The present invention comprises a two-track cam assembly wherein the cam assembly has a bowstring component for housing the bowstring and a power cable component that allows for the take up and let out of the power cable on opposing ends of the power cable component, effectively creating a two-track cam assembly. The efficiency rating of the device achieves 95.8%. The cam assembly can come in a unitary or modular form and further each component (i.e., the bowstring or power cable component) can be in a circular or non-circular form.
TWO-TRACK SYSTEM FOR DUAL CAM COMPOUND BOW

CROSS-REFERENCE TO RELATED APPLICATIONS


FIELD OF THE INVENTION

[0002] This invention relates to compound bows, and more specifically, it relates to a two-track system for bow strings and power cables of the compound bow.

BACKGROUND OF THE INVENTION

[0003] Cams have been used on compound bows for some time. Compound bows have opposing limbs extending from a handle portion which house the cam assemblies. Typically, the cam assemblies are rotatably mounted on an axle which is then mounted on a limb. The compound bows have a bow string attached to the cam which sits in a track and also, generally, two power cables that each sit in a track on a separate component on the cam, and either anchored to the cam or a limb/axel. When a bowstring is pulled to full draw position, the cam is rotated and the power cables are "taken up" on their respective ends to increase energy stored in the bow for later transfer, with the opposing ends "let out" to provide some give in the power cable.

[0004] Cam assemblies are designed to yield efficient energy transfer from the bow to the arrow. Some assemblies seek to achieve a decrease in draw force closer to full draw and increase energy stored by the bow at full draw for a given amount of rotation of the cam assembly.

[0005] There exists a number of U.S. patents directed to compound bows, including U.S. Pat. No. 7,305,979 issued to Craig Yehle on Dec. 11, 2007. The Yehle patent discloses a cam assembly having a journal for letting out a draw cable causing the cam to rotate and two other journals for take-up mechanism and a let-out mechanism for the two power cables. The Yehle patent requires that the power cables and draw string each sit in different components and tracks for the take up and let out mechanism to work and to have the efficiencies described therein.

[0006] Therefore, a compound bow having a mechanism with fewer tracks is desired because of the advantage in assembly in manufacturing to increase efficiency in the transfer of energy to propel bows.

[0007] Further, an adjustable or modular take-up/let-out mechanism is desired to account for different size draw lengths or other specifications required by the user.

SUMMARY OF THE INVENTION

[0008] The invention comprises, in one form thereof, a cam assembly comprising bowstring cam component having a track for receiving a bowstring; and a power cable cam component having a take up portion and a let out portion, wherein the take up and let out portion have a track for receiving a power cable.

[0009] More particularly, the invention includes a compound bow comprising a handle portion; a limb portion; at least two cam assemblies, each comprising a bowstring cam component having a track for receiving a bowstring; and a power cable cam component having a take up portion and a let out portion, wherein the take up and let out portion have a track for receiving a power cable, a draw stop pin, a take up terminating post, and a let out terminating post; an axel; at least two power cables; and a bowstring.

[0010] The cam assembly has a two track system wherein the power cables utilize a track or opposing tracks made on the power cable component of the cam assembly. Another track is formed on the bowstring component of the cam assembly in which the bowstring lies.

[0011] An advantage of the present invention is that the device has high efficiency in transferring energy stored in the limbs during the draw cycle to the arrow or other projectile of the device.

[0012] A further advantage of the present invention is that it requires less component parts for cam assembly which is highly desirable in the art.

[0013] An even further advantage of the present invention is that the cam assembly allows for a modular format which allows the user to change minor components to change parameters of the device (e.g. draw length) without having to change the entire cam assembly or bow.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] The present invention is disclosed with reference to the accompanying drawings, wherein:

[0015] FIG. 1 is a side view of a dual cam compound bow embodying the present invention;

[0016] FIG. 2 is a side view of the top cam assembly in a first embodiment of the present invention.

[0017] FIG. 3 is a rearview of the top cam assembly in a first embodiment of the present invention.

[0018] FIG. 4 is a side view of the bottom cam assembly in a first embodiment of the present invention.

[0019] FIG. 5 is a rearview of the bottom cam assembly in a first embodiment of the present invention.

