/02); A63B (53/007); A63B (53/0487); A63B (53/10); A63B (2209/02)

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Background/Summary

CROSS-REFERENCE TO RELATED APPLICATIONS (1) This application claims the benefit of U.S. Provisional Application No. 63/677,586, filed on Jul. 31, 2024. The entire disclosure of the application referenced above is incorporated herein by reference.

FIELD

(1) The present disclosure relates to golf equipment and more to carbon fiber golf shafts for putters.

BACKGROUND

(2) The background description provided here is for the purpose of generally presenting the context of the disclosure. Work of the presently named inventors, to the extent it is described in this background section, as well as aspects of the description that may not otherwise qualify as prior art at the time of filing, are neither expressly nor impliedly admitted as prior art against the present disclosure.

(3) Golf shafts are manufactured in various lengths for various different types of golf clubs. Some golf shafts are steel golf shafts, and some golf shafts are graphite golf shafts.

(4) In golf, golf clubs are used to strike golf balls. An object is to move a golf ball from tee to a hole in a fewest number of strokes. Various types of golf clubs are used, such as woods, irons, wedges, and putters. Golf shafts include a tip end where a golf club head is attached and a butt end where a golf grip is applied.

(5) Multiple different types of golf club heads are used. For example, a set of golf clubs includes

one or more woods, one or more irons and wedges, and a putter.

SUMMARY

(6) In a feature, a carbon fiber tip to connect a straight carbon fiber golf shaft with a golf club head is described. The carbon fiber tip includes: a first end that is cylindrical and that is configured to be joined with the golf club head; a second end that opposite the first end, that is cylindrical, and that is configured to be joined with a tip end of the straight carbon fiber golf shaft; and a bend disposed between the first end and the second end that changes an axis along which the carbon fiber tip extends.

(7) In further features, a golf club includes: the straight carbon fiber golf shaft having a tip end and a grip end that is opposite the tip end; the golf club head; and the carbon fiber tip, where the first end of the carbon fiber tip is joined with the golf club head and the second end of the carbon fiber tip is joined with the tip end of the straight carbon fiber golf shaft. In further features, the golf club head is a putter head.

(8) In further features, the first end of the carbon fiber tip is fixed to the golf club head via an adhesive.

(9) In further features, the second end of the carbon fiber tip is fixed to the tip end of the straight carbon fiber golf shaft via an adhesive.

(10) In further features, the second end of the carbon fiber tip is fixed to the tip end of the straight carbon fiber golf shaft via the carbon fiber tip and the straight carbon fiber golf shaft having been cured together.

(11) In further features, the first end includes a cylindrical recessed portion configured to receive a cylindrical post on the golf club head.

(12) In further features, the first end includes one or more apertures that extend through the carbon fiber tip to the cylindrical recessed portion.

(13) In further features, an outer diameter of the first end is between 0.3 inches to 0.4 inches.

(14) In a feature, a tip includes: the carbon fiber tip; and a cylindrical tube disposed within the second end that extends outwardly past the second end of the carbon fiber tip.

(15) In further features, the carbon fiber tip is co-molded onto the cylindrical tube.

(16) In further features, the cylindrical tube is to extend into a tip end of the straight carbon fiber golf shaft.

(17) In further features, the cylindrical tube is made of one of steel, a metal, an alloy, and carbon fiber.

(18) In further features, the straight carbon fiber golf shaft is straight axially and does not include any bends along the axis of the straight carbon fiber golf shaft.

(19) In further features, a second bend is disposed between (a) the bend and (b) the first end.

(20) In further features, the carbon fiber tip: extends axially along a first axis between the bend and the second end; extends axially along a second axis between the bend and the second bend; and extends axially along a third axis between the second bend and the first end, where the first axis is not coaxial with the second axis, and the second axis is not coaxial with the third axis.

(21) In further features, the first axis is not coaxial with the third axis.

(22) In further features, the first axis intersects the second axis at only one point, and the second axis intersects the third axis at only one point.

(23) In a feature, a golf shaft for a putter is described, where the golf shaft includes: a straight carbon fiber golf shaft having a tip end and a grip end that is opposite the tip end; and the carbon fiber tip, the first end of the carbon fiber tip to be joined with the golf club head and the second end of the carbon fiber tip to be joined with the tip end of the straight carbon fiber golf shaft.

