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UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF OREGON

EXTREME TECHNOLOGIES, INC. DBA BOWTECH, an Oregon Corporation,

Plaintiff,

v.

OUTDOR INNOVATIONS, LLC, an Ohio Limited Liability Company,

Defendant.

Case No. 6:07-CV-729 (HO)

FIRST AMENDED COMPLAINT
Declaratory Judgment of Non-Infringement of Patents
DEMAND FOR JURY TRIAL

JURISDICTION

1. Federal question jurisdiction exists under 28 U.S.C. §§ 1331, 1338, and 2201(a).

2. Venue in this district is proper under 28 U.S.C. §§ 1391 and 1400.

3. Plaintiff Extreme Technologies, Inc. dba BowTech ("BowTech") is an Oregon corporation whose address is 90554 Highway 99 North, Eugene, Oregon, 97402. BowTech is in the business of manufacturing and selling unique, high quality compound archery bows and

accessories.

4. Albert A. Andrews ("Andrews") is an individual and the named inventor in United States Patent No. 6,712,057, issued March 30, 2004 and entitled ARCHERY BOW ASSEMBLY (the "`057 patent"), and United States Patent No. 6,786,214, issued September 7, 2004 and entitled BOW ACTUATING SYSTEM (the "`214 patent"), attached as Exhibits 1 and 2, respectively. The `057 and the `214 patents identify his address as 423 Old Tasso Place Rd., Cleveland, Tennessee 37312.

5. According to the records of United States Patent and Trademark Office ("PTO"), Andrews assigned the rights in the `057 and `214 patents to Jeffery Lynn Nish ("Nish") on March 31, 2004, an individual whose address is 960 West 850 South, Suite B, Woods Cross, Utah 84087.

6. On information and belief, Nish was at all material times a Manager of Whisper Creek Archery, LLC ("Whisper Creek Utah"), a Utah limited liability company with registered address 975 West 850 South, Woods Cross, Utah 84087.

7. On information and belief, Nish was at all material times a Manager of Design Innovations, LLC ("Design Innovations"), a Utah limited liability company with registered address 975 West 850 South, Woods Cross, Utah 84087.

8. According to the records of the PTO, Nish assigned the `057 and `214 patents to Design Innovations on May 24, 2005.

9. On information and belief, Whisper Creek Archery, LLC ("Whisper Creek Ohio"), an Ohio limited liability company with registered address 986 Tibbets-Wick Road, Girard, Ohio 44420, was formed on February 23, 2007, to engage in the manufacturing, sale and

distribution of bow and archery products, supplies and components.

10. On information and belief, Defendant Outdoor Innovations, LLC ("Outdoor Innovations"), an Ohio limited liability company with registered address 986 Tibbetts-Wick Road, Girard, Ohio 44420, was formed February 23, 2007 to engage in the ownership, purchase, sale and licensing of intellectual property in the bow and archery industry.

11. On information and belief, on May 10, 2007, Design Innovations and Whisper Creek Utah executed an assignment effective March 1, 2007 of all rights, title, and interest in and to, *inter alia*, the `057 and `214 patents; the registered trademark WHISPER CREEK ARCHERY, registration No. 3,059,987, together with the good will of the business symbolized by the mark; and any and all causes of action and claims for damages for infringement of the `057 and `214 patents.

12. On information and belief, Defendant Outdoor Innovations has granted a non-exclusive license to Whisper Creek Ohio under the `057 and `214 patents.

13. On information and belief, Defendant Outdoor Innovations and Whisper Creek Ohio are commonly owned and controlled.

14. On information and belief, Whisper Creek Utah has operated, and continues to operate under authority of Defendant Outdoor Innovations, a website with domain name "www.whispercreekarchery.com" for the purpose of selling and distributing bow and archery products under the trade name and trademark WHISPER CREEK ARCHERY.

15. On information and belief, Defendant Outdoor Innovations has extensive and on-going contacts with the State of Oregon, as follows:

a. Its licensee, distributor and/or agent Whisper Creek Utah and/or Whisper

Creek Ohio conduct business in Oregon for the sale of WHISPER CREEK ARCHERY ("WCA") brand bows and other products to consumers in Oregon through at least five WCA authorized dealers located throughout the state who are authorized to sell products covered by the `057 and `214 patents.

b. Outdoor Innovations, through Whisper Creek Ohio and/or Whisper Creek Utah, has an extensive and on-going relationship with the dealers in Oregon authorized to sell products covered by the `057 and `214 patents, who through such relationship, are licensed or otherwise authorized by Outdoor Innovations to sell products covered by the `057 and `214 patents and to repair and maintain such products.

c. The WCA brand products are advertised, sold, and promoted in Oregon through dealers licensed or otherwise authorized under the `057 and `214 patents, and such products are advertised in publications distributed in Oregon.

d. Through the WCA interactive website, sales are solicited and contacts made with Oregon consumers and prospective authorized dealers in Oregon for products licensed or otherwise authorized for sale under the `057 and `214 patents. Persons in Oregon, as well as other states, are encouraged to telephone and email Whisper Creek Utah and/or Whisper Creek Ohio about becoming an "Authorized Dealer" of WCA brand products.

e. Outdoor Innovations obtains significant revenue from the sale in Oregon of products licensed or otherwise authorized for sale under the `057 and `214 patents, where there is customer base for WCA brand products.

16. Prior to the assignment of the `057 and `214 patents from Design Innovations and Whisper Creek Utah to Outdoor Innovations, Whisper Creek Utah and/or Whisper Creek Ohio

attempted through threat of lawsuit to prevent BowTech, an Oregon company, from manufacturing, selling and distributing competing products, under claim of right under the `057 and/or `214 patents. Subsequent to the assignment of the patents to Outdoor Innovations, Outdoor Innovations continues the threat of a lawsuit to prevent BowTech from manufacturing, selling and distributing competing products, under claim of right under the `057 and/or `214 patents.

17. As a result of at least the circumstances set forth in paragraphs 9 through 15 hereof, Outdoor Innovations knows or reasonably should know that archery bows are sold in Oregon under license or other authorization under the `057 and `214 patents and are used in the ordinary course of trade. Outdoor Innovations has continuous, systematic, and substantial contacts with the State of Oregon, and through such extensive and on-going contacts it has purposefully directed its activities to Oregon and has purposely availed itself of the privileges of doing business and conducting activities in Oregon.

FIRST CLAIM FOR RELIEF
DECLARATORY JUDGMENT OF NON-INFRINGEMENT

18. BowTech realleges and incorporates by reference paragraphs 1 - 17 above.

19. BowTech and Whisper Creek Utah and/or Whisper Creek Ohio and Outdoor Innovations are competitors in the compound archery bow market. In or about January 2007, patent counsel representing Whisper Creek Utah and/or Whisper Creek Ohio sent a cease and desist letter to BowTech accusing BowTech of infringing the `057 and `214 patents by its manufacture and sale of its line of compound archery bows called "Guardian" and "Commander." Whisper Creek Utah and/or Whisper Creek Ohio invited BowTech to take a

license under the `057 and `214 patents to avoid legal action to enforce their patent rights. In subsequent communications by Whisper Creek Utah and/or Whisper Creek Ohio on or about March 9, April 4, April 19, and May 4, 2007, they reiterated their position that BowTech's compound bows infringe the `057 and `214 patents and threatened patent infringement litigation if the parties could not come to an agreement whereby BowTech would pay a royalty.

20. In response to Whisper Creek Utah and/or Whisper Creek Ohio January 2007 cease and desist letter, BowTech informed them that it understood they were willing and prepared to institute legal action to enforce their patent rights. BowTech informed Whisper Creek Utah and/or Whisper Creek Ohio that the allegations and demands in the cease and desist letter have no basis and that neither the `057 patent or `214 patent have been infringed. BowTech also informed Whisper Creek Utah and/or Whisper Creek Ohio that BowTech has the right to continue to manufacture and sell its compound bows without taking a license under the patents. No meaningful licensing negotiations occurred between BowTech and Whisper Creek Utah and/or Whisper Creek Ohio.

21. Subsequent to the assignment of the patents rights, title and interest under the `057 and `214 patents to Outdoor Innovations, Outdoor Innovations has informed BowTech that it continues to maintain that BowTech infringes one or more claims of the `057 and `214 patents, and BowTech has informed Outdoor Innovations that it continues to dispute that claim.

22. Based on Whisper Creek Utah and/or Whisper Creek Ohio's January 2007 correspondence and subsequent communications to BowTech, and Outdoor Innovations' continued allegation or patent infringement, there is a definite, concrete, and substantial controversy between BowTech and Outdoor Innovations over whether Bowtech's "Guardian"

and "Commander" line of compound hunting bows infringe the `057 or `214 patents. BowTech and Outdoor Innovations have adverse legal interests which are of sufficient immediacy and reality to warrant the issuance of a declaratory judgment that BowTech's "Guardian" and "Commander" line of compound hunting bows do not infringe the `057 or the `214 patents.

23. BowTech has not directly, contributorily, or by inducement infringed any valid, enforceable claim of the `057 or `214 patents and has a right to engage in selling its compound hunting bows without taking a license from Outdoor Innovations.

24. There is a substantial and continuing justiciable controversy between BowTech and Outdoor Innovations as to whether BowTech's manufacture and sale of its "Guardian" and "Commander" line of compound hunting bows infringes the `057 or `214 patents.

25. BowTech is entitled to a declaratory judgment declaring that it has not infringed either the `057 or the `214 patents.

PRAYER FOR RELIEF

WHEREFORE, BowTech requests the following relief:

A. A judgment be entered declaring the claims of the `057 patent and `214 patent are not infringed by BowTech;

B. Pursuant to 35 U.S.C. § 285, an award of reasonable fees be awarded to BowTech; and

/ / /

C. For such other relief as the Court deems just and equitable.

DATED: July 27, 2007

Respectfully submitted,

BIRDWELL & JANKE, LLP

/s/ William A. Birdwell

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DEMAND FOR JURY TRIAL

Pursuant to Fed.R.Civ.P. 38(b), BowTech hereby demands a trial by jury.

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(503) 228-1841
Of Attorneys for Plaintiff Extreme Technologies, Inc. dba BowTech

CERTIFICATE OF SERVICE

I hereby certify that on July 27, 2007 I electronically filed the FIRST AMENDED COMPLAINT , Declaratory Judgment of Non-Infringement of Patents, Demand for Jury Trial, with the Clerk of the Court using the ECF system which will send notification of such filing to the following:

Patrick J. Kouba, Esq.
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Eugene, OR 97401
Attorney for Defendant

RESPECTFULLY SUBMITTED,

DATED: July 27, 2007

/s/ Allen Field

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US006712057B2

(12) **United States Patent**
Andrews

(10) **Patent No.: US 6,712,057 B2**
(45) **Date of Patent: Mar. 30, 2004**

(54) **ARCHERY BOW ASSEMBLY**

(76) Inventor: **Albert A. Andrews**, 423 Old Tasso Place Rd., Cleveland, TN (US) 37312

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **10/256,623**

(22) Filed: **Sep. 27, 2002**

(65) **Prior Publication Data**

US 2003/0084893 A1 May 8, 2003

Related U.S. Application Data

(60) Provisional application No. 60/325,376, filed on Sep. 27, 2001.

(51) **Int. Cl.**[7] **F41B 5/00**
(52) **U.S. Cl.** **124/23.1**
(58) **Field of Search** 124/23.1, 25.6, 124/86, 88

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Primary Examiner—John A. Ricci
(74) *Attorney, Agent, or Firm*—Clark Hill PLC

(57) **ABSTRACT**

An archery bow comprising a riser extending between opposing first and second ends. A limb is coupled to each end of the riser. Each limb has a first end for connecting to the riser and a second distal end. A pocket axle pivotally connects the first ends of each limb to one end of the riser. A strut assembly is operatively coupled between each of the limbs and the riser adjacent the pocket axle for selectively pivoting the limbs relative to the riser thereby allowing manual assembly and tuning of the bow by varying the distance between the distal ends of the limbs.

