A nock mounting system for an arrow including a nock adapter which has a shaft end and a nock end. The shaft end has an internal surface for receiving and engaging the arrow shaft. The nock end has an extension for engaging an internal mounting surface of the nock. The extension has locking ridges for engaging indentations in the internal mounting surface of the nock. The nock adapter has a tapered body whose diameter slightly exceeds the outer diameter of the arrow shaft and which is equal to the outer diameter of the nock to provide a streamlined nock assembly.
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ARROW NOCK WITH ADAPTER

The present invention relates to nock assemblies for arrows. More specifically, the field of the invention is that of nock adapters for arrows.

Arrows consist of three basic varieties of shafts: aluminum, carbon, and aluminum-carbon. Each variety has a number of different sizes, all with common problems which are inherently involved in mounting nocks. About 12 to 15 different sizes of carbon arrows are common. Typically, the shaft of a carbon arrow is cylindrical and has a relatively small outer diameter as compared to aluminum arrows. On prior art carbon arrows, a plastic nock with an inner bore which has a larger diameter than the outer diameter of the carbon arrow is fitted over the carbon arrow shaft. Alternately, a metal nock adapter cap with an adhesively attached nock is fitted over the carbon arrow shaft. However, the larger nock creates nock collision with the arrow rest, thus disrupting the flight of the arrow. Collisions with arrow rests are undesired because they interfere with the accuracy and speed of the arrow's flight.

A suitable nock mounting system is described in U.S. Patent No. 5,067,731 to Bickel, assigned to the assignee of the present invention, the disclosure of which is explicitly incorporated herein by reference. In the Bickel system, one end of the nock adapter receives the shaft and the other end receives the nock and the external surface of the adapter is generally cylindrical including a forward portion which tapers down to the outer diameter of the shaft.

A problem associated with any arrow involves situations when an arrow strikes the back end of another arrow, which is sometimes referred to as a robin hood shot. A robin hood shot often damages or destroys the nock and splits the arrow shaft. With a plastic nock, a robin hood shot usually destroys the nock and damages the arrow. With a plastic nock and metal adapter, a robin
hood shot usually destroys the nock while the adapter and shaft absorb the force of the oncoming arrow. This may still damage the arrow depending on the force of the shot and the strength of the adapter. Damage to the arrow shaft should be avoided because of its relatively high cost in comparison with the nock.

Another problem in the archery art is that each of the above mentioned sizes of carbon arrows needs a particular size of nock. This requires that numerous types of nocks be provided which may not be optimal or even compatible to more than one size carbon arrow. Nocks are broken more frequently than nock adapters. Large volumes of inventory are therefore required to adequately stock nocks for the various arrow sizes.

What is needed is a streamlined nock adapter which is smaller in size to eliminate collision with arrow rests and to reduce the drag on the arrow. Also what is needed is a low weight nock adapter capable of providing a nock mount for all the various available carbon arrow sizes. A further need exists for a nock adapter which allows for easier attaching and detaching of nocks. Yet another need exists for a nock adapter which minimizes damage from robin hood shots.

The present invention provides a nock mounting system for an arrow. A nock adapter has a shaft end for receiving the arrow shaft, and a nock end for engaging the internal mounting surface of the nock. The present invention provides a streamlined nock mounting system for arrows which allows one size of nock to be used with all arrow shaft and nock adapter sizes.

The nock end of the nock adapter has an aperture with an internal surface corresponding to the external surface of the shaft. The body of the nock adapter has an external surface including a tapered portion and a cylindrical portion, the cylindrical portion having a diameter greater than the diameter of the shaft. The cylindrical portion abuts the tapered portion, which
extends from the cylindrical portion to the shaft. The outer diameter of the nock abuts the cylindrical portion and is approximately coextensive with the outer diameter of the cylindrical portion.

The nock end of the nock adapter includes an extension which corresponds in shape to the shape of an internal mounting surface of the nock. The extension and the nock internal mounting surface are generally cylindrical. The extension includes a barb or locking ridge, and the internal mounting surface includes an annular indentation for engaging the locking ridge. The barb or locking ridge has a slanted surface with the outer diameter being increasingly larger at portions which are further from the nock end. The extension thereby engages the nock internal mounting surface. The extension also includes a tapered end for facilitating the insertion of the nock over the extension.

The present invention, in one form, comprises an arrow assembly comprising a shaft, a nock, and a nock adapter. The nock includes an internal mounting surface. The nock adapter secures the nock to the shaft. The nock adapter has a first end with an aperture engaging one end of the shaft, and a second end having an extension engaging the nock internal mounting surface.

The above mentioned and other features and objects of this invention, and the manner of attaining them, will become more apparent and the invention itself will be better understood by reference to the following description of an embodiment of the invention taken in conjunction with the accompanying drawings, wherein:

Figure 1 is an exploded elevational view of the nock assembly of the present invention.

Figure 2 is an elevational view of an arrow assembly.