(24) In a feature, a one piece carbon fiber golf shaft for a putter is described. The one piece carbon fiber golf shaft includes: a grip end that is cylindrical and that is configured to be fixed within a golf grip; a tip end that is cylindrical and that is configured to be joined with a putter head, where the tip end is opposite the grip end; and at least one bend disposed between the grip end and the tip

end, the at least one bend changing an axis along which the one piece carbon fiber golf shaft extends.
(25) Further areas of applicability of the present disclosure will become apparent from the detailed description, the claims and the drawings. The detailed description and specific examples are intended for purposes of illustration only and are not intended to limit the scope of the disclosure.

Description

BRIEF DESCRIPTION OF THE DRAWINGS
(1) The present disclosure will become more fully understood from the detailed description and the accompanying drawings, wherein:
(2) FIG. **1** includes an example illustration of a golf club shaft;
(3) FIG. **2** is a perspective view of a left-handed putter head including a cylindrical post;
(4) FIG. **3** is a perspective view of a right-handed putter head that does not include a cylindrical post and includes a cylindrical recessed portion;
(5) FIGS. **4-8** are perspective views of an example carbon fiber tip that includes two bends;
(6) FIGS. **9-12** include perspective views of an example of the carbon fiber tip including only a single bend;
(7) FIGS. **13** and **14** include example perspective views of the carbon fiber tip including two bends joined with a straight golf shaft;
(8) FIG. **15** includes a perspective view of an example of the carbon fiber tip joined with the straight golf shaft; and
(9) FIG. **16** includes an example perspective view of the carbon fiber tip joined with/fixed to the shaft end with the straight golf shaft and joined with/fixed to a golf club head.
(10) In the drawings, reference numbers may be reused to identify similar and/or identical elements.
DETAILED DESCRIPTION
(11) The present application involves an carbon fiber tip portion that includes one or more bends. The carbon fiber tip portion can be connected to a straight carbon fiber golf shaft to create a carbon fiber golf shaft for a putter that includes one or more bends. Single piece golf shafts including one or more bends are difficult and costly to manufacture and may be susceptible to breaking at or near a bend.
(12) FIG. **1** includes an example illustration of a golf club shaft **104** prior to joining the golf shaft **104** with a golf club head, such as a putter head. The golf shaft **104** may be a straight carbon fiber golf shaft or straight graphite golf club shaft. While the example of a straight graphite golf club shaft is provided, the present application is also applicable to straight steel golf club shafts, straight hybrid steel and graphite golf club shafts, and other types of straight golf club shafts. The golf shaft **104** may include one or more tapered (stepped) outer portions or may be a stepless shaft. An interior of the golf shaft **104** is hollow. The straight golf club shaft **104** includes zero bends and extends along one axis.
(13) The golf shaft **104** includes a tip end **108** and a butt end **112**. The outer diameter of the butt end **112** may be greater than the outer diameter of the tip end **108**. A golf club head can be attached via the tip end **108** of the golf shaft **104**. A golf grip can be fixed at the butt end **112** of the golf shaft **104** and extend toward the tip end **108**. An interior diameter of the golf shaft **104** may decrease moving from the butt end **112** toward the tip end **108**. The decreasing may be gradual via tapered portions and/or stepwise in the example of stepped portions.
(14) FIGS. **2** and **3** include perspective views of example putter heads for golf clubs. FIG. **2** includes a left-handed putter head **204** including a cylindrical post **208**. The cylindrical post **208** is part of the putter head **204** and is provided for attachment of a golf shaft via an inner diameter

(hollow interior) of the golf shaft. In other words, an outer diameter of the cylindrical post **208** may be fixed to an inner diameter of the tip end of a golf shaft. The cylindrical post **208** may be referred to as a spud.

(15) FIG. **3** includes a right-handed putter head **304** that does not include a cylindrical post. Instead, the putter head **304** includes a cylindrical recessed portion (cup or bore) **308** that is provided for attachment of a golf shaft via an outer diameter and surface of the golf shaft. In other words, an outer diameter of the cylindrical recessed portion **308** may be fixed to an outer diameter of the tip end of a golf shaft.

(16) The cylindrical recessed portion **308** may be slightly larger than (e.g., 0.01″ larger or another suitable value) approximately 0.350″ to 0.500″ for straight graphite shafts that do not have a tapered tip end and slightly larger than approximately 0.333″ to 0.370″ for some straight golf shafts that have a tapered tip end. The taper rate of tip ends of graphite golf shafts having tapered tip ends may be approximately 0.0075 inches diameter (e.g., outer) per inch axially to 0.02 inches diameter per inch axially or another suitable taper rate.

(17) The present application is applicable for use with right-handed putter heads, left handed putter heads, putter heads with cylindrical posts (e.g., **208**), and putter heads with cylindrical recessed portions (e.g., **308**). Also, while example types of putter heads are illustrated, the present application is also applicable to other types of putter heads, such as blade putter heads, half mallet putter heads, (full) mallet putter heads, and other types of putter heads.