16 Claims, 5 Drawing Sheets

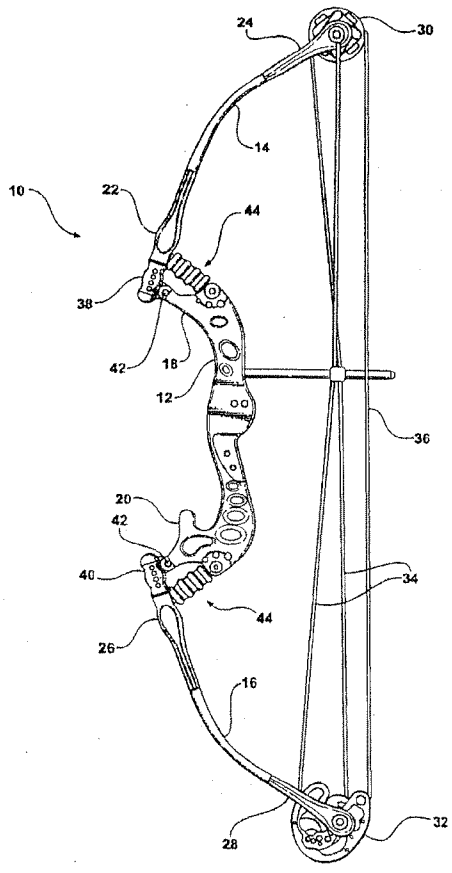

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FIG - 1

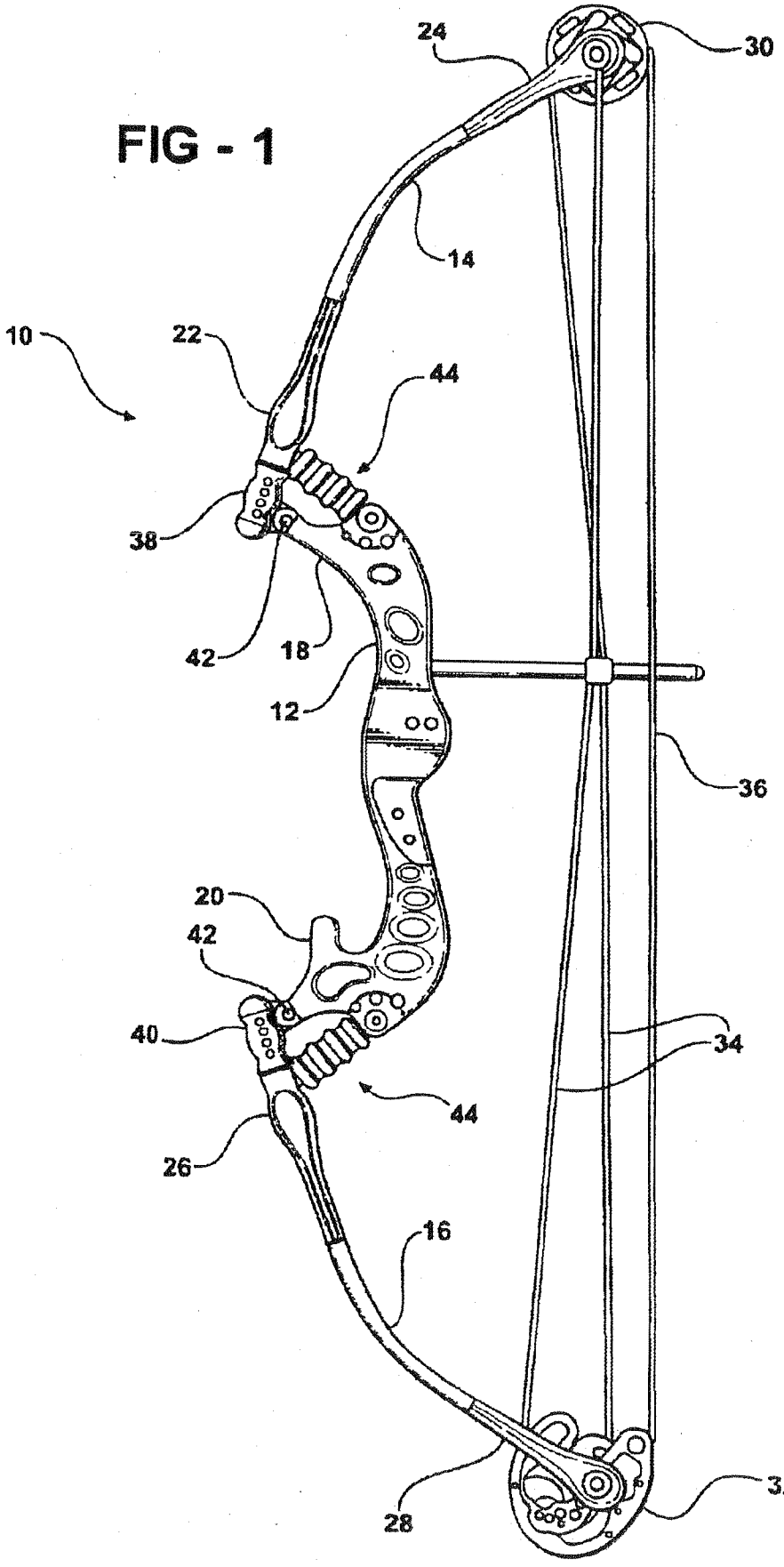

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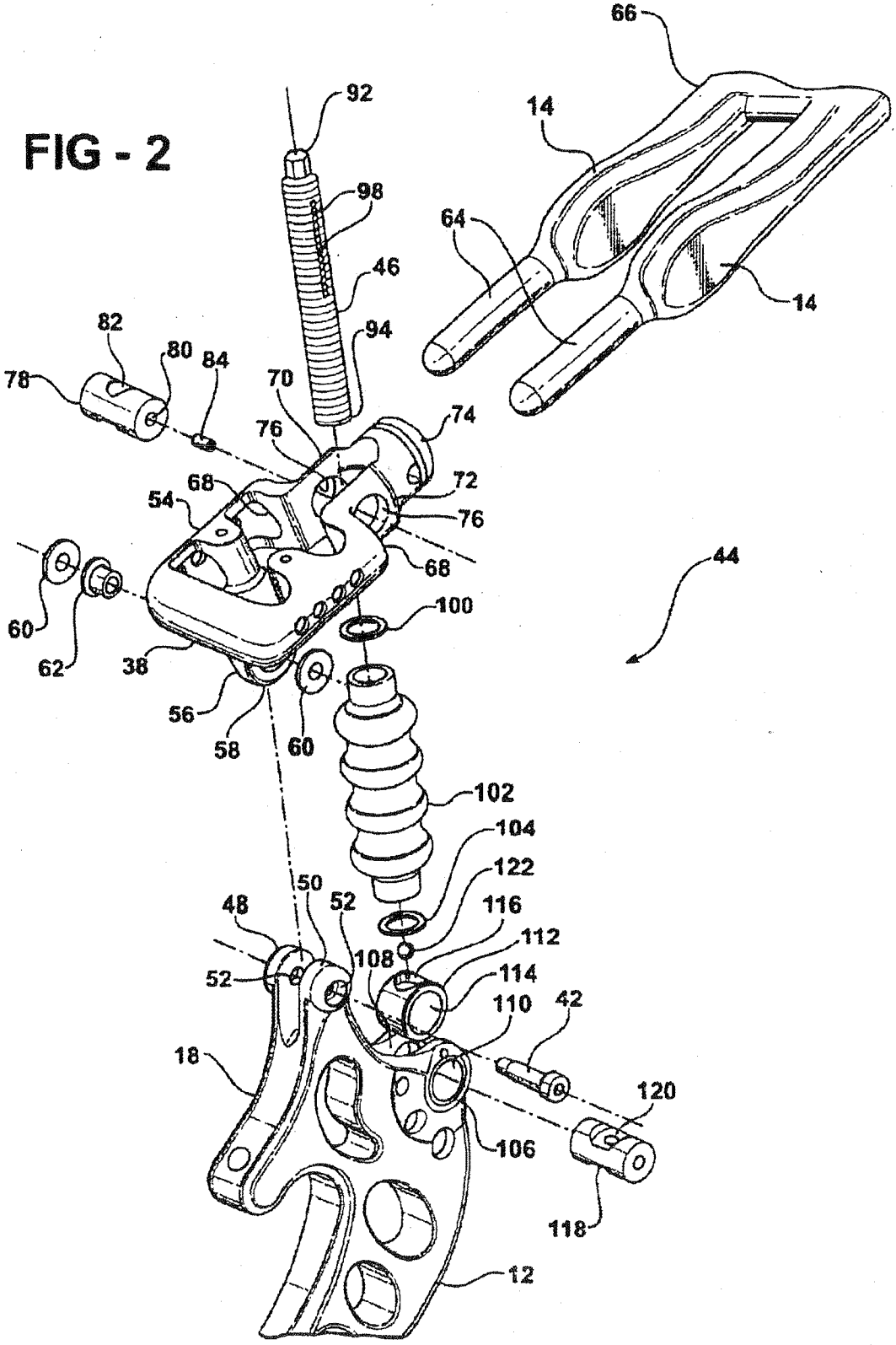
FIG - 2