Figure 3 is an exploded elevational view of another embodiment of the nock assembly of the present invention.

Corresponding reference characters indicate corresponding parts throughout the several views.
Although the drawings represent an embodiment of the present invention, the drawings are not necessarily to scale and certain features may be exaggerated in order to better illustrate and explain the present invention. The exemplification set out herein illustrates one embodiment of the invention, in one form, and such exemplifications are not to be construed as limiting the scope of the invention in any manner.

The preferred embodiment disclosed below is not intended to be exhaustive or limit the invention to the precise form disclosed in the following detailed description. Rather, the embodiment is chosen and described so that others skilled in the art may utilize its teachings.

The nock mounting system of the present invention includes arrow shaft 20, nock adapter 22, and nock 24 as shown in Figures 1 and 2. Arrow shaft 20 is of the conventional carbon shaft type, and has a relatively small diameter, i.e., in the range of 4 millimeters (mm) to 7 mm. Nock adapter 22 connects nock 24 with shaft 20 so that furrow 26 formed between nock wings 28 may receive a bow string (not shown). Both shaft 20 and the end of nock 24 having wings 28 are of conventional design, and any suitable arrangement of these parts may be included in the present invention.

In accordance with the present invention, nock adapter body 22 includes shaft end 30 and nock end 32 for connecting with shaft 20 and nock 24, respectively. Shaft end 30 includes aperture 34 which has a shape generally corresponding to the external surface of shaft 20, which in the exemplary embodiment is generally cylindrical for receiving the generally cylindrical shaft 20. A glue or other adhesive is conventionally used to secure shaft 30 within aperture 34. Shaft end 30 also includes external tapered surface 36 and external cylindrical surface 38. Tapered surface 36 extends from about the outer diameter of shaft 20 to abut cylindrical portion 38. Cylindrical
portion 38 has an outer diameter greater than the outer
diameter of shaft 20, e.g., the outer diameter of
cylindrical portion 38 being approximately 6.9 mm. The
outer diameter of shaft 20 is in the range of 4 mm - 7 mm.
Nock adapter body 22 comprises a suitable lightweight,
strong material such as graphite or, as in the exemplary
embodiment, aluminum. Nock end 32 includes extension 40
for attaching with nock 24 as explained in greater detail
below.

Also in accordance with the present invention, nock
body 24 includes recess 42 defining an internal mounting
surface corresponding to the external mounting surface of
extension 40 for engaging extension 40. In the exemplary
embodiment, extension 40 has a generally cylindrical
external surface, and recess 42 has a generally
cylindrical external surface. To enhance the engagement
of extension 40 with recess 42, extension 40 includes at
least one barb or locking ridge 44, with three locking
ridges 44 being provided in the exemplary embodiment.
Recess 42 includes corresponding annular indentations 46
for engaging each locking ridge 44. Alternatively recess
42 could be smooth. Each locking ridge 44 includes a
slanted frusto-conical surface which has an outer diameter
that increases at portions being a greater distance from
nock end 32 so that locking ridges 44 extends into
indentations 46 to form an interference fit. Nock end 32
includes tapered surface 48 which facilitates the
insertion of extension 40 into recess 42. An adhesive may
be used to secure extension 40 to recess 42. Nock 24 may
be made of a conventional plastic, wood, or other suitable
material.

The end of nock body 24 which includes recess 42
abuts cylindrical portion 38 of nock adapter body 22. The
outer diameter of nock body 24 is approximately
coextensive with the outer diameter of cylindrical portion
38. This creates a streamlined outer surface of the arrow
assembly, wherein the nock assembly of nock adapter 22 and
nock 24 has a slight taper then a smooth cylindrical outer surface, thereby reducing drag on the arrow assembly and increasing the accuracy. Also, the relatively light weight of nock adapter 22 and nock 24 minimizes the weight of the arrow assembly. In the case of a robin hood shot nock 24 may be damaged, but nock adapter 22 protects shaft 20 from any damage and can be used to mount a new nock 24.

Fig. 3 shows an alternative embodiment of the nock adapter 22. In this embodiment, shaft end 30 tapers continuously from nock end 32 to the left hand end of shaft end 30.

While this invention has been described as having a preferred design, the present invention may be further modified within the spirit and scope of this disclosure. This application is therefore intended to cover any variations, uses, or adaptations of the invention using its general principles. Further, this application is intended to cover such departures from the present disclosure as come within known or customary practice in the art to which this invention pertains.
CLAIMS

1. A nock adapter for attaching a nock to an arrow shaft, the nock having an internal mounting surface and a furrowed end, said nock adapter comprising a body with an arrow shaft end and a nock end, said arrow end having means for engaging a said arrow shaft including an aperture, said nock end having a means for engaging a nock including an extension for engaging the nock internal mounting surface.

2. The nock adapter of Claim 1 wherein said aperture has an internal surface corresponding to the external surface of the arrow shaft.

