



Patent Owner's Demonstrative Slides

IPR2023-00407 – U.S. Patent No. 9,354,015
April 23, 2024

U.S. Patent No. 9,354,015

Filed: December 16, 2013

(54) STRING GUIDE SYSTEM FOR A BOW

(12) United States Patent
Yehle

(10) Patent No.: US 9,354,015 B2
(45) Date of Patent: May 31, 2016

(57) STRING GUIDE SYSTEM FOR A BOW

(71) Applicant: Ravin Crossbows, LLC, Superior, WI (US)
(72) Inventor: Craig Thomas Yehle, Holmen, WI (US)
(73) Assignee: Ravin Crossbows, LLC, Superior, WI (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(h) by 298 days.

(21) Appl. No.: 14/107,058

(22) Filed: Dec. 16, 2013

(65) Prior Publication Data
US 2015/0168093 A1 Jun. 18, 2015

(51) Int. Cl. F41B 5/10 (2006.01)
(52) U.S. Cl. CPC: F41B 5/10 (2013.01); F41B 5/05 (2013.01)
(58) Field of Classification Search
CPC: F41B 5/10; F41B 5/05; F41B 5/1403; F41B 5/123; F41B 5/1484; F41B 5/00; F41B 5/12

See application file for complete search history.

(56) References Cited
U.S. PATENT DOCUMENTS

4,818,473 A 6/1977 Puryear
4,102,281 A 3/1988 King
4,287,807 A 9/1981 Idus
4,479,498 A 10/1984 Holt
4,545,158 A 10/1985 Collins
4,545,182 A 1/1986 Barnett
4,587,944 A 5/1986 Barnett
4,691,228 A 9/1987 Simonds et al.

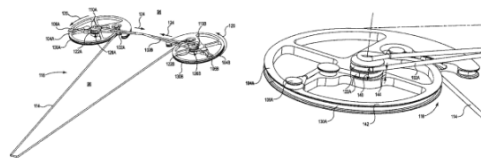
4,719,897 A 1/1988 Guadalu
4,766,874 A 8/1988 Nishida
4,877,885 A 10/1989 Troubridge
4,942,861 A 7/1998 Black
5,855,288 A 2/1992 Hinton-Corcoran et al.
5,228,080 A 6/1993 Choma
10,371,145 S 7/1993 Hinton-Corcoran
5,243,956 A 9/1993 Luching
5,265,581 A 11/1993 Adams et al.
5,388,564 A 2/1995 Idus
5,445,110 A 8/1995 Huber
5,522,373 A 6/1998 Barnett
5,596,076 A 11/1997 Weiner
5,598,829 A 2/1997 Bednar
5,618,485 A 5/1997 Naw
5,649,518 A 7/1997 Bednar
5,854,614 A 3/1999 Durlington et al.
6,473,351 A 6/2004 Barnett
6,895,128 A 8/2004 Bednar
6,285,058 B1 3/2005 Adams
6,286,496 B1 9/2004 Bednar
6,425,980 B1 7/2004 Adams
6,571,785 B1 6/2005 Choma
(Continued)

Primary Examiner—Melba Bungamer
Assistant Examiner—Amir Klayman

(57) ABSTRACT

A string guide for a bow having a reverse draw configuration with a draw string located adjacent a down-range side of the bow in a released configuration. First and second string guides rotate around first and second axes, respectively, as the draw string is displaced from the released configuration to the drawn configuration. A first power cable take-up journal on the first string guide rotates around the first axis to take up a power cable. The first power cable take-up journal includes a width measured along the first axis at least twice a width of the first power cable. The first power cable is biased away from at least the draw string. The first power cable is translated along the first power cable take-up journal as the bow is drawn from the released configuration to the drawn configuration.

20 Claims, 12 Drawing Sheets



(57)

ABSTRACT

A string guide for a bow having a reverse draw configuration with a draw string located adjacent a down-range side of the bow in a released configuration. First and second string guides rotate around first and second axes, respectively, as the draw string is displaced from the released configuration to the drawn configuration. A first power cable take-up journal on the first string guide rotates around the first axis to take up a power cable. The first power cable take-up journal includes a width measured along the first axis at least twice a width of the first power cable. The first power cable is biased away from at least the draw string. The first power cable is translated along the first power cable take-up journal as the bow is drawn from the released configuration to the drawn configuration.

“mounted to”

“mounted to” – “a first string guide mounted to the first bow limb and rotatable around a first axis...”

PATENT OWNER'S PROPOSAL

plain and ordinary meaning, such as:
“physically connected to allow only rotation about a fixed axis”

PETITIONER'S PROPOSAL

plain and ordinary meaning: **“connected to, either directly or indirectly”**

'015 Patent: Claim 1

Claim 1: “a first string guide mounted to the first bow limb and rotatable around a first axis ... a second string guide mounted to the second bow limb and rotatable around a second axis”

“mounted to” – “a first string guide mounted to the first bow limb and rotatable around a first axis...”