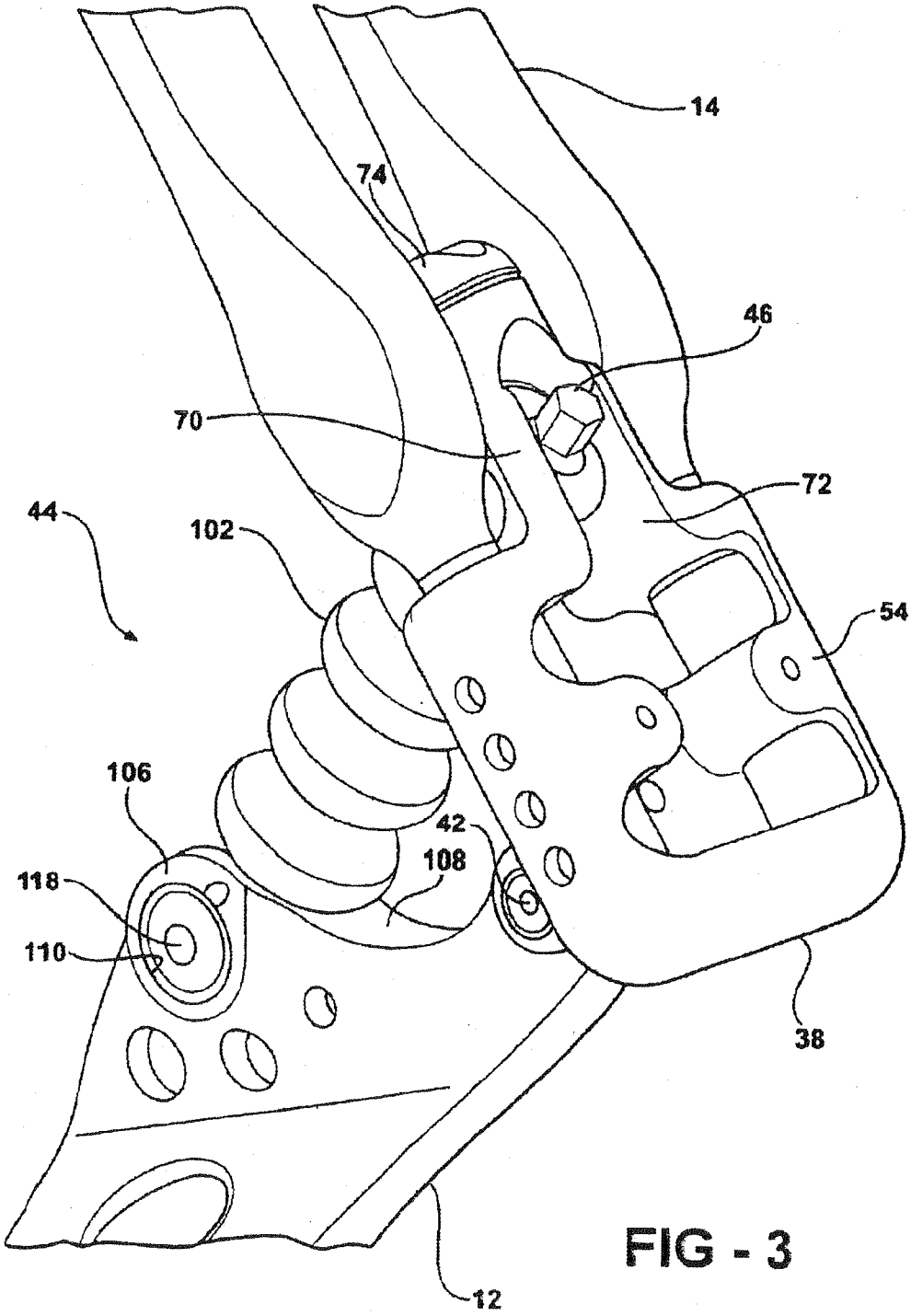


FIG - 3

FIG - 4

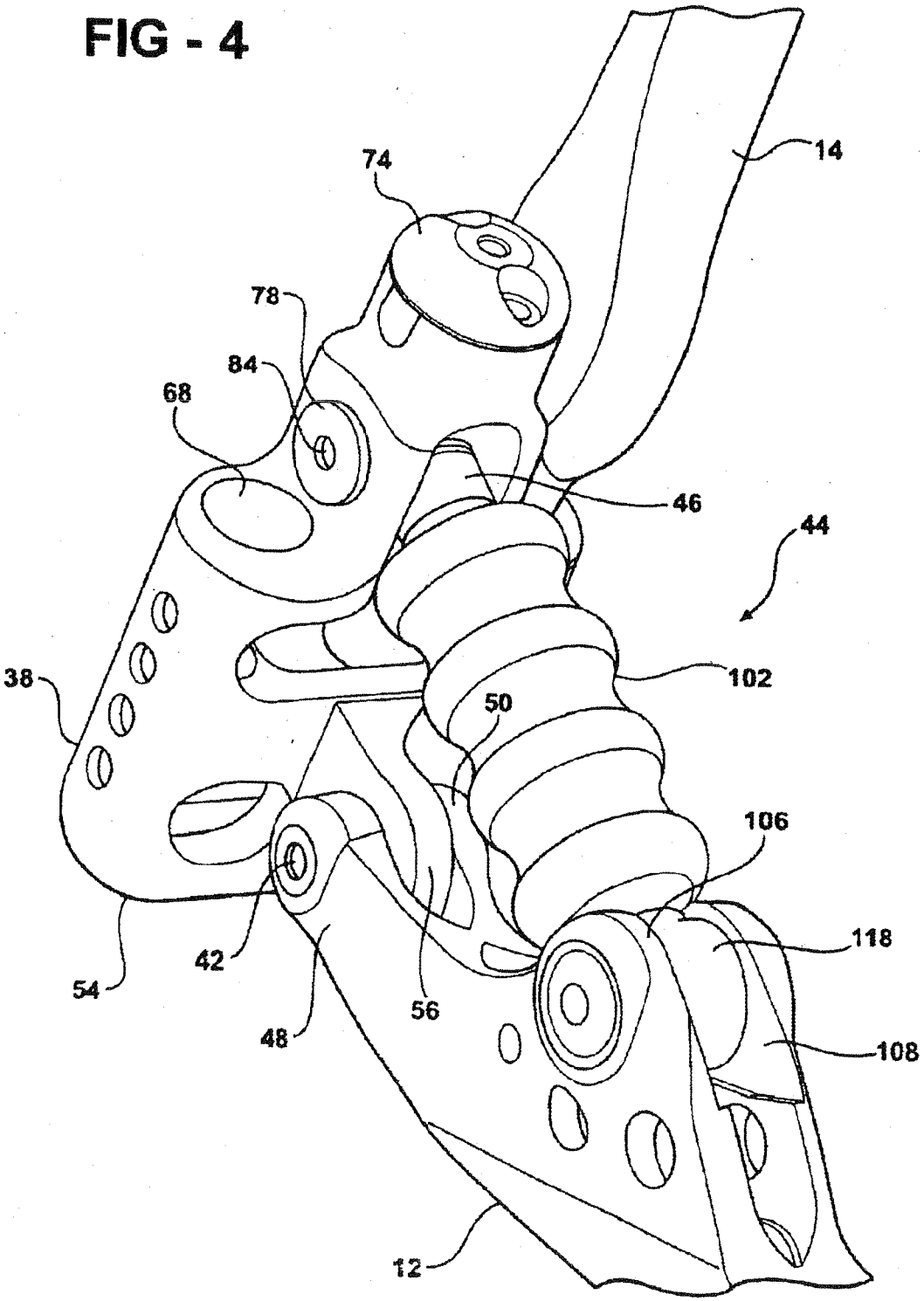


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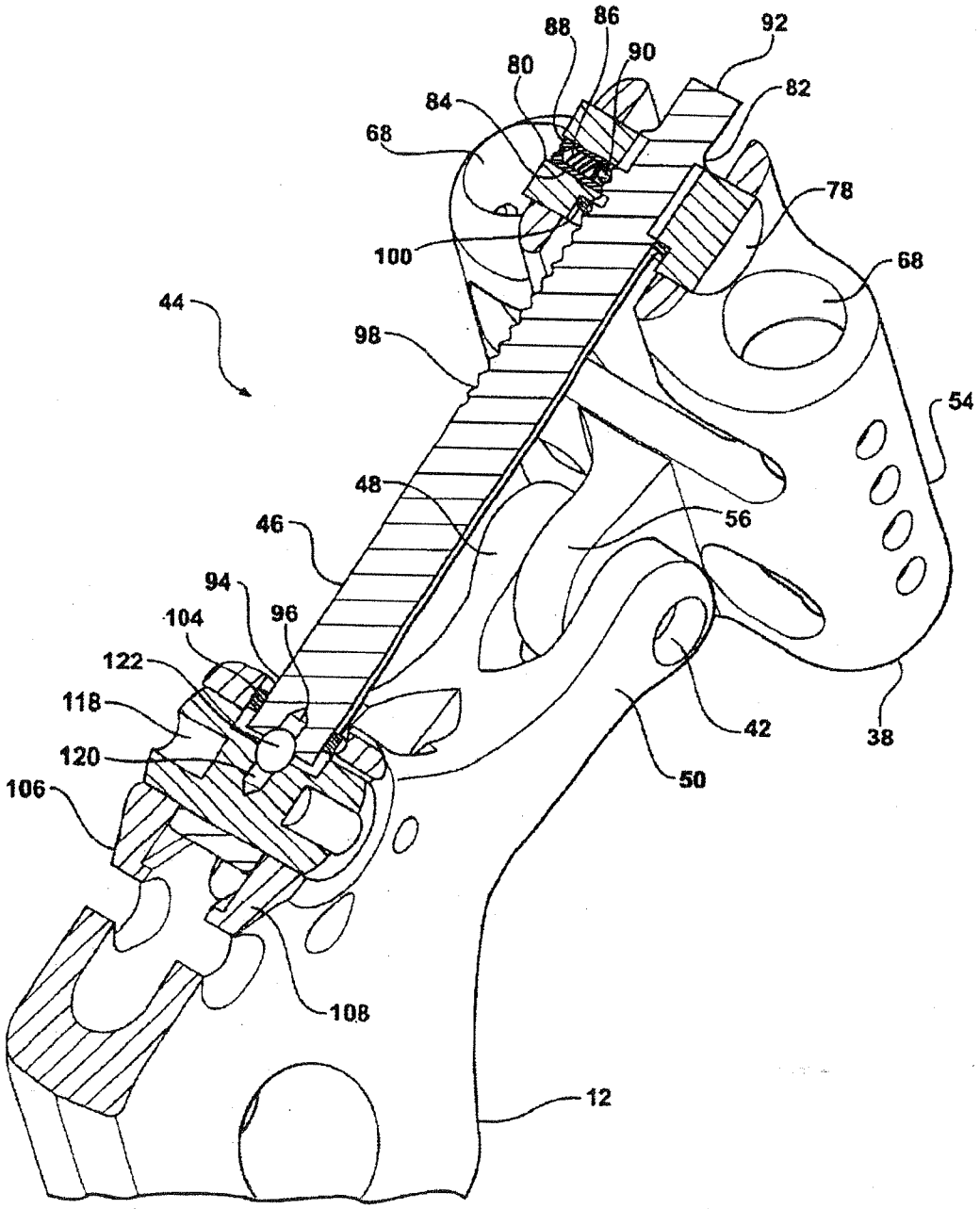
FIG - 5



ARCHERY BOW ASSEMBLY

This application claims the benefit of provisional application No. 60/325,376 filed Sep. 27, 2001.

BACKGROUND OF THE INVENTION

1. Field of Invention

The present invention relates to archery bow assemblies, and more particularly, to a strut assembly for mounting the limbs of the bow to the riser.

2. Description of the Related Art

Archery bows typically include a riser defining a handle for holding the bow and a pair of limbs extending from opposite ends of the riser to distal ends. A wheel or cam is commonly rotatably attached to the distal end of each limb and a string and harness system is wound between the wheels or cams of the limbs. The limbs are often flexed and the string and harness system is loaded under high tension to define the draw weight or force required to pull the string of the bow to its full draw position.

It is often desirable to change the string of the bow due to excessive wear or to change the draw weight of the bow. To change the string or other component of the bow typically requires the use of a bow press to flex the limbs of the bow and release the tension on the string and harness allowing removal from the wheels or cams. The bow press may then be used to release the flex on the limbs for complete disassembly of the bow.

The draw weight of the bow may be changed by attaching a different length string between the wheels or cams or by change the angle or orientation of the limbs relative to the bow. It is common to connect the limbs of the bow to the riser with a bolt or connector which extends through the limb and is threaded into the riser. The connector may be loosened to change the orientation of the limbs on the riser and slightly adjust the draw weight of the bow. However, significant shearing forces are exerted on the connector as the orientation of the limbs relative to the riser is changed. Additionally, the connector does not allow the bow to be assembled or disassembled without the use of a bow press.

Therefore, it remains desirable to provide a bow which may be manually assembled and disassembled without the need of a bow press and also an assembly which provide for full adjustment of the draw weight and tuning of the bow.

SUMMARY OF THE INVENTION

According to one aspect of the invention there is provided an archery bow comprising a riser extending between opposing first and second ends. A limb is coupled to each end of the riser. Each limb has a first end for connecting to the riser and a second distal end. An axle pivotally connects at least one of the limbs to one end of the riser. A strut assembly is operatively coupled between at least one of the limbs and the riser adjacent the axle for selectively pivoting the limb relative to the riser thereby allowing manual assembly and tuning of the bow by varying the distance between the distal ends of the limbs.