3. The nock adapter of Claim 1 wherein said body has an external surface including a tapered portion.

4. The nock adapter of Claim 3 wherein said external surface includes a cylindrical portion having a diameter greater than the diameter of the arrow shaft.

5. The nock adapter of Claim 4 wherein said cylindrical portion abuts said tapered portion, and said tapered portion extends from said cylindrical portion to said shaft end.

6. The nock adapter of Claim 1 wherein said extension is generally cylindrical.

7. The nock adapter of Claim 6 wherein said extension includes a locking ridge.

8. The nock adapter of Claim 7 wherein said locking ridge has a slanted surface with the outer diameter being increasingly larger at portions which are at a greater distance from said nock end.

9. The nock adapter of Claim 1 wherein said extension includes means for engaging the nock internal mounting surface.

10. The nock adapter of Claim 1 wherein said extension includes a tapered end.

11. A nock assembly for mounting a nock on an arrow shaft, said nock assembly comprising:
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a nock including an internal mounting surface;

and

a nock adapter for securing said nock to a said shaft, said nock adapter having a first end with an aperture engaging one end of said shaft, and a second end having an extension engaging said nock internal mounting surface.

12. The nock assembly of Claim 11 wherein said aperture has an internal surface corresponding to the external surface of the arrow shaft.

13. The nock assembly of Claim 11 wherein said body has an external surface including a tapered portion.

14. The nock assembly of Claim 13 wherein said external surface includes a cylindrical portion having a diameter greater than the diameter of the arrow shaft.

15. The nock assembly of Claim 14 wherein said cylindrical portion abuts said tapered portion, and said tapered portion extends from said cylindrical portion to said first end.

16. The nock assembly of Claim 15 wherein said nock has an outer diameter which abuts said cylindrical portion and is approximately coextensive with the outer diameter of said cylindrical portion.

17. The nock assembly of Claim 11 wherein said extension is generally cylindrical.

18. The nock assembly of Claim 17 wherein said internal mounting surface is generally cylindrical.
19. The nock assembly of Claim 17 wherein said extension includes a locking ridge.

20. The nock assembly of Claim 19 wherein said internal mounting surface is generally cylindrical and includes an annular indentation engaging said locking ridge.

21. The nock assembly of Claim 19 wherein said locking ridge has a slanted surface with the outer diameter being increasingly larger at portions which are at a greater distance from said second end.

22. The nock assembly of Claim 11 wherein said extension includes means for engaging the nock internal mounting surface.

23. The nock assembly of Claim 11 wherein said extension includes a tapered end.

24. An arrow assembly comprising:
   a shaft;
   a nock including an internal mounting surface;
and
   a nock adapter for securing said nock to said shaft, said nock adapter having a first end including an aperture which engages one end of said shaft, and a second end having an extension which engages said nock internal mounting surface.

25. The arrow assembly of Claim 24 wherein said aperture has an internal surface corresponding to the external surface of said shaft.
26. The arrow assembly of Claim 24 wherein said body has an external surface including a tapered portion.

27. The arrow assembly of Claim 26 wherein said external surface includes a cylindrical portion having a diameter greater than the diameter of said shaft.

28. The arrow assembly of Claim 27 wherein said cylindrical portion abuts said tapered portion, and said tapered portion extends from said cylindrical portion to said one end of said shaft.

29. The arrow assembly of Claim 28 wherein said nock has an outer diameter which abuts said cylindrical portion and is approximately coextensive with the outer diameter of said cylindrical portion.

30. The arrow assembly of Claim 24 wherein said extension is generally cylindrical.

31. The arrow assembly of Claim 30 wherein said internal mounting surface is generally cylindrical.

32. The arrow assembly of Claim 30 wherein said extension includes a locking ridge.

33. The arrow assembly of Claim 32 wherein said internal mounting surface is generally cylindrical and includes an annular indentation engaging said locking ridge.

34. The arrow assembly of Claim 32 wherein said locking ridge has a slanted surface with the outer diameter being increasingly larger at portions which are at a greater distance from said second end.
35. The arrow assembly of Claim 24 wherein said extension includes means for engaging the nock internal mounting surface.

36. The arrow assembly of Claim 24 wherein said extension includes a tapered end.
### A. CLASSIFICATION OF SUBJECT MATTER

| IPC 6 | F42B/06 |

According to International Patent Classification (IPC) or to both national classification and IPC

### B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbol)

| IPC 6 | F42B |

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

### C. DOCUMENTS CONSIDERED TO BE RELEVANT

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### Date of the actual completion of the international search

5 March 1996

### Date of mailing of the international search report

14.03.96

**Name and mailing address of the ISA**

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**Authorized officer**

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**INTERNATIONAL SEARCH REPORT**

**Publication Date:**
- US-A-5234220: 10-08-93
- US-A-5439231: 08-08-95
- US-A-4305588: 15-12-81

**Patent Family (s):**

Form PCT/ISA/21B (patent family annex) (July 1992)