US009354015B2

(12) **United States Patent**
Yehle

(10) Patent No.: **US 9,354,015 B2**
 (45) Date of Patent: **May 31, 2016**

(54) **STRING GUIDE SYSTEM FOR A BOW**

(71) Applicant: **Ravin Crossbows, LLC**, Superior, WI (US)

(72) Inventor: **Craig Thomas Yehle**, Holmen, WI (US)

(73) Assignee: **Ravin Crossbows, LLC**, Superior, WI (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(h) by 208 days.

(21) Appl. No.: **14/107,058**

(22) Filed: **Dec. 16, 2013**

(65) **Prior Publication Data**
 US 2015/0168093 A1 Jun. 18, 2015

(51) Int. Cl. **F41B 5/10** (2006.01)

(52) U.S. Cl. **CPC - F41B 5/10** (2013.01); **F41B 5/105** (2013.01)

(58) **Field of Classification Search**
 CPC — F41B 5/10; F41B 5/105; F41B 5/1403; F41B 5/123; F41B 5/1484; F41B 5/100; F41B 5/12

See application file for complete search history.

(56) **References Cited**

4,719,897 A	1/1988	Gaudreau
4,766,874 A	8/1988	Nakajima
4,877,488 A	10/1989	Towbridge
4,942,361 A	7/1990	Bosch
5,057,386 A	2/1992	Hornig-Concannon et al.
5,228,986 A	6/1993	Choma
5,317,145 S	7/1993	Hornig-Concannon
5,343,956 A	9/1993	Lauchling
5,365,584 A	1/1995	Jalton et al.
5,385,564 A	2/1995	Ida
5,445,130 A	8/1995	Hybee
5,522,373 A	6/1996	Bennett
5,596,976 A	1/1997	Waiser
5,598,820 A	2/1997	Bachar
5,638,483 A	5/1997	Nisov
5,645,328 A	7/1997	Bachar
5,854,614 A	3/1999	Darlington et al.
6,073,311 A	6/2000	Barnett
6,095,128 A	6/2000	Bachar
6,281,598 B1	3/2001	Adkins
6,286,496 B1	3/2001	Bachar
6,423,380 B1	7/2002	Adkins
6,571,780 B1	6/2003	Choma

(Continued)

(57) **ABSTRACT**
 A string guide for a bow having a reverse draw configuration with a draw string located adjacent a down-range side of the bow in a released configuration. First and second string guides rotate around first and second axes, respectively, as the draw string is dislatched from the released configuration to the

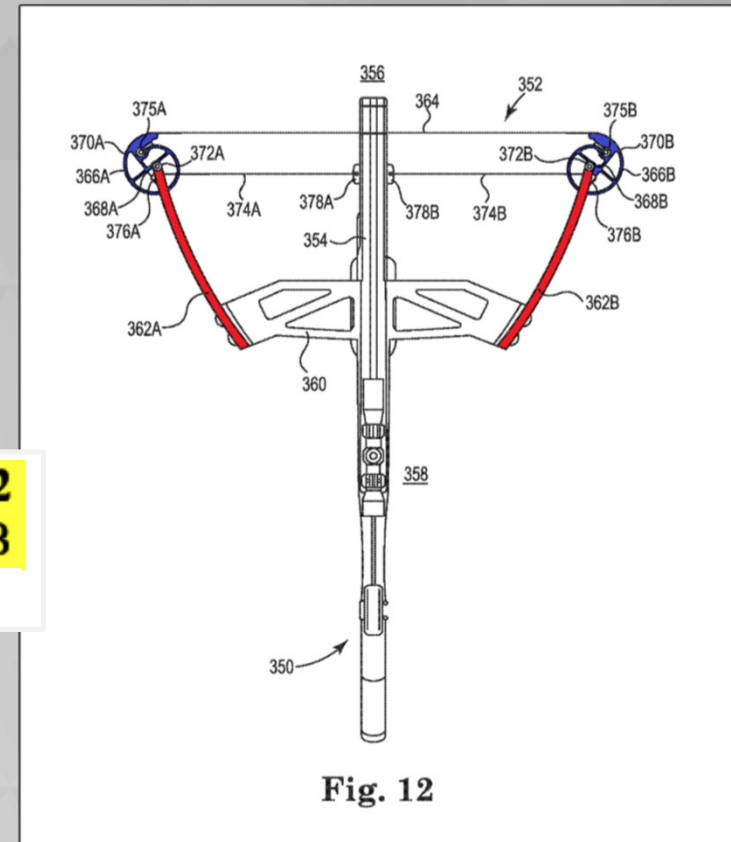


Fig. 12 (annotated with string guides in blue and limbs in red)

“mounted to” – “a first string guide mounted to the first bow limb and rotatable around a first axis...”