[0020] FIGS. 6 and 7 show the modular form of the let out portion 64a,b with the draw stop pin 90a,b attached thereto.

[0021] FIG. 8 is a side view of the top cam assembly in a second embodiment of the present invention.

[0022] FIG. 9 is a side view of the bottom cam assembly in a second embodiment of the present invention.

[0023] FIG. 10 is a side view of the top cam assembly in a third embodiment of the present invention.

[0024] FIG. 11 is a side view of the bottom cam assembly in a third embodiment of the present invention.

[0025] FIG. 12 is a rearview of the top cam assembly in a fourth embodiment of the present invention.

[0026] FIG. 13 is a rearview of the bottom cam assembly in a first embodiment of the present invention.

[0027] Corresponding reference characters indicate corresponding parts throughout the several views. The examples set out herein illustrate a few embodiments of the invention but should not be construed as limiting the scope of the invention in any manner.

DETAILED DESCRIPTION

[0028] FIG. 1 shows a dual cam compound bow 10 of the present invention. The bow 10 has a frame, which includes bow limbs 12a,b extending from handle 14. Extending from the handle is cable guard 16 and a cable slide 18 through which the power cables 50 and 52 are placed. The bowstring
70 and power cables 50, 52 are attached to the bow 10 at the cam assemblies 30a,b, which further is placed on the limbs via axle 36a,b. The cams 30a,b are shown in greater detail in the following figures.

[0029] The cam 30a,b have bowstring assemblies 40a,b, each having a single track for the bowstring 70 with each end of the bowstring 70 being attached to the cams 30a,b at a terminating post (not shown). Further, the each of the cams 30a,b have terminating posts 80,82 for each of the ends of the respective power cables 50, 52, and which will be described in more detail herein. Further, each cam assembly 30a,b has a power cable assembly 60a,b having either a single track or groove around perimeter of the assembly 60a,b for receiving or retaining the power cables. Alternatively, the power cable assembly 60a,b can have the tracks or grooves on the portions of the assembly receiving the cable instead of a unitary track around the perimeter. The power cable assembly 60a,b has a take up portion 62a,b and a let out portion 64a,b for managing the take up and let out of the power cables through a single track.

[0030] FIG. 2 shows a side view of the top cam assembly 30a. FIG. 2 shows one embodiment of the cam 30a in non-circular shape. The bowstring 70 is in line with the track in the bowstring assembly 40a and attached with a terminating post (not shown). The power cable assembly 60a has a take up portion 62a and a let out portion 64a, and can either be a unitary piece or be modular. For instance as shown in FIG. 2, the power cable assembly 60a has a modular unit for the let out portion 64a, which allows manufacturers to make a single cam assembly with one small piece that can account for varying sizes and preferences by the user. Specifically, this versatility is important because each hunter or archer has different specifications (e.g., draw length) which can be accommodated for by having a modular portion to the cam assembly 30a, and in this case is the let out portion 64a. The power cable 52, in FIG. 2, is attached to terminating post 82a and wraps around the let out portion 64a and therefore feeds power cable 52 out when the bow is in full draw. On the opposing side of power cable assembly 60a is power cable 50, which sits on the take up portion 62a of the assembly 60a. Power cable 50 is attached at terminating post 80a, and is taken up when the bow is in full draw by the take up portion 62a. The power cable assembly 60a is attached to the bowstring assembly 30a by a fastening mechanism, but it will be well recognized the power cable assembly 60a can be attached to the bowstring assembly 40a by any means or, if desired, manufactured as a single piece with the bowstring assembly 40a to make-up top cam assembly 30a. As shown, the power cable assembly 60a is attached to the bowstring assembly 40a by a fastener 78a. The cam assembly 30a is attached to the limb 12a by axle 36a. Last the take power cable assembly 60a, either in a unitary form or modular form, may optionally have draw stop pin 90a attached to stop the draw cycle of the bow. The draw stop pin 90a, however, does not have to be attached to the power cable assembly 60a in order to function on the cam assembly 30a.

[0031] FIG. 3 shows the rearview of the top cam assembly. As seen from this perspective, the cam assembly 30a has one track on the bowstring assembly 40a for the bowstring 70 and a second track for the power cables 52 and 50 (not shown) on same track but on opposing sides of the power cable assembly 60a. In FIG. 3, the let out portion 64a is visible with power cable 52 sitting in the track or groove. Axle 36a is inserted through the limb 12a and then the cam assembly 30a and then the other end of the limb 12a.