BRIEF DESCRIPTION OF THE DRAWINGS

Other advantages of the present invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

FIG. 1 is a side view of an archery bow assembly according to one aspect of the invention;

FIG. 2 is a fragmentary exploded view of the archery bow assembly and strut assembly for attaching the limbs to the riser;

FIG. 3 is an enlarged perspective view of the strut assembly connected between the limb and the riser;

FIG. 4 is another enlarged perspective view of the strut assembly connected between the limb and the riser with a portion of the limb removed; and

FIG. 5 is a cross-sectional view of the strut assembly between the limb and riser.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings, FIG. 1 illustrates a compound archery bow **10** having a riser **12** with a pair of limbs **14**, **16** extending from opposing ends **18**, **20** of the riser **12**. The limb **14** has a first end **22** connected to the end **18** of the riser **12** and a second distal end **24**. Similarly, the limb **16** has a first end **26** connected to the opposite end **20** of the riser **12** and a second distal end **28**. A wheel or cam **30**, **32** is rotatably attached to each distal end **24**, **28** of the limbs **14**, **16**. Additionally, a harness or cable system **34** and bow string **36** are wound around and between each wheel or cam **30**, **32** and pulled in tension by the limbs **14**, **16**.

The bow **10** further includes a pair of limb pockets **38**, **40** for pivotally attaching the respective limbs **14**, **16** to the opposing ends **18**, **20** of the riser **12**. A pocket axle **42** pivotally couples each of the respective limbs pockets **38**, **40** to the opposing ends **18**, **20**. Finally, a strut assembly **44** adjustably couples each of the limb pockets **38**, **40** to the opposing ends **18**, **20** of the riser. The strut assembly **44** allows for assembly and disassembly of the limbs **14**, **16** and limb pockets **38**, **40** to the riser **12** as well as the harness system **34** and string **36** between the wheels or cams **30**, **32**. Additionally, the strut assembly **44** further allows for selective micro-tuning and adjustment of the bow **10**, such as for example, the adjustment of the bow's draw weight and/or axle to axle length between the wheels or cams **30**, **32**.

More specifically, referring to FIGS. 2–5, the strut assembly **44** is shown in more detail. Only one strut assembly **44** between the limb **14** and riser **12** will be described in detail, however, it should be appreciated that the strut assembly **44** between the opposite limb **16** and riser **12** includes the same elements and function. The strut assembly **44** includes an adjustable threaded strut power screw **46** coupled to and between the limb pocket **38** and the end **18** of the riser **12**. Referring more particularly to FIG. 2, the end **18** of the riser **12** includes an extended pair of spaced apart fingers **48**, **50** each having a bore **52** therethrough for receiving the pocket axle **42** and pivotally securing the limb pocket **38** to the riser **12**. The limb pocket **38** includes a base **54** having a pivot post **56** extending therefrom with a through bore **58**. The pivot post **56** is seated between the fingers **48**, **50** and the bores **52**, **58** aligned axially to receive the pocket axle **42** therethrough. A spacer **60** is received on each side of the pivot post **56** around the axle **42** and an end cap or bushing **62** is secured to the distal end of the pocket axle **42** to pivotally secure the limb pocket **38** to the riser **12** while allowing pivotal movement of the limb **14** and limb pocket **38** about the pocket axle **42** and end **18** of the riser **12**.

Each limb **14**, **16** may be a single unitary member, may be two spaced apart members or may be a split limb, as shown in FIG. 2, with a pair of substantially separate and parallel spaced apart limb posts **64** connected to a main member **66**. The base **54** of the limb pocket **38** includes spaced apart tunnels **68** for receiving and mounting the limb posts **64** to

EXHIBIT 1
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the limb pocket **38** along the longitudinal length thereof. The limb posts **64** may be secured to the limb pocket **38** by any suitable means.

The limb pocket **38** further includes a pair of spaced apart support posts **70**, **72** extending longitudinally from the base **54** and attached by an end cap **74**. Each support post **70**, **72** includes a bore **76** therethrough, the axis of which is parallel to the pocket axle **42**. A cylindrical strut pivoting power screw nut **78** is seated in each bore **76** between the spaced apart and parallel support posts **70**, **72**. The screw nut **78** includes a longitudinal bore **80** extending therethrough and a transverse bore **82** extending perpendicular to the bore **80** for receiving the strut power screw **46**. Each of the bores **80**, **82** are threaded and the screw nut **78** is freely rotatably seated in the bores **76** of the support posts **70**, **72**. The power screw **46** is threaded through the bore **82** toward the riser **12** and retained in the limb pocket **38** by the screw nut **78**.

A ball plunger **84** is threaded into the bore **80** as shown in FIGS. **2** and **5**. The ball plunger **84** includes a compression spring **86** seated between a cap **88** and ball bearing **90**. The ball plunger **84** is biased against the power screw **46** for indexing the rotational position of the power screw **46** relative to the screw nut **78** as will be further described hereinbelow.

The strut power screw **46** is a cylindrical threaded rod extending longitudinally between a first nut end **92** and a second distal end **94** having a concave recess **96** therein. The power screw **46** further includes a row of spaced apart indexing holes or recesses **98** extending along the longitudinal extent of the screw **46** for engagement with the ball plunger **84**. The power screw **46** may include one or more rows of indexing holes **98** around the perimeter of the screw **46** at any number of spaced apart degrees of separation with the individual holes **98** spaced apart longitudinally as desired. For example, the screw may include two parallel rows of indexing holes **98** spaced apart 180 degrees; three rows spaced apart 120 degree; four row spaced apart 90, etc.

Once the strut power screw **46** is threaded through the screw nut **78**, the nut end **92** is seated between the support posts **70**, **72**. The second distal end **94** extends towards the end **18** of the riser **12** through a first strut shock absorber washer **100**, a cylindrical resilient strut shock absorber **102** (which is corrogated as shown) and a second strut shock absorber washer **104**.

Still referring to FIGS. **2** and **5**, the riser **12** further includes spaced apart flanges **106**, **108** each having a hole **110** therethrough with the axes of which are parallel to the axis of the pocket axle **42**. A cylindrical strut power screw ball bearing retainer **112** is rotatably seated between the flanges **106**, **108** and aligned axially with the holes **110**. The retainer **112** includes an axial bore **114** aligned with the holes **110** and a transverse bore **116** extending perpendicular to and through the axial bore **114** for receiving the distal end **94** of the power screw **46**.

Finally, the strut assembly **44** includes a cylindrical strut pivot support **118** dimensioned to be rotatably received in the axial bore **114** of the retainer **112** and holes **110** of the riser flanges **106**, **108**. The strut pivot support **118** includes a recessed detent **120** in the periphery outer wall thereof for seating and supporting a ball bearing **122**. The second distal end **94** of the power screw **46** is inserted through the transverse bore **116** in the ball bearing retainer **112** and the ball bearing **122** is rotatably seated between the recess **96** in the end of the power screw **46** and the detent **120** in the pivot support **118** to facilitate rotation of the strut power screw **46**.

The strut assembly **44** enables the end user of the archery bow **10** to assemble, disassembly and micro-tune or selectively adjust the characteristics of the bow **10** without the necessity of a conventional bow press typically used to compress the bow limbs and allow removal of the cables and string. More specifically, once the limbs **14**, **16** are secured to the limb pockets **38**, **40**, the limb pockets **38**, **40** may be pivotally attached to the opposing ends **18**, **20** of the riser **12**. The strut assembly **44** is then coupled between the limb pockets **38**, **40** and each end **18**, **20** of the riser **12**. Next, the wheels or cams **30**, **32** may be assembled to the distal ends of the limbs **14**, **16** and then the harness or cable system **34** and string **36** are attached to the wheels or cams **30**, **32**. The strut assembly **44** allows the limbs **14**, **16** to be pivoted toward the riser **12** to reduce the distance between the distal ends of the limbs **14**, **16** for attachment of the harness **34** and string **36** without tension. Once assembled, the nut end **92** of the strut power screw **46** may be rotated using a ratchet or wrench in a clockwise direction as shown in the drawings to increase the angle between the limbs **14**, **16** and riser **12** until the limbs **14**, **16** start to flex naturally due to the fixed length of the string **36** and harness **34** coupled between the wheels **30**, **32**. Rotating the strut power screw **46** forces the power screw nut **78** to travel longitudinally along the threaded length of the screw **46** and pivot the limb pocket **38**, **40** about the pocket axle **42** and riser **12**. As the strut power screw **46** is rotated and the limbs **14**, **16** flex and pivot open relative to the riser **12**, the distance between the wheels or cams **30**, **32** increases and the harness **34** and string **36** is pulled in tension to a desired draw weight. Additionally, the strut shock absorber **102** which encases and protects the strut power screw **46** may be compressed between the limb pockets **38**, **40** and riser **12** to allow pivotal movement of the limbs **14**, **16** while preventing dirt and debris from entering the strut assembly **44**.

In order to disassembly the bow **10**, the strut power screw **46** is simply rotated in the opposite, or counter-clockwise direction as shown, so that the screw nut **78** travels down the length of the screw **46** pivoting the limb pocket **38**, **40** about the pocket axle **42** and riser **12** until the tension on the string **36** and harness **34** is loosened. The bow **10** may then be fully disassembled or part may be changed such as the string **36** without the need of a bow press to release the flex and tension on the limbs **14**, **16** and string **36**.

Finally, the strut assembly **44** also allows selective adjustment of the bow **10** by rotation of the strut power screw **46** in either the clockwise or counterclockwise direction. As the screw nut **78** travels along the length of the threaded power screw **46** forcing the limb pocket **38**, **40** to pivot about the riser **12**, the ball plunger **84** follows the outer perimeter of the power screw **46** and engages with each indexing holes **98** along the length of the power screw **46**. By counting or tracking the position of the ball plunger **84** relative to the indexing holes **98**, the bow **10** may be selectively adjusted by pivoting or tuning each limb **14**, **16** position relative to the riser **12** to adjust the tension on the string **36** and the flex of the limbs **14**, **16** which account for the draw weight of the bow **10** and also the axle to axle length defined between the wheels or cams **30**, **32**. The location of the ball plunger **84** along the indexing holes **98** is maintain absent additional rotation of the power screw **46**. Therefore, by identifying the desired reference of the ball plunger **84** along the indexing holes **98**, the user may re-establish this adjustment after assembly and disassembly or after further tuning without having to go back to the factory recommended settings. Additionally, the user may selective adjust the bow **10** for different shooting conditions. For example, the strut assembly **44** allows the user to adjust the axle to axle distance to 37 inches during target practice and then adjust the axle to

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axle distance to 34 inches for hunting. The strut assembly **44** also allows the user to selectively adjust the bow draw weight infinitely by rotating the power screw **46** and pivoting the limbs **14**, **16** relative to the riser **12**.

It should be appreciated to one skilled in the art that the strut assembly may be used on a recurve bow, compound bow or cross bow without varying from the invention. Additionally, the strut assembly may be coupled between only one of the limbs and the riser or both of the limbs and the riser. That is, one of the limbs may be fixedly attached to one end of the riser and the other limb pivotally attached to the opposite end of the riser with the strut assembly extending therebetween to selectively pivot the one limb relative to the riser sufficient to release the tension on the string and allow assembly, disassembly and tuning of the bow.

Finally, it should also be appreciated that the strut pivoting power screw nut **78** may be retained in the riser **12** and the strut pivot support **118** retained by the limb **14** or limb pocket **38** without varying from the scope of the invention or function of the strut assembly **44**.

The invention has been described in an illustrative manner, and it is to be understood that the terminology, which has been used, is intended to be in the nature of words of description rather than of limitation.

Many modifications and variations of the present invention are possible in light of the above teachings. It is, therefore, to be understood that within the scope of the appended claims, the invention may be practised other than as specifically described.

What is claimed is:

1. An archery bow comprising:

a riser extending between opposing first and second ends;

a limb coupled to each end of said riser, each limb having a first end for connecting to the riser and a second distal end;

an axle pivotally connecting at least one of said limbs to one end of said riser; and

a strut assembly operatively coupled between at least one of said limbs and said riser adjacent said axle for selectively pivoting said limb relative to said riser thereby allowing manual assembly and tuning of the bow by varying the distance between said distal ends of said limbs.