US009354015B2

(12) **United States Patent**
Yehle

(10) **Patent No.: US 9,354,015 B2**
(45) **Date of Patent: May 31, 2016**

(54) **STRING GUIDE SYSTEM FOR A BOW**

(71) Applicant: **Ravin Crossbows, LLC**, Superior, WI (US)

(72) Inventor: **Craig Thomas Yehle**, Holmen, WI (US)

(73) Assignee: **Ravin Crossbows, LLC**, Superior, WI (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(h) by 208 days.

(21) Appl. No.: **14/107,058**

(22) Filed: **Dec. 16, 2013**

(65) **Prior Publication Data**
US 2015/0168093 A1 Jun. 18, 2015

(51) Int. Cl. **F41B 5/10** (2006.01)

(52) U.S. Cl. **F41B 5/10** (2013.01); **F41B 5/105** (2013.01)

(58) **Field of Classification Search**
CPC — F41B 5/10; F41B 5/105; F41B 5/1405; F41B 5/123; F41B 5/1484; F41B 5/100; F41B 5/12

See application file for complete search history.

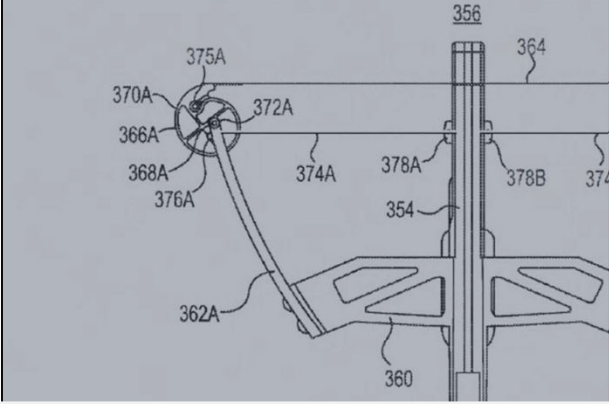
4,719,897 A 1/1988 Gaudreau
4,766,874 A 8/1988 Nakakita
4,877,489 A 10/1990 Towbridge
4,942,361 A 7/1990 Bonak
5,057,388 A 2/1992 Horan-Corcoran et al.
5,228,986 A 6/1993 Choma
10,017,145 S 7/1993 Horan-Corcoran et al.
5,243,956 A 9/1993 Luchting
5,265,588 A 1/1993 Jallou et al.
5,385,564 A 2/1995 Ida
5,445,130 A 8/1995 Bybee
5,522,373 A 6/1996 Bennett
5,596,976 A 1/1997 Waizer
5,598,820 A 2/1997 Bodnar
5,638,483 A 5/1997 Nizov
5,648,328 A 7/1997 Bodnar
5,854,614 A 3/1999 Darlington et al.
6,873,311 A 6/2000 Barnett
6,895,128 A 6/2000 Bodnar
6,981,598 B1 3/2001 Atkins
6,986,490 B1 3/2001 Bodnar
6,423,380 B1 7/2002 Atkins
6,571,780 B1 6/2003 Choma

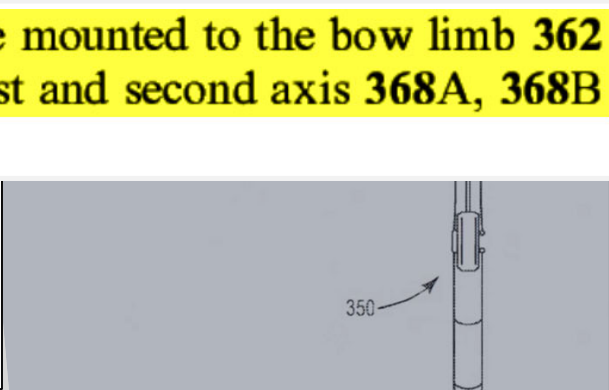
(Continued)

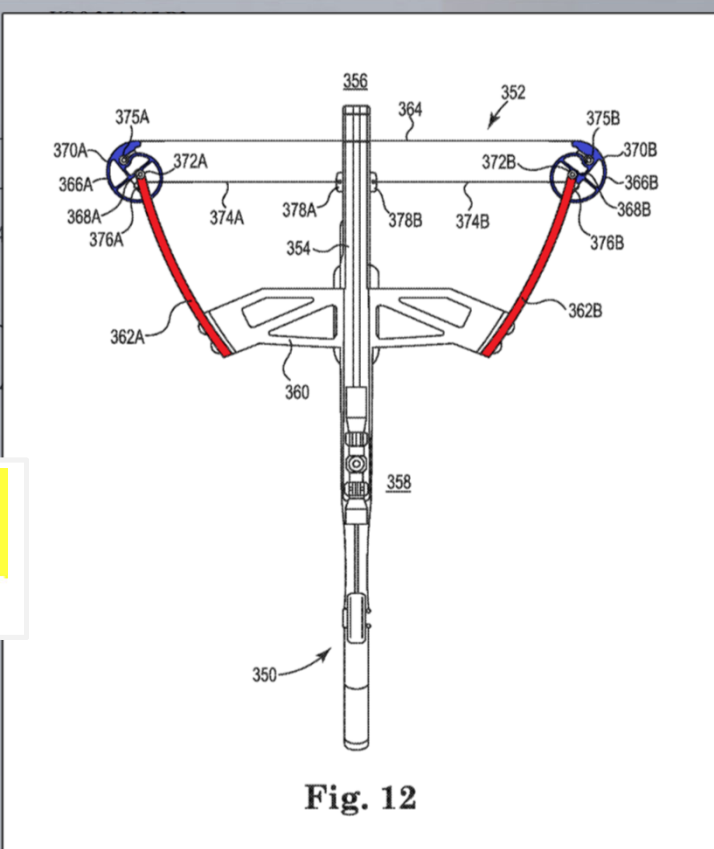
Primary Examiner — Melba Bungamer
Assistant Examiner — Amir Klayman