[0032] FIG. 4 shows a side view of the bottom cam assembly 30b. FIG. 4 shows the bottom cam 30b in non-circular shape as well. The bowstring 70 is in bowstring assembly 40b and attached with a terminating post (not shown). The power cable assembly 60b has a take up portion 62b and a let out portion 64b, which can either be a unitary piece or as shown can have a modular unit. In FIG. 4, there is a modular assembly shown where the let up portion 64b can be changed in size and shape according to the user’s specifications. The power cable 52, in FIG. 4, is attached to terminating post 80b and wraps around the take up portion 62b and therefore is taken up when the bow is in full draw. On the opposing side of power cable assembly 60b is power cable 50, which attaches to terminating post 82b and wraps around the let out portion 64b, and is let out when the bow is in full draw position. The power cable assembly 60b is attached to the bowstring assembly 30b by a fastening mechanism, the two assemblies can be attached by any means or if desired manufactured as a single piece. As shown, the power cable assembly 60b is attached to the bowstring assembly 40b by a fastener 78b. The cam assembly 30b is attached to the limb 12b by axle 36b. Last the power cable assembly 60b, either in a unitary or modular form, may optionally have draw stop pin 90b attached to stop the draw cycle of the bow.

[0033] FIG. 5 shows the rearview of the bottom cam assembly 30b. As seen from this perspective, the cam assembly 30b has a bowstring assembly 40b for the bowstring 70, and a power cable assembly 60b for both power cables 50,52. In FIG. 5, power cable 50 is visible because it is sitting on the let out portion 64b of the power cable assembly 60b. Axle 36b allows bottom cam assembly 30b to rotate when the drawstring is pulled, and holds bottom cam assembly 30b in limb 12b.

[0034] FIGS. 6 and 7 show the modular form of the let out portion 64a,b and draw stop pin 90a,b for the cam assemblies 30a,b. The let out portion 64a,b and draw stop pins 90a,b can be attached in any number of ways or can be further manufactured as a unitary piece. Further, as described above, let out portion 64a,b can be manufactured as a single part of power cable assembly 60a,b. Therefore, though the modular form is more desirable to personalize parameters of the device size (e.g., draw length), the cam assembly could be manufactured as a single unit or in varying degrees of pieces.

[0035] FIGS. 8 and 9 show a side view of a second embodiment of the present invention 100a,b. FIG. 8 shows the top cam assembly 100a is in a circular shape. In particular, the power cable assembly 120a is shown as being in a unitary form, having the take up portion 122a and let out portion 124a. The draw stop pin 90a is not attached to the power cable assembly 120a, though if preferred the assembly 120a could be attached to the pin 90a. Further the bowstring assembly 110a is also in a circular or disc shape with power cable assembly 120a attached thereto. FIG. 9 exemplifies the bottom cam assembly 100b for the second embodiment, which is in a circular or disc shape. Generally the other components of the cam assemblies 100a,b are similar to those shown in the first embodiment.

[0036] FIGS. 10 and 11 show a third embodiment of the present invention, wherein the cam assembly 200a,b have a circular portion for the bowstring track 110a,b and a non-circular power cable assembly 60a,b. It will be understood
that other embodiments could include a non-circular portion for the bowstring assembly and a circular power cable assembly and, again, can be either modular or unitary form. Further other geometrical shapes, such as oval, may be used in varying forms for either the bowstring or power cable assembly.

Still another embodiment could include a three track system, as shown in the rearview perspectives of FIGS. 12 and 13. The three track system would be used where there are four power cables. This type of embodiment would include two power cable assemblies as described above, both of which would be attached to the bowstring assembly.