2. An archery bow as set forth in claim **1** wherein said strut assembly includes a strut power screw having a first end pivotally coupled to said limb and an opposite end pivotally coupled to said riser.

3. An archery bow as set forth in claim **2** wherein said strut assembly includes a screw nut retained by one of said limb and said riser and movably coupled to said strut power screw for movement along the length thereof to pivot said limb about said axle and riser.

4. An archery bow as set forth in claim **3** wherein said strut power screw has threads and said screw nut is threadedly attached to said strut power screw whereby rotation of said strut power screw forces said screw nut to travel along the longitudinal length of said strut power screw and pivot said limb about said riser.

5. An archery bow as set forth in claim **4** wherein said strut assembly includes a strut pivot support retained by said riser for rotatably supporting said strut power screw on said riser.

6. An archery bow as set forth in claim **5** wherein said strut power screw includes a first nut end and an opposite second distal end with said threads extending therebetween.

7. An archery bow as set forth in claim **6** wherein said strut pivot support includes a recessed detent for rotatably supporting said second distal end of said strut power screw.

8. An archery bow as set forth in claim **7** wherein said strut assembly includes a ball bearing seated between said second distal end of said strut power screw and said recessed detent of said strut pivot support to allow free rotation of said strut power screw between said limb and said riser.

9. An archery bow as set forth in claim **8** wherein said strut assembly includes a ball bearing retainer having an axially bore for rotatably housing said strut pivot support and a transverse bore for housing said ball bearing.

10. An archery bow as set forth in claim **9** wherein said riser includes a pair of spaces apart flanges having axially aligned holes for rotatably supporting said ball bearing retainer and strut pivot support.

11. An archery bow as set forth in claim **10** wherein said strut power screw includes a row of spaced apart indexing holes extending at least partially between said first and second ends.

12. An archery bow as set forth in claim **11** further including a ball plunger supported by said screw nut for cooperating with a select one of said indexing holes during rotation of said strut power screw for identifying the selected adjusted position of said limb relative to said riser.

13. An archery bow as set forth in claim **12** wherein said ball plunger includes a ball bearing for engaging said strut power screw and a spring compressed between said screw nut and said ball bearing for biasing said ball bearing against said strut power screw and indexing holes.

14. An archery bow as set forth in claim **13** further including a limb pocket having a base for fixedly supporting said first end of said limb and a pivot post for receiving said axle and pivotally attaching said limb to said riser.

15. An archery bow as set forth in claim **14** wherein said limb pocket includes a pair of spaced apart support posts extending from said base each having an axially aligned bore therethrough for rotatably supporting said screw nut between said posts.

16. An archery bow as set forth in claim **15** wherein said strut assembly includes a resilient shock absorber encasing said strut power screw between said limb and said riser.

* * * * *

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US006786214B2

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Andrews

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(45) **Date of Patent: Sep. 7, 2004**

(54) **BOW ACTUATING SYSTEM**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **10/712,193**

(22) Filed: **Nov. 13, 2003**

(65) **Prior Publication Data**

US 2004/0094139 A1 May 20, 2004

Related U.S. Application Data

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(60) Provisional application No. 60/425,900, filed on Nov. 13, 2002.

(51) **Int. Cl.**[7] **F41B 5/00**
(52) **U.S. Cl.** **124/23.1**; 124/25.6
(58) **Field of Search** 124/23.1, 25.6, 124/86, 88

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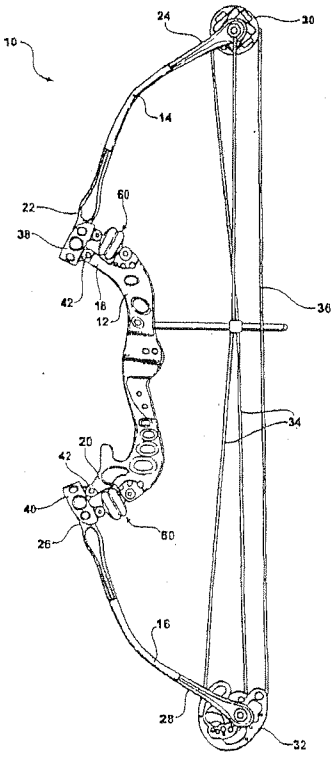
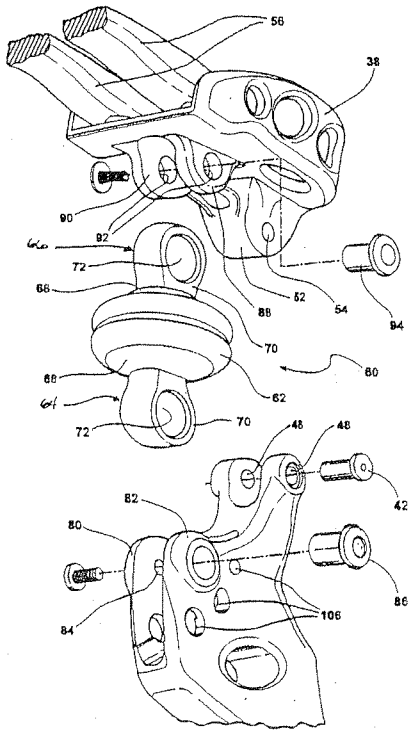
Primary Examiner—John A. Ricci
(74) *Attorney, Agent, or Firm*—Clark Hill PLC

(57) **ABSTRACT**

An archery bow comprising a riser extending between opposing first and second ends, with a limb coupled to each end. Each limb has a first end for connecting to the riser and a second distal end. An axle pivotally connects at least one of the limbs to one end of the riser. An actuator operatively couples between at least one of the limbs and the riser adjacent the axle for supporting the limbs about the riser. The actuator includes a resilient member for storing energy as the bow is drawn, and releasing energy as the bow is released. The resilient member pivotally attaches to the riser and the limb, elongating or compressing to dynamically change the angle between the riser and the limb while the bow is in use. After the shot, the resilient member acts as a shock absorber to damp the vibration of the bow.

20 Claims, 5 Drawing Sheets





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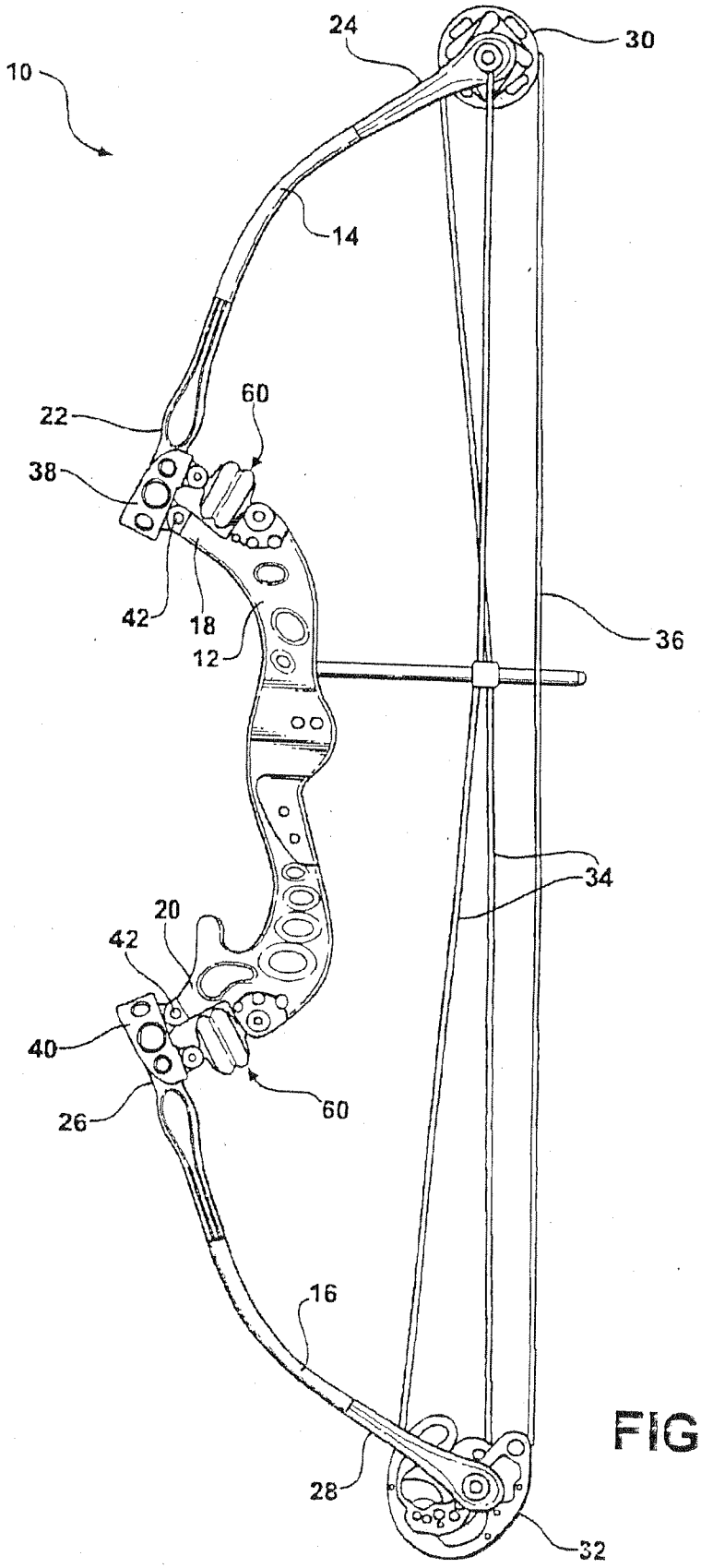

FIG - 1

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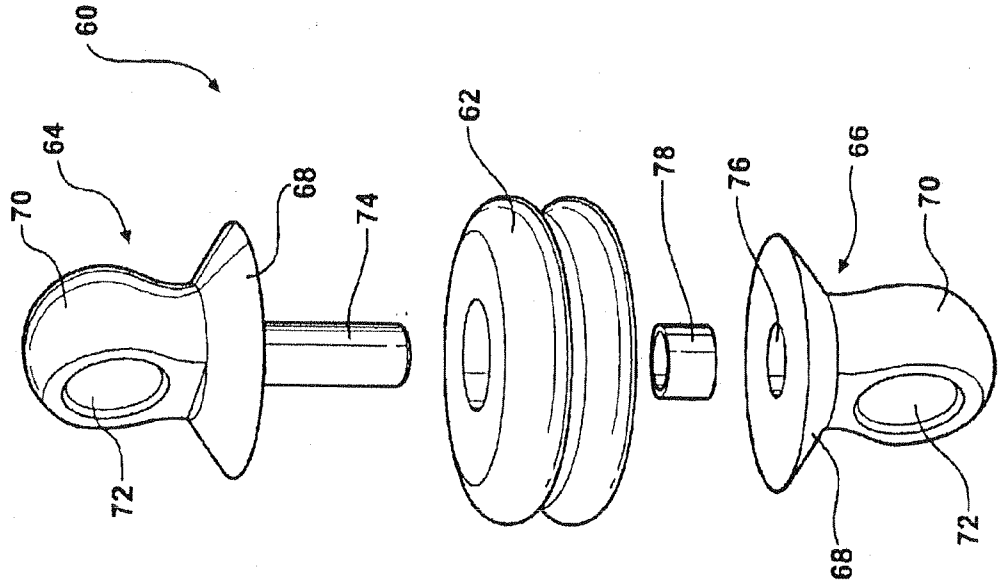