(57) **ABSTRACT**
A string guide for a bow having a reverse draw configuration with a draw string located adjacent a down-range side of the bow in a released configuration. First and second string guides rotate around first and second axes, respectively, as the draw string is dislatched from the released configuration to the

U.S. Patent May 31, 2016 Sheet 12 of 12







The string guides 366 are mounted to the bow limb 362 and are rotatable around first and second axis 368A, 368B (“368”), respectively.

Fig. 12

Fig. 12

Fig. 12 (annotated with string guides in blue and limbs in red)

EX1001 at 6:34-36; POR at 5; EX2005.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

6

Note: The animation of Fig. 12 of the '015 Patent, (EX2005), is embedded in this slide.

“mounted to” - “a first string guide mounted to the first bow limb and rotatable around a first axis...”

The specification describes applying the claimed string guide system to not only crossbows but also vertical bows. EX1001, Figs. 10-12, 3:34-42.

Yet, despite such differences, as seen in exemplary Figures 10-12 below, all figures depict the string guide physically connected to the limb such that the string guide always moves with the limb, but for the ability of the string guide to rotate relative to the limb about an axis:

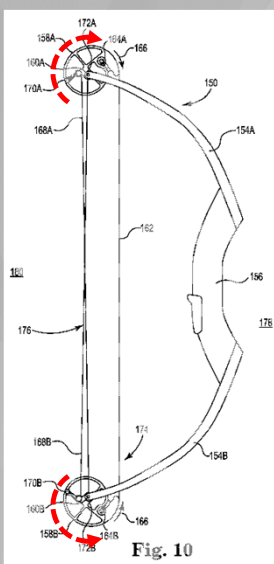


Fig. 10

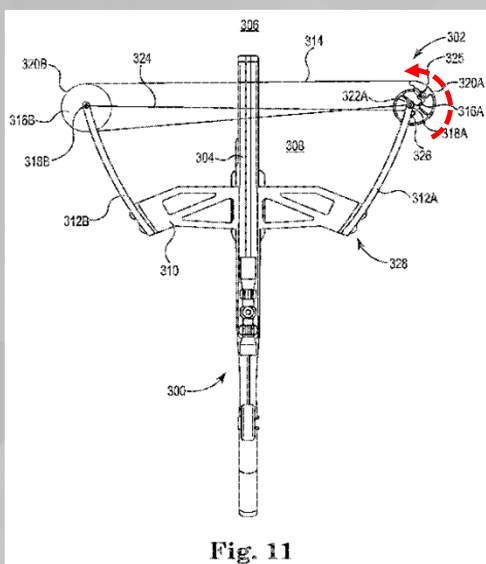


Fig. 11

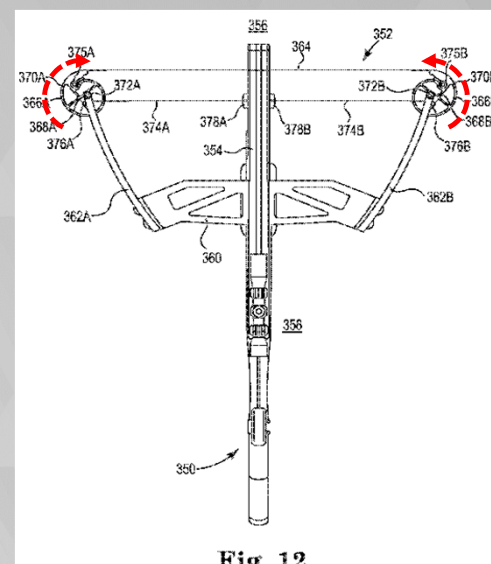


Fig. 12

Id., Figs. 10-12 (annotated); EX2029 ¶172.

“mounted to” - “a first string guide mounted to the first bow limb and rotatable around a first axis...”

Under Petitioner’s construction:

- “mounted to” is unbounded, with no way to differentiate between a seemingly infinite number of possible physical relationships between the string guide and the limb
- a POSA has no meaningful information about the physical relationship between the string guide and the limb

Stephen Batzer Testimony

“If we had a crossbow on the table here and I were to mount an American flag decal to the stock, to one side of it for decoration, the decal is mounted directly to the stock, but indirectly to all other components.”