(18) Bent graphite and carbon fiber golf club shafts are difficult and costly to manufacture and may be susceptible to damage. Steel golf shafts including one or more bends club shafts may be more easily manufactured and may be less costly than even straight graphite shafts and straight carbon fiber golf shafts.

(19) The present application involves a carbon fiber tip that includes one or more bends. The carbon fiber tip allows a straight (e.g., graphite or carbon fiber or steel) golf shaft (and other types of straight golf shafts) to be attached to a putter head via the carbon fiber tip instead of using a putter shaft that itself with one or more bends. Golf shafts with one bend may be referred to as single bend golf shafts, while golf shafts with two bends may be referred to as double bend golf shafts.

(20) The carbon fiber tip is configured to not change the loft angle or the lie angle of the putter head outside of predetermined ranges despite the use of a straight golf shaft. Example lie angles may be approximately 70 degrees+/−10 degrees with respect to a flat ground surface. Example loft angles may be approximately 2 to 7 degrees with respect to a flat ground surface.

(21) FIG. **4** is a side view of an example carbon fiber tip **404** that includes two bends. The carbon fiber tip **404** includes a shaft (first) end **408** and a head (second) end **412**. The head end **412** is to be connected to a golf club head, such as putter heads with a cylindrical post (e.g., **208**) or with a cylindrical recessed portion (e.g., **308**). The shaft end **408** is to be connected to a straight golf shaft, such as a straight graphite golf shaft or a straight carbon fiber golf shaft or a straight steel golf shaft. The head end **412** may be joined with/fixed to the putter head, for example, by via an adhesive such as an epoxy or in another suitable manner. The carbon fiber tip **404** may be a hollow cylindrical tube with one or more bends.

(22) A portion of a cylindrical tube **416** may be fixed within the interior of the carbon fiber tip **404** at the shaft end **408**. The cylindrical tube **416** may be joined with/fixed to the interior of the carbon fiber tip **404**, for example, by via an adhesive such as an epoxy or in another suitable manner. In various implementations, the carbon fiber tip **404** may be over molded onto the cylindrical tube **416**. The cylindrical tube **416** may be, for example, steel, a metal, an alloy, a plastic, carbon fiber, or another suitable material. The carbon fiber tip **404** may be compression molded with a foam inside of the carbon fiber tip **404** or manufactured in another suitable manner.

(23) The remainder of the cylindrical tube **416** may extend outwardly past the shaft end **408**. The remainder of the cylindrical tube **416** extends into the hollow interior of the straight golf shaft **104**

and is fixed within or joined to the straight golf shaft **104**. The cylindrical tube **416** may be joined with/fixed to tip end **108** of the straight golf shaft **104**, for example, by via an adhesive such as an epoxy or in another suitable manner.

(24) In the example of FIG. **4**, the carbon fiber tip **404** includes two bends **420** and **424**. The axis along which the carbon fiber tip **404** extends changes at each of the bends **420** and **424**.

(25) FIG. **5** includes another perspective view of the example of the carbon fiber tip **404**. As illustrated in FIG. **5**, from the carbon fiber tip **404** extends along a first axis **504** from the end **412** to the bend **424**. Between the bend **424** and the bend **420**, the carbon fiber tip **404** extends along a second axis **508**. Between the bend **420** and the end **408**, the carbon fiber tip **404** extends along a third axis **512**. The first axis **504** is not coaxial with the second axis **508** and is not coaxial with the third axis **512**. The second axis **508** is not coaxial with the third axis **512**. In various implementations, the first axis **504** may intersect the second axis **508** at only one point. In various implementations, the second axis **508** may intersect the third axis **512** at only one point. In various implementations, the first axis **504** may or may not intersect the third axis **512** if the first and third axes **504** and **512** are extended into space.

(26) FIGS. **6**, **7**, and **8** includes other perspective views of the example of the carbon fiber tip **404**. FIG. **7** is from the perspective facing the head end **412**.

(27) FIGS. **9-12** include perspective views of an example of the carbon fiber tip **404** including only a single bend **904**. In this example, the carbon fiber tip **404** extends along a first axis **908** between the head end **412** and the bend **904**. The carbon fiber tip **404** extends along a second axis **912** between the bend **904** and the shaft end **408**. In various implementations, the first and second axes **908** and **912** are not coaxial and may intersect at only one point.

(28) FIG. **10** is from the perspective facing the head end **412**. FIG. **12** illustrates a spud (e.g., **208**) extending into the interior of the head end **412** at **1204**. In other words, the end **412** may include a cylindrical inner portion **1204** that is configured to receive a cylindrical post, such as the post **208** of FIG. **2**.