FIG - 3

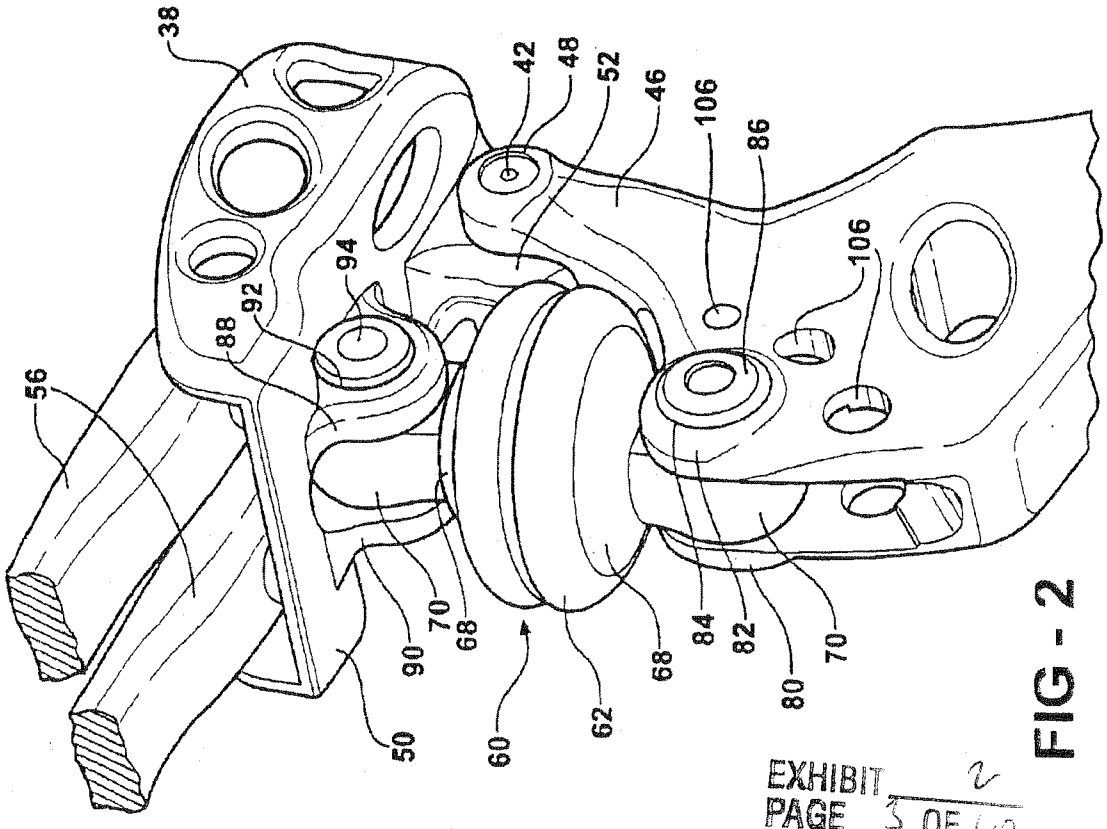

FIG - 2

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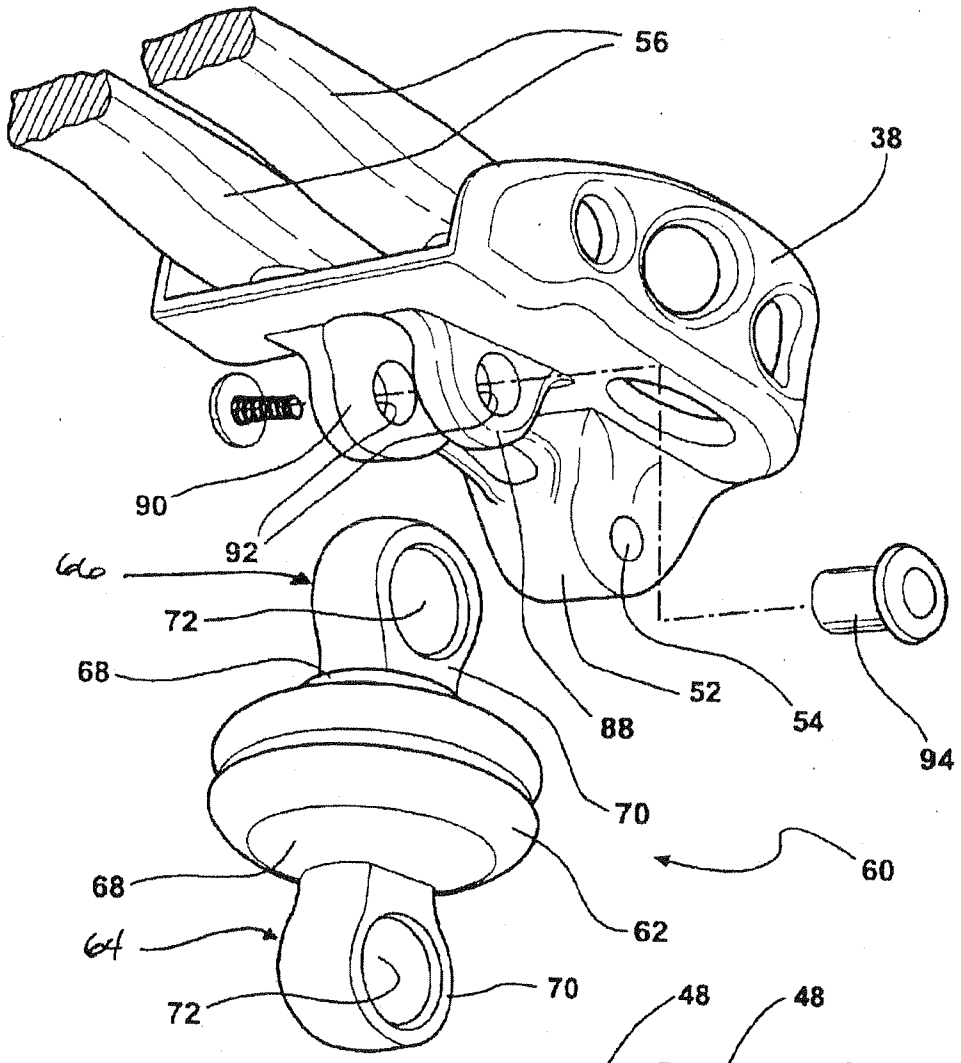

FIG - 4

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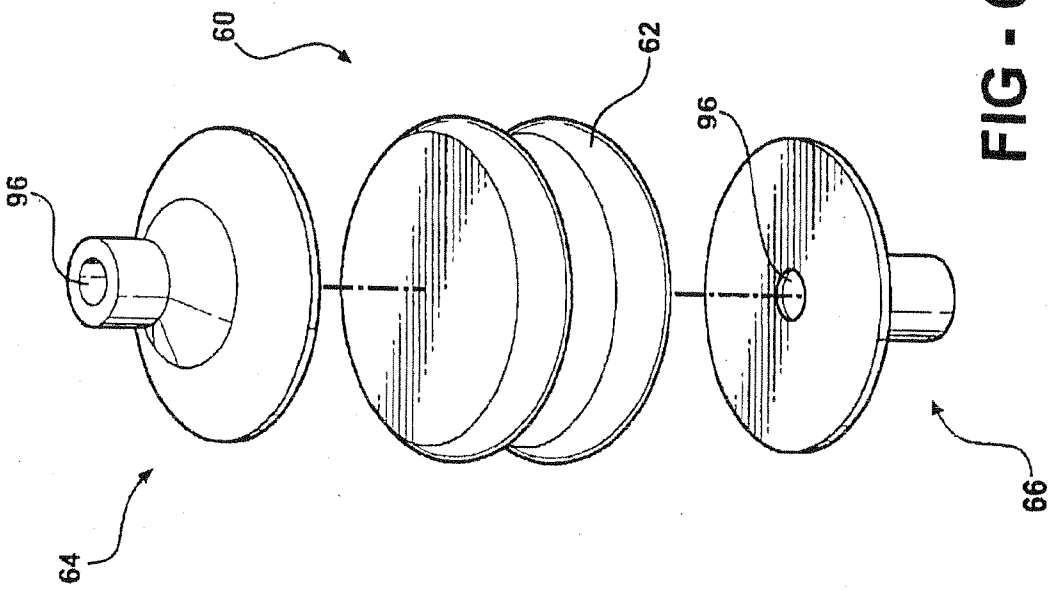