“mounted to” - “a first string guide mounted to the first bow limb and rotatable around a first axis...”

The District Court construed “mounted to” to have its plain and ordinary meaning.

Chief Judge Lioi of the U.S. District Court for the Northern District of Ohio determined that Petitioner’s proposed construction, including specifically its allowance for any indirect connection without limitation, cannot be correct:

“Defining ‘mounted to’ to include any direct or indirect connection makes it difficult to discern the relationship between the various parts of the crossbow. Ravin offers a simple example that highlights the problem. Under Tenpoint’s proposed construction, the trigger of the crossbow could be said to be indirectly connected to the limbs of the bow because the trigger is connected to the center rail, which is itself connected to the mounts, which are connected to the limbs. A construction that includes any indirect connection, without some other limiting principle, makes it impossible to determine how various parts of the bow fit together and does not aid the jury in determining whether the patents-in-suit were infringed.”

Ravin Crossbows, LLC v. Hunter’s Mfg. Co., Case No. 5:23-cv-598, Dkt. 148, 8 (N.D. Ohio Mar. 1, 2024)

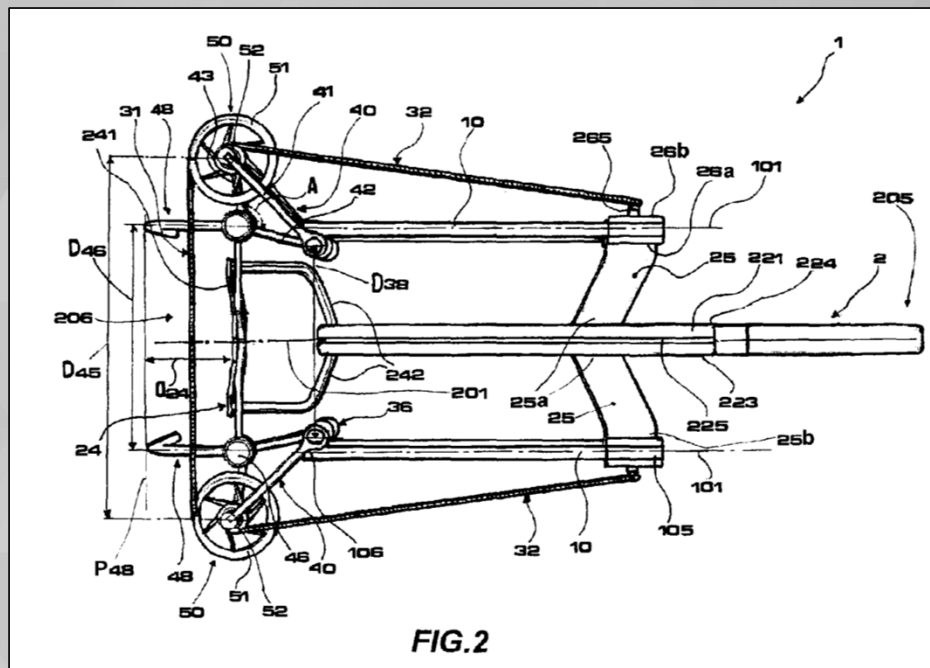
Grounds 1 and 2
U.S. Patent Pub. No. 2012/0125302 (“Stanziale ‘302”)

Ground 1 – Claim 1 is Not Anticipated by Stanziale '302

Stanziale '302 does not disclose “a first string guide mounted to the first bow limb” or “a second string guide mounted to the second bow limb” under the correct construction of “mounted to.” EX2029, ¶78-87.