In use, using the first embodiments as an exemplar and in reference to FIGS. 1-3, the bowstring 70 is pulled rearward toward the hunter or archer. The tension by the bowstring forces the cam assemblies 30a, b to rotate rearward. Focusing on FIG. 1, the power cable assembly 60a on top cam assembly 30a is moved upward as the entire cam 30a is moved rearward. The terminating post 80, with power cable 50 attached, moves upward, and therefore causes take up of power cable 50. On the bottom cam assembly 30b the cam 30b is also moved rearward. The positioning of the power cable assembly 60 and power cable 50 causes power cable 50 to be let out on the bottom cam assembly 30b. The same is true in the opposite manner for power cable 52 (i.e. power cable 52 is taken up) on the cam assemblies 30a, b. Accordingly energy is stored in the limbs of the device and transferred to the arrow or other projectile placed in the compound bow in a highly efficient manner with little shock to the user.

Though the compound bow embodying the invention may have differing specifications, the bow may have a brace height of about eight (8) inches and axel-to-axel length of about thirty-two and half (32 1/2) inches. The draw length can range from twenty-seven (27) to thirty (30) inches and a draw weight between sixty (60) to eighty (80) inches.

It should be particularly noted that dual track cam disclosed in this invention has a highly efficient and powerful performance. With respect to speed, the following performance results were noted in a twenty-nine (29") inch draw cycle, sixty pound (60 lbs.) draw weight compound bow, in testing completed by Archery Evolution:

<table>
<thead>
<tr>
<th>Arrow (Grains)</th>
<th>300</th>
<th>360</th>
<th>420</th>
<th>540</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed (ft/sec)</td>
<td>307.3</td>
<td>283.5</td>
<td>264.2</td>
<td>235.4</td>
</tr>
<tr>
<td>Kinetic Energy (ft. lbs.)</td>
<td>62.9</td>
<td>64.2</td>
<td>65.1</td>
<td>66.4</td>
</tr>
<tr>
<td>Momentum</td>
<td>13.2</td>
<td>14.6</td>
<td>15.9</td>
<td>18.2</td>
</tr>
<tr>
<td>Dynamic Efficiency</td>
<td>85.7%</td>
<td>85.9%</td>
<td>86.7%</td>
<td>88.5%</td>
</tr>
<tr>
<td>Noise Output (dBA)</td>
<td>84.1</td>
<td>85.5</td>
<td>87.1</td>
<td></td>
</tr>
<tr>
<td>Total Vibration (G)</td>
<td>222.8</td>
<td>234.4</td>
<td>228.7</td>
<td>188.6</td>
</tr>
</tbody>
</table>

While the invention has been described with reference to particular embodiments, it will be understood by those skilled in the art that various changes may be made and equivalents may be substituted for elements thereof without departing from the scope of the invention. In addition, many modifications may be made to adapt a particular situation or material to the teachings of the invention without departing from the scope of the invention.

Therefore, it is intended that the invention not be limited to the particular embodiments disclosed as the best mode contemplated for carrying out this invention, but that the invention will include all embodiments falling within the scope and spirit of the appended claims.

1. A compound bow comprising:
   a. a handle portion;
   b. two limb portions each having at least one cam assembly rotatably mounted on a limb;
   c. the cam assembly comprising:
      i. a bowstring cam component having a track for receiving a bowstring;
      ii. a power cable cam component having a take up portion and a let out portion; the take up portion and let out portion each comprise a track for receiving a power cable; the tracks for the take up portion and let out portion are substantially coplanar.

2. The compound bow of claim 1 further comprising:
   a. two power cables; and
   b. a bowstring;
   wherein the first power cable is anchored to the first cam assembly with a portion adjacent to the first end sitting in the take up portion track of the power cable cam component on the first cam assembly and at its second end is anchored to the second cam assembly with a portion adjacent to the second end sitting in the let out portion track of the power cable cam component on the second cam assembly;
   wherein the second power cable is anchored to the first cam assembly with a portion adjacent to the first end sitting in the let out portion track of the power cable cam component on the first cam assembly and at its second end is anchored to the second cam assembly with a portion adjacent to the second end sitting in the take up portion track of the power cable cam component on the second cam assembly;
   such that the respective power cables while sitting in the tracks are coplanar.

3. The compound bow of claim 1 wherein the tracks on the take up portion and the let out portion of the power cable cam assembly are part of a continuous track around at least a portion on the periphery of the power cable cam assembly.

4. The compound bow of claim 1 wherein the tracks on the take up portion and the let out portion of the power cable cam assembly are non-continuous tracks on the periphery of the power cable cam assembly.

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