FIG - 6

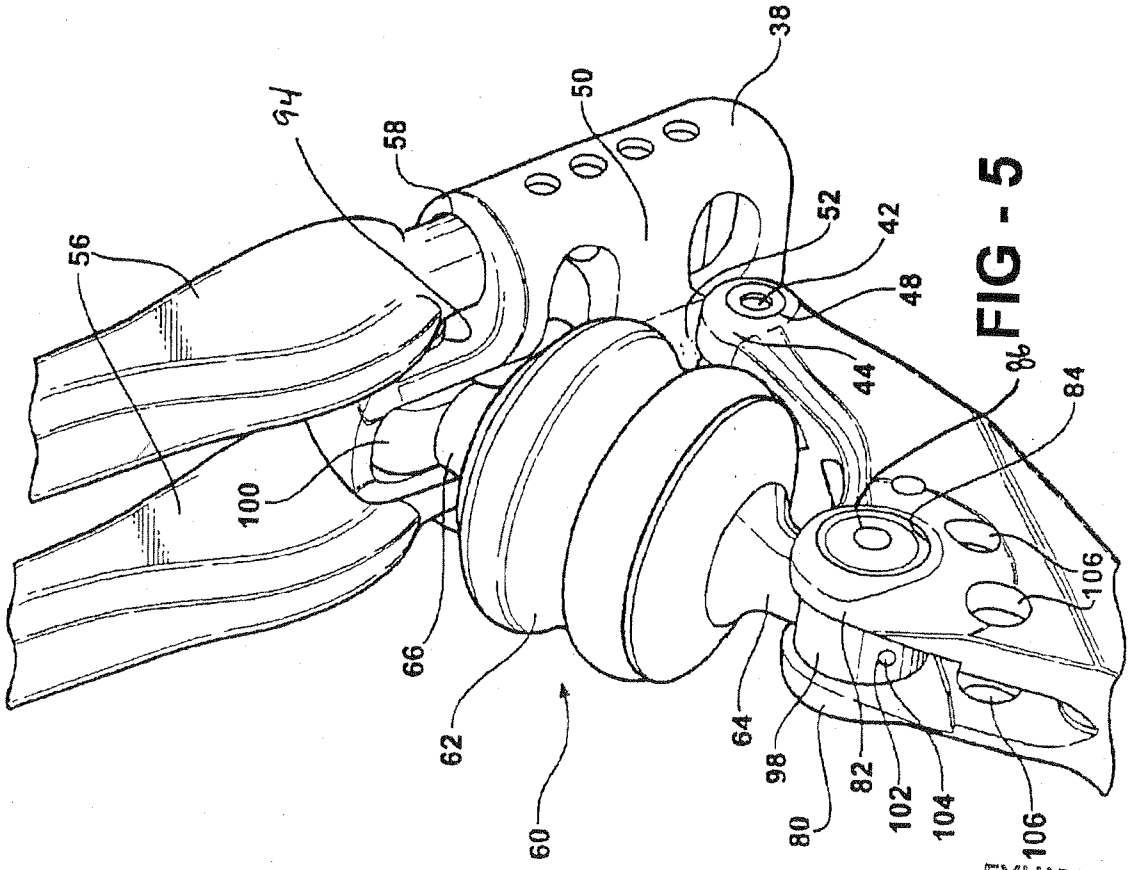

FIG - 5

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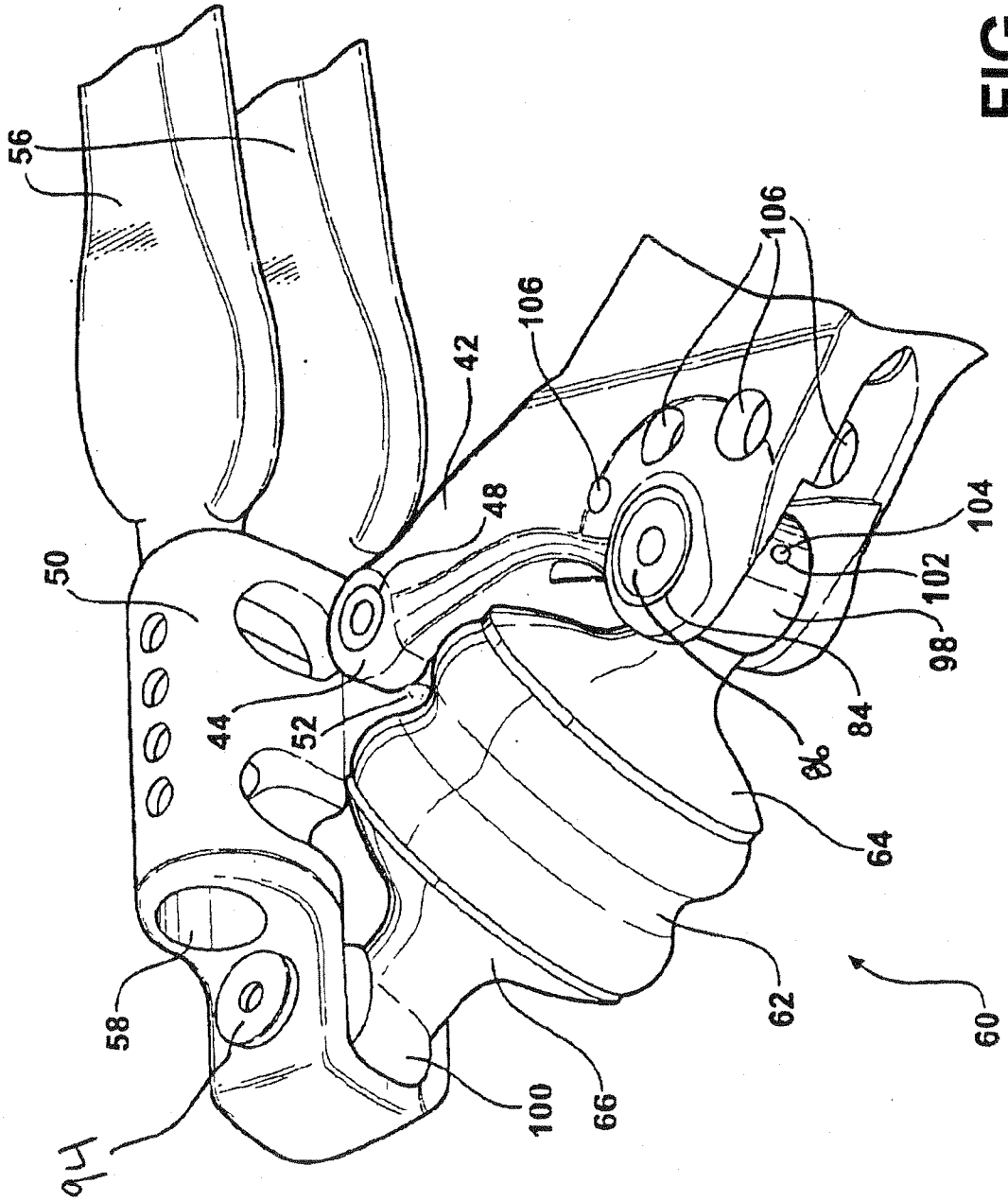

FIG - 7

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BOW ACTUATING SYSTEM

RELATED APPLICATIONS

This application is a continuation in part of U.S. patent application Ser. No. 10/256,623, filed on Sep. 27, 2002, now U.S. Pat. No. 6,712,057, and further claims the benefit and priority under 35 U.S.C. § 119(e) of U.S. Provisional Application No. 60/425,900, filed on Nov. 13, 2002.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to archery bow assemblies, and more particularly, to an actuating system for dynamically reducing the draw weight of a bow and damping extraneous motions of the bow following a shot.

2. Description of the Related Art

Archery bows typically include a riser defining a handle for holding the bow and a pair of flexible limbs extending from opposite ends of the riser to distal ends. A wheel or cam is commonly rotatably attached to the distal end of each limb and a bowstring and harness system is wound between the wheels or cams of the limbs. The limbs are typically flexible such that as a bow is drawn, potential energy is typically stored within the limbs themselves. When the bowstring is released, the potential energy is converted to kinetic energy for propelling the arrow as the limbs return to a rest position.

The bowstring and harness system is loaded under high tension, thereby defining a draw weight as the force required to pull the bowstring to its full position. It is common to connect the limbs of the bow to the riser with a connector which extends through the limb and is threaded into the riser. As the bow is drawn, the limbs flex and exert a significant shearing force, typically on the connector. The force imparted to an arrow upon release of the bowstring, or the bow thrust, is directly proportional to the draw weight. While it is desirable to provide an increased bow thrust for propelling the arrow with increased speed and force, the corresponding increase in the draw weight will increase the shearing force on the connector and vibration in the bow. Therefore, it is desirable to provide a bow actuating system which maximizes the bow thrust while decreasing the draw weight by supporting at least some of the force exerted by the limbs.

The draw weight of the bow is typically changed by attaching a different length string between the wheels or cams, by changing the size of the limbs, or by changing the angle or orientation of the limbs relative to the riser. The connector may be loosened to change the orientation of the limbs relative to the riser and slightly adjust the draw weight of the bow. However, prior art systems providing orientation adjustment by loosening the connector require manual adjustment, which can only occur when the bow is not is use. Thus, it is also desirable to provide a bow actuating system which dynamically changes the orientation of the limbs during use of the bow to minimize the draw weight.

The accuracy of an archery bow largely depends on elimination of extraneous motions of the bow. As the bowstring is released, the riser and the limbs vibrate causing the bowstring to oscillate as the arrow leaves the bow. The oscillation affects the trajectory of the arrow, greatly impacting an archer's accuracy, while also causing unwanted noise and hand shock. Therefore, it is further desirable to provide a bow actuating system which acts as a shock absorber after a shot, thereby reducing vibration of the bow.

SUMMARY OF THE INVENTION

Accordingly, the invention provides an archery bow comprising a riser extending between opposing first and second

ends. A limb is coupled to each end of the riser. Each limb has a first end for connecting to the riser and a second distal end. An axle pivotally connects at least one of the limbs to one end of the riser. An actuator is operatively coupled between at least one of the limbs and the riser adjacent the axle for supporting the limbs about the riser, and thus for supporting the forces exerted by the limb. The actuator includes a resilient member for storing energy as the bow is drawn, and releasing energy as the bow is released. The resilient member is pivotally attached to both the riser and the limb, elongating or compressing to dynamically change the angle between the riser and the limb while the bow is in use to minimize the draw weight. Because of the three-pivot system, the force exerted by the limbs impacts the actuator at approximately a 90 degree angle throughout the shot, thereby maximizing bow thrust. After the shot, the resilient member acts as a shock absorber to reduce the vibration of the bow.

BRIEF DESCRIPTION OF THE DRAWINGS

Other advantages of the present invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

FIG. **1** is a side view of an archery bow assembly in a braced position according to one aspect of the present invention, showing an actuator connected between a limb and a riser of the archery bow in compression;

FIG. **2** is an enlarged perspective view of a first embodiment of the actuator connected between the limb and the riser;

FIG. **3** is an enlarged exploded view of the actuator shown in FIG. **2**;

FIG. **4** is a fragmentary exploded view of the archery bow assembly as shown in FIG. **2**;

FIG. **5** is an enlarged perspective view of a second embodiment of the actuator connected between the limb and the riser;

FIG. **6** is an enlarged exploded view of the actuator shown in FIG. **4**; and

FIG. **7** is an enlarged perspective view of another aspect of the present invention, showing the actuator of FIGS. **4** and **5** connected between the limb and the riser in tension.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings, FIG. **1** illustrates a compound archery bow **10** having a riser **12** with first and second limbs **14**, **16** extending from opposing ends **18**, **20** of the riser **12**. The first limb **14** has a first end **22** connected to the end **18** of the riser **12** and a second distal end **24**. Similarly, the second limb **16** has a first end **26** connected to the opposite end **20** of the riser **12** and a second distal end **28**. A wheel or cam **30**, **32** is rotatably attached to each distal end **24**, **28** of the limbs **14**, **16**. Additionally, a harness or cable system **34** and a bowstring **36** are wound around and between each wheel or cam **30**, **32** and pulled in tension by the limbs **14**, **16**.

The bow **10** further includes a pair of limb pockets **38**, **40** for pivotally attaching the respective limbs **14**, **16** to the opposing ends **18**, **20** of the riser **12**. A pocket axle **42** pivotally couples each of the respective limb pockets **38**, **40** to the opposing ends **18**, **20**. Specifically, the ends **18**, **20** of the risers **12** each include an extended pair of spaced apart

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fingers **44**, **46** (as shown in FIGS. **2** through **7**) each having a bore **48** therethrough for receiving the pocket axle **42**. The limb pockets **38**, **40** each include a base **50** having an axle post **52** extending therefrom with a through bore **54**. The axle post **52** seats between the fingers **44**, **46** and the bores **48**, **54** align axially to receive the pocket axle **42** therethrough, thus pivotally securing the limb pocket **38**, **40** to the riser **12**.

Each limb **14**, **16** may be a single unitary member, two spaced apart members, or a split limb, as shown in FIG. **2**, with a pair of substantially separate and parallel spaced apart limb posts **56**. When limb posts **56** are utilized, the limb pocket **38** may include spaced apart tunnels **58**, as shown in FIG. **5**, for receiving and mounting the limb posts **56** to the limb pocket **38** along the longitudinal length thereof, as best shown in FIG. **4**. The limb posts **56** may be secured to the limb pocket **38** by any suitable means.

In the preferred embodiment, an actuator **60** pivotally attaches between each limb pocket **38**, **40** and the riser end **18**, **20** adjacent thereto. However, the actuator **60** could also attach directly between each limb **14**, **16** and the adjacent riser end **18**, **20**. Pivotal attachment is preferably achieved as described below. However, pivotal attachment may occur using a machined cylinder, a swiveling bolt or head, a ball and socket joint, or a pivoting cam block, or any other means of pivotal attachment known in the art.

FIGS. **2**, **3** and **4** depict a first embodiment of the actuator **60** connected between the limb **14** and riser **12** in more detail. Only one actuator **60** between the limb **14** and riser **12** will be described in detail. However, it should be appreciated that the actuator **60** between the opposite limb **16** and riser **12** includes the same elements and functions. The actuator **60** comprises a resilient member **62** and first and second connectors **64**, **66**. The resilient member **62** is preferably an elastomeric material such as urethane or polyurethane in any durometer, for example, ranging from 0 to 100 on the Shore 00 scale, 0 to 100 on the Shore A scale, and 0 to 100 on the Shore D scale. Two or more materials having different durometers may also be combined to form the actuator **60** to provide specific energy absorption properties. For example, the actuator **60** may partially comprise a material of durometer **90** for maximizing energy storage and partially a material of durometer **70** for providing increased damping capabilities. The resilient member **62** may also be comprised of any type of elastomeric material such as plastic or certain types of metal. Additionally, the resilient member **62** may be a spring, a gas cylinder, a cantilever arm, or any other type of expandable and compressible device.