(29) In various implementations, one or more vent apertures **1208** may extend through the adapter **404** (from an outer diameter) to the cylindrical inner portion **1204**. The aperture(s) **1208** may prevent the cylindrical post of the putter head from being pushed out of the cylindrical inner portion **1204**, such as by an adhesive during curing. The aperture(s) **1208** may be, for example, perpendicular to the cylindrical walls of the cylindrical inner portion **1204**.

(30) FIGS. **13** and **14** include example perspective views of the carbon fiber tip **404** including two bends joined with a straight golf shaft **104**.

(31) The carbon fiber tip **404** may be joined with/fixed to the tip end **108** of the straight golf shaft via an adhesive such as an epoxy, co-bonded (e.g., cured with the straight shaft while connected to the golf shaft), or in another suitable manner. The carbon fiber tip **404** may be joined with the straight golf shaft with the shaft end **408** facing the tip end **108** and with the shaft end **408** close to or directly contacting the tip end **108**.

(32) In the example of the tip end **108** not directly contacting the shaft end **408** of the carbon fiber tip **404**, a gap between the tip end **108** and the shaft end **408** may be filled, such as with an epoxy, and smoothed.

(33) For example, FIG. **15** includes a perspective view of an example of the carbon fiber tip **404** joined with the straight golf shaft **104**. A gap **1504** is disposed between the tip end **108** of the straight golf shaft **104** and the shaft end **408** of the carbon fiber tip **404**. The gap **1504** may be filled with one or more materials, such as with an epoxy, to provide a constant outer diameter or taper rate from the tip end **108** to the shaft end **408**, such as illustrated in FIGS. **13** and **14**. The epoxy or other material may be smoothed while the epoxy is still wet (not yet cured), such as using a squeegee or a sponge. The epoxy or other material may be sanded after being cured to provide a smooth outer surface where the gap **1504** was. The material added to the gap **1504** may be the same color as the material of the carbon fiber tip **404** and the straight golf shaft **104**. In various

implementations, the material added to fill the gap **1504** may be included in the carbon fiber tip **404** and/or the straight golf shaft **104**. FIG. **15** also illustrates an example single piece steel shaft **1508** having similar bends to that accomplished using the carbon fiber tip **404**.

(34) The end **408** may be cylindrical, and the end **412** may be cylindrical. The end **412** may be configured to fit within a cylindrical recessed portion of the putter head, such as **308** of FIG. **3**. In this example, an outer diameter of the first end **408** is fixed to an inner diameter of the cylindrical recessed portion of the putter head.

(35) The use of the carbon fiber tip **404** allows for the head end **412** to have a smaller outer diameter than the head ends of other carbon fiber shafts because a wall thickness of the head end **412** is less than the wall thicknesses of the head ends of other carbon fiber shafts. The diameter of the head end **412** of the carbon fiber tip **404** may be, for example, approximately 0.370 inches or less.

(36) The head end **412** of the carbon fiber tip **404** may be joined with/fixed to the putter head, for example, by via an adhesive such as an epoxy or in another suitable manner. The end **408** may be joined with/fixed to the tip end of the straight golf shaft via an adhesive such as an epoxy, co-bonded (e.g., cured with the straight graphite shaft while connected to the straight graphite golf shaft), or in another suitable manner.

(37) FIG. **16** includes an example perspective view of the carbon fiber tip **404** joined with/fixed to the shaft end **408** with the straight golf shaft **104** and joined with/fixed to a golf club head **1604**, such as a putter head.

(38) While the example of the carbon fiber tip and the straight carbon fiber golf shaft is described above, the present application and the above is also applicable to a single piece carbon fiber golf shaft that is made of carbon fiber and an epoxy (no other material) and that includes one or more bends. The single piece would include both a straight section (e.g., like the straight carbon fiber golf shaft above) and one or more bends (e.g., like the carbon fiber tip above).

(39) The foregoing description is merely illustrative in nature and is in no way intended to limit the disclosure, its application, or uses. The broad teachings of the disclosure can be implemented in a variety of forms. Therefore, while this disclosure includes particular examples, the true scope of the disclosure should not be so limited since other modifications will become apparent upon a study of the drawings, the specification, and the following claims. It should be understood that one or more steps within a method may be executed in different order (or concurrently) without altering the principles of the present disclosure. Further, although each of the embodiments is described above as having certain features, any one or more of those features described with respect to any embodiment of the disclosure can be implemented in and/or combined with features of any of the other embodiments, even if that combination is not explicitly described. In other words, the described embodiments are not mutually exclusive, and permutations of one or more embodiments with one another remain within the scope of this disclosure.