Stephen Batzer Testimony

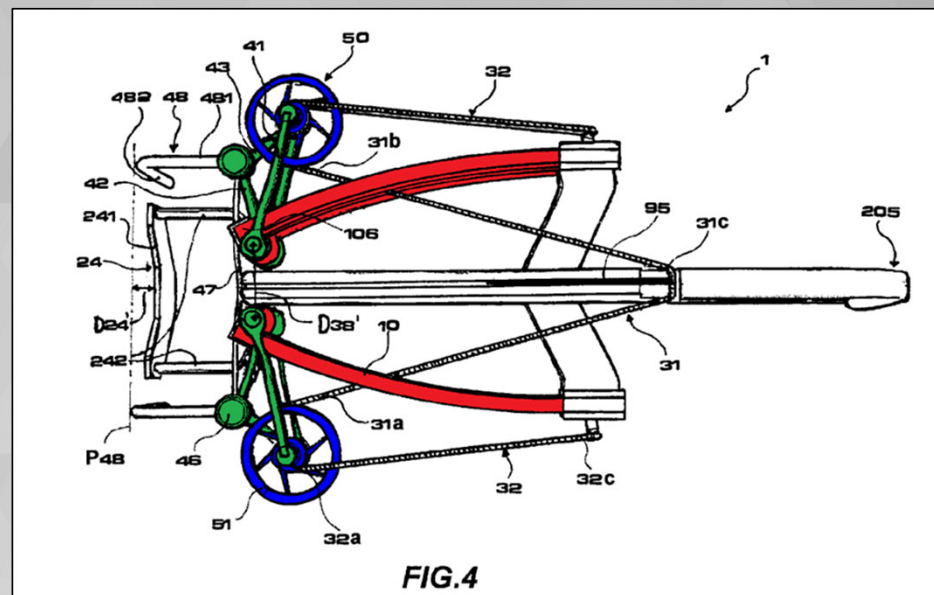
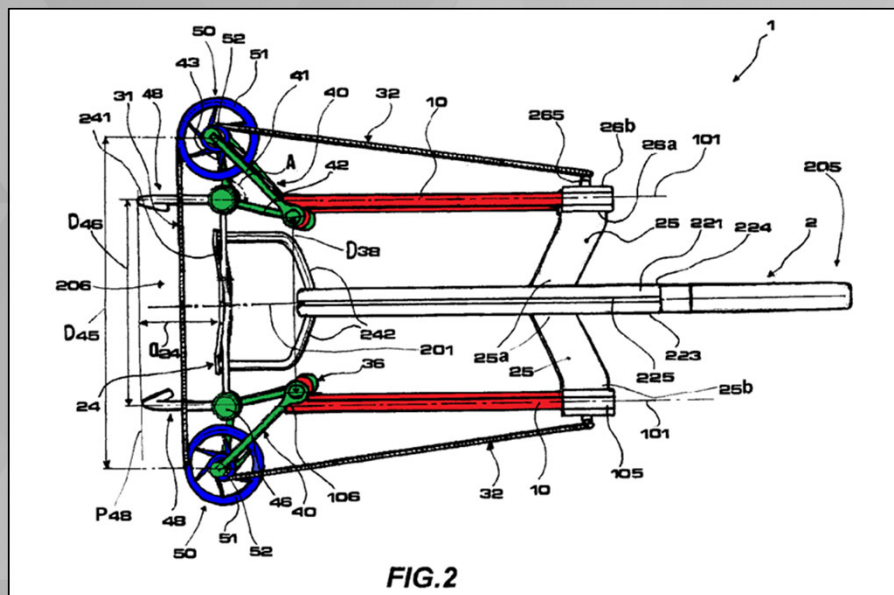
Stanziale '302 does not disclose this element of Claim 1: “Yeah, this isn’t a mounting strategy that was used on the '015 patent.”



Ground 1 – Claim 1 is Not Anticipated by Stanziale '302

In Stanziale '302 the string guide is not mounted to the first bow limb:

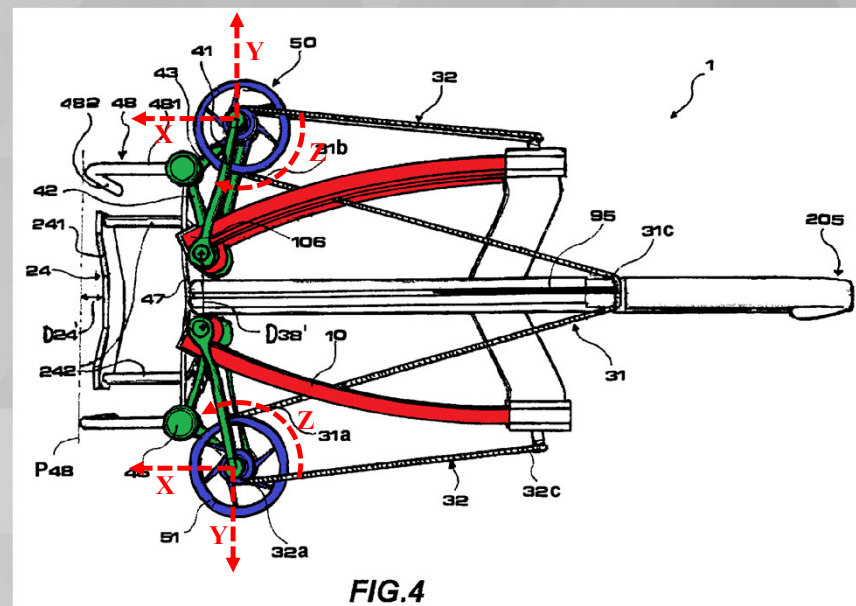
- Petitioner identifies pulley **assemblies 50** as the recited string guides. Petition, 31.
- These structures, however, are not mounted to the **first and second limbs (elastic members 10** (*id.*, 30)); EX2029, ¶81.
- Instead, as illustrated below, pulley **assemblies 50** (**blue**) are mounted to **levers 40** (**green**), which are distinct from **limbs 10** (**red**).