In the first embodiment, each connector **64**, **66** comprises an attachment portion **68** and a pivot post **70** including a hole **72** therethrough. Additionally, the first connector **64** includes a connector pin **74**, while the second connector **66** includes a recess **76** for receiving the connector pin **74**. The connector pin **74** extends from the first connector **64** through the resilient member **62** to seat within the recess **76** to secure the connectors **64**, **66** to the resilient member **62**. A bushing **78** may be used to secure the connection between the connectors **64**, **66**. The connector pin **74** can extend through the resilient member **62** in a number of different ways. By way of example, the resilient member **62** may be formed with a hole to receive the connector pin **74**, or the connector pin **74** may be integrally molded with the resilient member **62**. The connectors **64**, **66** may also be bonded directly to the resilient member **62** for additional connection security, either using adhesive or heat bonding, or any other bonding process.

Referring to FIG. **4**, the riser **12** includes spaced apart flanges **80**, **82** each having a hole **84** therethrough, the axis of which is parallel to the axis of the pocket axle **42**. The pivot post **70** of the first connector **64** seats between the flanges **80**, **82** such that the holes **72**, **84** align axially. A riser axle **86** extends through the holes **72**, **84** allowing the first connector **64** to rotate thereabout to pivotally secure the actuator **60** to the riser **12**.

The limb pocket **38** includes a pair of spaced apart support posts **88**, **90** extending longitudinally from the base **50**. Each support post **88**, **90** includes a bore **92** therethrough, the axis of which is parallel to the axis of the pocket axle **42**. Similar to the connection described previously, the pivot post **70** of the second connector **66** seats between the support posts **88**, **90** such that the bores **92** and the hole **72** align axially. A limb axle **94** extends through the bores **92** and the hole **72** allowing the second connector **66** to rotate thereabout to pivotally secure the actuator **60** to the limb **14**. While the invention as described contemplates attaching the first connector **64** to the riser **12** and the second connector **66** to the limb **14**, the inventive concept would not be changed by connecting the first connector **64** to the limb **14** and the second connector **66** to the riser **12**.

FIGS. **5** and **6** illustrate a second embodiment of the actuator **60** connected between the limb **14** and riser **12** in more detail. Again, only one actuator **60** between the limb **14** and riser **12** will be described in detail. However, it should be appreciated that the actuator **60** between the opposite limb **16** and riser **12** includes the same elements and functions. The actuator **60** comprises a resilient member **62** and first and second connectors **64**, **66** as in the first embodiment. In the second embodiment, each connector **64**, **66** includes a recessed threaded bore **96**. A cylindrical riser retainer **98**, shown best in FIG. **5**, seats between the holes **84** in the flanges **80**, **82** of the riser **12**. A riser axle **86** extends through the retainer **98**, allowing the retainer **98** to rotate thereabout. Similarly, a cylindrical limb retainer **100** seats between the bores **92** in the support posts **88**, **90** of the limb **14**, and a limb axle **94** extends through the retainer **100**, allowing the retainer **100** to rotate thereabout. Each retainer **98**, **100** includes a longitudinal bore **102** for receiving a threaded retainer pin **104**. The retainer pin **104** extends through the retainer **98**, **100** and continues through the recessed threaded bore **96** of one of the connectors **64**, **66**, thereby securing one connector **64**, **66** to the riser **12** and the other connector **64**, **66** to the limb **14**.

In each of the first and second embodiments, the actuator **60** connects between the riser **12** and the limb **14** in compression. As the bow **10** is drawn, the actuator **60** supports the limb **14**, allowing the limb **14** to flex about the riser **12**. The force exerted by the limb **14** compresses the resilient member **62** of the actuator **60** further, thereby storing at least a portion of the energy which is usually stored in the limb **14**. The actuator **60** receives at least part of the force and perhaps all of it, though the limb **14** may still store energy. In this manner, the actuator **60** relieves the shearing forces typically present on the connector between the riser **12** and the limbs **14**, **16**. As the pocket axle **42** pivots, the riser axle **86** and the limb axle **94** also pivot, moving the actuator **60** therewith, thereby minimizing draw weight by dynamically changing the orientation of the limb **14** relative to the riser **12** while the bow **10** is in use. Preferably, the axles **42**, **86**, **94** are arranged such that the force exerted by the limb **14** always impacts the actuator **60** at approximately a 90 degree angle to maximize bow thrust.

More specifically, as the limb **14** flexes about the riser **12** and pivots about the riser axle **86**, the pocket axle **42** and

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limb axle **94** which pivotally couple the first connector **64** and second connector **66** to the riser **12** and limb **14**, respectively, allow the actuator **60** to articulate and maintain its angular position, approximately a 90 degree angle, relative to the limb **14**. Maintaining the angular position of the actuator **60** relative to the limb **14** maximizes the amount of energy stored in actuator **60** and ultimately released from the bow **10** into the arrow.

As the bowstring **36** is released, the resilient member **62** releases the stored energy to assist in propelling an arrow forward. The bow **10** returns to a braced position as shown in FIG. **1**, with the resilient member **62** returning to an initially compressed position. As this occurs, the resilient member **62**, being elastomeric, absorbs much of the vibration from the bowstring **36**, acting as a shock absorber. The resilient member **62** damps the vibration by elongating and compressing until the initial compressed position is once again attained.

FIG. **7** shows an alternate configuration of the bow **10** of the present invention, wherein the actuator **60** connects between the riser **12** and the limb **14** in tension. While FIG. **7** depicts the second embodiment of the actuator **60**, either embodiment may be utilized in this tension arrangement. In this configuration, the force exerted by the limb **14** as the bow **10** travels from the braced position to the drawn position further elongates the resilient member **62**. When the bowstring **36** is released, the resilient member **62** releases the stored energy and the bow **10** returns to the braced position. The resilient member **62** damps the vibration from the bowstring **36** by compressing and elongating until an initial elongated position is once again attained.

In each configuration and embodiment of the present invention, the riser **12** includes a recessed end profile **110** defining a pocket between the riser **12** and limb **14** for receiving and allowing the actuator **60** to pivot freely between the riser **12** and the limb **14** without contacting either. Specifically, the riser end **18** is fabricated to provide at least $1/16^{th}$ of an inch of clearance between the limb pocket **38** and the riser **12**. The clearance may also be substantially larger. For instance, utilizing the actuator **60** of the preferred embodiment, the clearance may reach 5 inches or more. Additionally, undercuts **106** may be provided in the riser **12** to reduce the mass of the bow **10** without changing the inventive concept.

It should be appreciated by one skilled in the art that the actuator **60** may be used on a recurve bow, compound bow or cross bow without changing the inventive concept. Additionally, the actuator **60** may be coupled between only one of the limbs **14**, **16** and the riser **12** or between both limbs **14**, **16** and the riser **12**. That is, one of the limbs **14**, **16** may be fixedly attached to one end **18**, **20** of the riser **12** and the other limb **14**, **16** pivotally attached to the opposite end **18**, **20** of the riser **12** with the actuator **60** extending therebetween. Furthermore, a combination of actuators **60** can be used in series or in parallel. Finally, it should also be appreciated that the support posts **88**, **90** may attach to either the limb pocket **38** as shown, or the limb **14** itself without varying from the scope of the invention or function of the actuator **60**. That is, the actuator **60** may be attached between the riser **12** and the limb pocket **38**, or the riser **12** and the limb **14** itself.

The invention has been described in an illustrative manner, and it is to be understood that the terminology used is intended to be in the nature of words of description rather than of limitation. Many modifications of the present invention are possible in light of the above teachings. It is, therefore, to be understood that within the scope of the appended claims, the invention may be practiced in a substantially equivalent way other than as specifically described.

What is claimed is:

1. An archery bow comprising:

a riser extending between opposing first and second ends;

a limb coupled to each end of said riser;

an axle pivotally connecting at least one of said limbs to one end of said riser; and

an actuator operatively coupled between at least one of said limbs and said riser adjacent said axle for supporting said limb about said riser, said actuator including a resilient member for storing and releasing energy as said limbs are flexed about said riser.

2. An archery bow as set forth in claim **1** wherein said resilient member compresses and stores energy as said limbs are flexed from a braced position to a drawn position and elongates and releases said stored energy as said limbs return from said drawn position to said braced position.

3. An archery bow as set forth in claim **1** wherein said resilient member elongates and stores energy as said limbs are flexed from a braced position to a drawn position and compresses and releases said stored energy as said limbs return from said drawn position to said braced position.

4. An archery bow as set forth in claim **1** wherein said actuator further includes a first connector attached to said resilient member and pivotally coupled to said riser, and a second connector attached to said resilient member and pivotally coupled to said limb.

5. An archery bow as set forth in claim **4** wherein said riser includes a pair of spaced apart riser flanges having axially aligned holes for rotatably supporting said first connector.

6. An archery bow as set forth in claim **5** wherein said limb comprises a limb pocket and an extending arm, said limb pocket having a base for fixedly supporting said extending arm and an axle post for receiving said axle and pivotally attaching said limb to said riser.

7. An archery bow as set forth in claim **6** wherein said limb pocket includes a pair of spaced apart support posts extending from said base each having an axially aligned holes therethrough for rotatably supporting said second connector.

8. An archery bow as set forth in claim **7** wherein at least one of said connectors includes a pivot post having an axial bore therethrough, said pivot post seating between one of said riser flanges of said riser and said support posts of said limb such that said axial bore and said axially aligned holes are aligned.

9. An archery bow as set forth in claim **8** further including an axle extending through said axially aligned holes and said axial bore to secure said at least one of said connectors and said one of said riser and said limb such that as said pivot post rotates about said retaining pin, said actuator rotates about said one of said riser and said limb.

10. An archery bow as set forth in claim **9** wherein one of said first and second connectors includes a connector pin extending through said resilient member and seated within the other of said first and second connectors to secure said first and second connectors to said resilient member.

11. An archery bow as set forth in claim **7** wherein at least one of said connectors includes a longitudinally recessed threaded bore, said threaded bore seating between one of said riser flanges of said riser and said support posts of said limb.

12. An archery bow as set forth in claim **11** further including a retainer extending through said axially aligned

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holes of said one of said riser flanges of said riser and said support posts of said limb for rotatably supporting said at least one of said connectors.

13. An archery bow as set forth in claim **12** further including a retainer axle extending through said retainer for allowing said retainer to rotate within said thereabout.

14. An archery bow as set forth in claim **13** wherein said retainer includes an longitudinal bore for receiving said at least one of said connectors such that as said retainer rotates about said retainer axle, said actuator rotates about said one of said riser and said limb.

15. An archery bow as set forth in claim **14** wherein said at least one of said connectors includes a longitudinally recessed threaded bore, said threaded bore extending through said aperture to align said at least one of said connectors and said support rod.

16. An archery bow as set forth in claim **15** further including a retainer pin extending longitudinally through said longitudinal bore and said threaded bore for securing said at least one of said connectors to said retainer.

17. An archery bow as set forth in claim **1** wherein said resilient member absorbs excess energy as said limbs return to a braced position from a drawn position after a shot to minimize oscillation of said limbs and said riser.

18. An archery bow comprising:

a riser extending between opposing first and second ends;

a limb coupled to each end of said riser;

an axle pivotally connecting at least one of said limbs to one end of said riser; and

an actuator operatively coupled between at least one of said limbs and said riser for supporting said limb about said riser, said actuator including a first connector pivotally coupled to said riser and a second connector pivotally coupled to said limb for maintaining the angular postion of said actuator relative to said limb as said limb is flexed about said riser.

19. An archery bow as set forth in claim **18** wherein said actuator includes a resilient member extending between said first and second connector for storing and releasing energy as said limb is flexed about said riser.

20. An archery bow as set forth in claim **19** wherein said riser includes a recessed end profile for defining a pocket between said riser and said limb for receiving and allowing said actuator to articulate and maintain its angular position relative to said limb as said limb pivots about said riser.

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