(40) Spatial and functional relationships between elements (for example, between modules, circuit elements, semiconductor layers, etc.) are described using various terms, including “connected,” “engaged,” “coupled,” “adjacent,” “next to,” “on top of,” “above,” “below,” and “disposed.” Unless explicitly described as being “direct,” when a relationship between first and second elements is described in the above disclosure, that relationship can be a direct relationship where no other intervening elements are present between the first and second elements, but can also be an indirect relationship where one or more intervening elements are present (either spatially or functionally) between the first and second elements. As used herein, the phrase at least one of A, B, and C should be construed to mean a logical (A OR B OR C), using a non-exclusive logical OR, and should not be construed to mean “at least one of A, at least one of B, and at least one of C.”

Claims

1. A carbon fiber tip to connect a straight carbon fiber golf shaft with a golf club head, the carbon fiber tip comprising: a first end that is cylindrical and that is configured to be joined with the golf club head; a second end that opposite the first end, that is cylindrical, and that is configured to be joined with a tip end of the straight carbon fiber golf shaft; a bend disposed between the first end and the second end that changes an axis along which the carbon fiber tip extends; and a foam that is compression molded within the carbon fiber tip.
2. A golf club, comprising: the straight carbon fiber golf shaft having a tip end and a grip end that is opposite the tip end; the golf club head; and the carbon fiber tip of claim 1, wherein the first end of the carbon fiber tip is joined with the golf club head and the second end of the carbon fiber tip is joined with the tip end of the straight carbon fiber golf shaft.
3. The golf club of claim 2 wherein the golf club head is a putter head.
4. The golf club of claim 2 wherein the first end of the carbon fiber tip is fixed to the golf club head via an adhesive.
5. The golf club of claim 2 wherein the second end of the carbon fiber tip is fixed to the tip end of the straight carbon fiber golf shaft via an adhesive.
6. The golf club of claim 2 wherein the second end of the carbon fiber tip is fixed to the tip end of the straight carbon fiber golf shaft via the carbon fiber tip and the straight carbon fiber golf shaft having been cured together.
7. The carbon fiber tip of claim 1 wherein the first end includes a cylindrical recessed portion configured to receive a cylindrical post on the golf club head.
8. The carbon fiber tip of claim 1 wherein an outer diameter of the first end is between 0.3 inches to 0.4 inches.
9. A tip comprising: the carbon fiber tip of claim 1; and a cylindrical tube disposed within the second end that extends outwardly past the second end of the carbon fiber tip.
10. The tip of claim 9 wherein the carbon fiber tip is co-molded onto the cylindrical tube.
11. The tip of claim 9 wherein the cylindrical tube is to extend into a tip end of the straight carbon fiber golf shaft.
12. The tip of claim 9 wherein the cylindrical tube is made of one of steel, a metal, an alloy, and carbon fiber.
13. The carbon fiber tip of claim 1 wherein the straight carbon fiber golf shaft is straight axially and does not include any bends along the axis of the straight carbon fiber golf shaft.
14. The carbon fiber tip of claim 1 further comprising a second bend disposed between (a) the bend and (b) the first end.
15. The carbon fiber tip of claim 14 wherein the carbon fiber tip: extends axially along a first axis between the bend and the second end; extends axially along a second axis between the bend and the second bend; and extends axially along a third axis between the second bend and the first end, wherein the first axis is not coaxial with the second axis, and the second axis is not coaxial with the third axis.
16. The carbon fiber tip of claim 15 wherein the first axis is not coaxial with the third axis.
17. The carbon fiber tip of claim 15 wherein the first axis intersects the second axis at only one point, and the second axis intersects the third axis at only one point.
18. A golf shaft for a putter, the golf shaft comprising: a straight carbon fiber golf shaft having a tip end and a grip end that is opposite the tip end; and the carbon fiber tip of claim 1, the first end of the carbon fiber tip to be joined with the golf club head and the second end of the carbon fiber tip to be joined with the tip end of the straight carbon fiber golf shaft.
19. A carbon fiber tip to connect a straight carbon fiber golf shaft with a golf club head, the carbon fiber tip comprising: a first end that is cylindrical and that is configured to be joined with the golf club head; a second end that opposite the first end, that is cylindrical, and that is configured to be joined with a tip end of the straight carbon fiber golf shaft; and a bend disposed between the first

end and the second end that changes an axis along which the carbon fiber tip extends, wherein the first end includes a cylindrical recessed portion, and wherein the first end includes one or more apertures that extend through a side wall of the carbon fiber tip and to the cylindrical recessed portion.