Ground 1 – Claim 1 is Not Anticipated by Stanziale '302

Because the string guide is not “mounted to” the bow limb, the assembly in Stanziale '302 has three degrees of freedom relative to the bow limb:

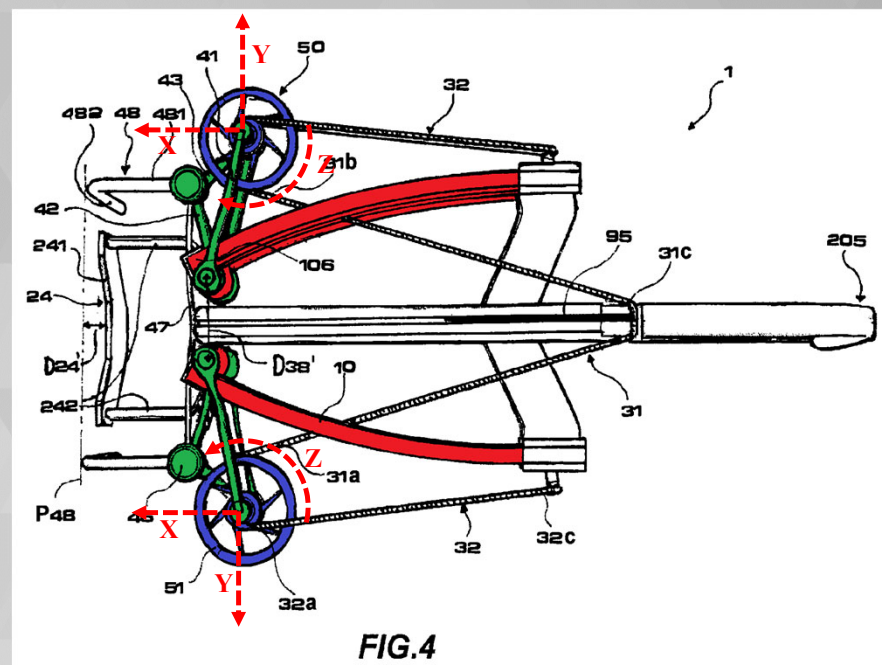
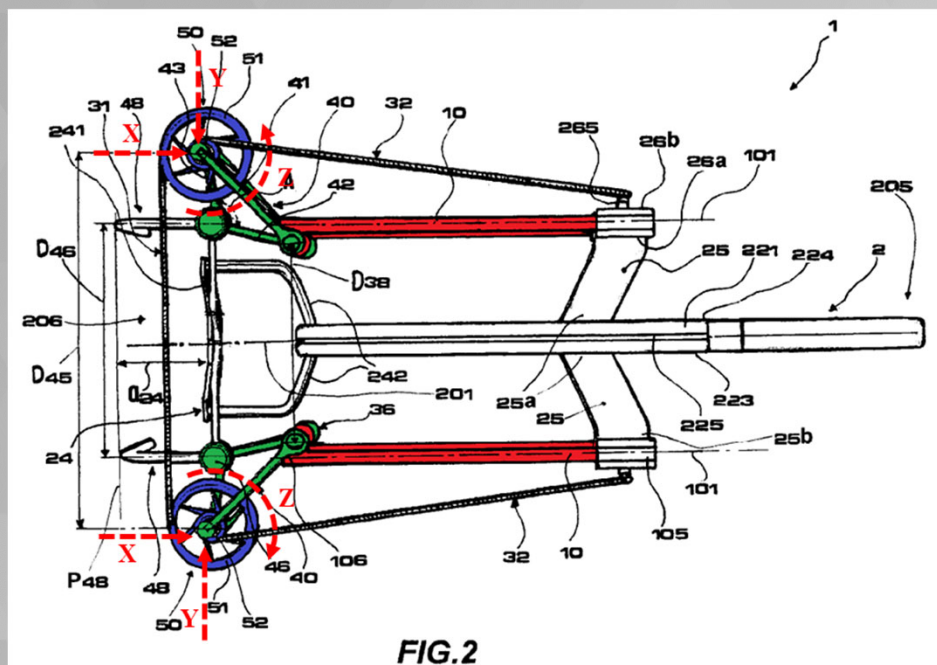
- Lever 40 is a moment arm pivotally mounted to elastic member 10 and provides **two degrees of freedom** between lever 40 and elastic member 10 (*i.e.*, translation along x- and y-axes). EX2029, ¶¶82-84.
- Pulley assembly 50 is rotatably mounted to lever 40, providing an **additional degree of freedom** (*i.e.*, pulley assembly 50 rotates about a z-axis relative to lever 40). *Id.*, ¶¶84-85.
- Viewed as a whole, there are at least **three degrees of freedom** between the elastic member and the pulley assembly (*i.e.*, **x-axis translation, y-axis translation, and z-axis rotation**). *Id.*



Ground 1 – Claim 1 is Not Anticipated by Stanziale '302

Since the string guide is not “mounted to” the bow limb, the assembly in Stanziale '302 has three degrees of freedom:

Figures 2 and 4, annotated below, show the three degrees of freedom of pulley assemblies 50 (blue) and their corresponding motion as intervening levers 40 (green) rotate and elastic members 10 (red) move. Ex. 2029, ¶85.



Ground 1 – Claim 1 is Not Anticipated by Stanziale '302

Since the string guide is not “mounted to” the bow limb, the assembly in Stanziale '302 has three degrees of freedom:

Batzer agrees this is how Stanziale '302's pulley assemblies move when the device is drawn.

Stephen Batzer Testimony

“The pulley 50, which is connected via lever 40 to the bow limb, then will move both back towards the down-range side. It will also move modestly inboard. So this is your X and Y coordinates. And the lever will rotate, when viewed from above, clockwise for the right limb, limbs, and counterclockwise for the bottom limbs. So the pulleys 50 or string guides do not maintain their absolute position relative to the limbs upon cocking.”

Stanziale '302's three degrees of freedom between pulley assemblies 50 and elastic members 10 are fundamentally different than what is claimed in Claim 1 or otherwise disclosed in the '015 Patent. EX2029, ¶86

Stephen Batzer Testimony

Stanziale '302 does not disclose this element of Claim 1: “Yeah, this isn't a mounting strategy that was used on the '015 patent.”

Ground 1 – Claim 1 is Not Anticipated by Stanziale '302

As the annotated Figures 11-12 of the '015 Patent highlight, there is only a single degree of freedom between the string guides (316A, 366 (blue)) and limbs (312A, 362 (red)):

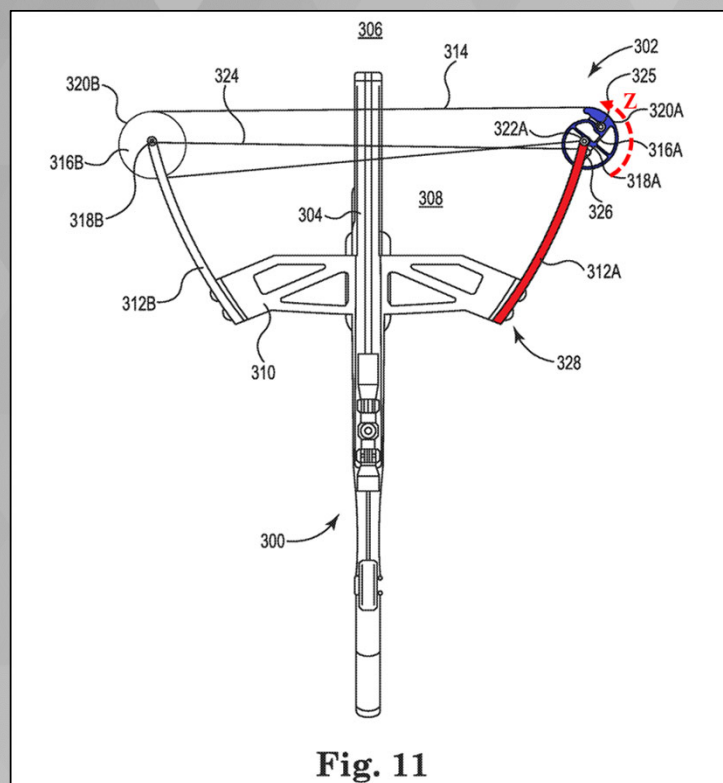


Fig. 11

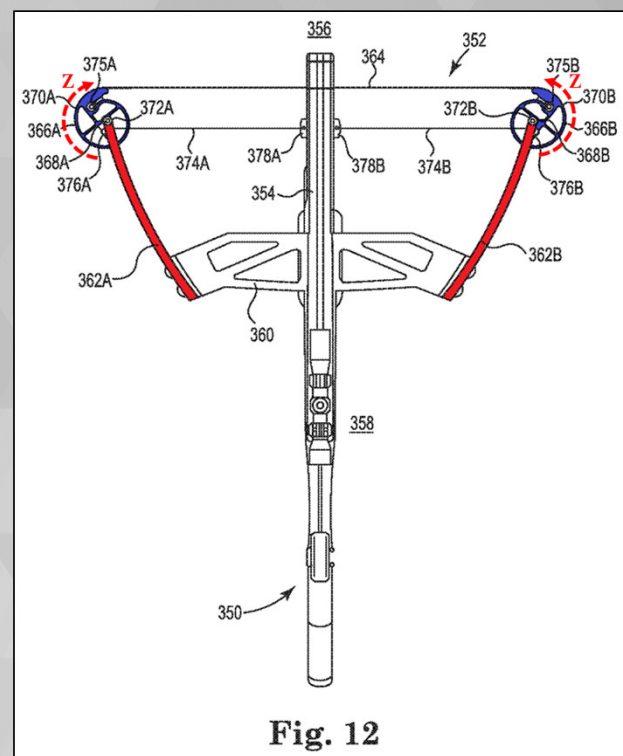


Fig. 12

EX1001, Figs. 11-12 (annotated).

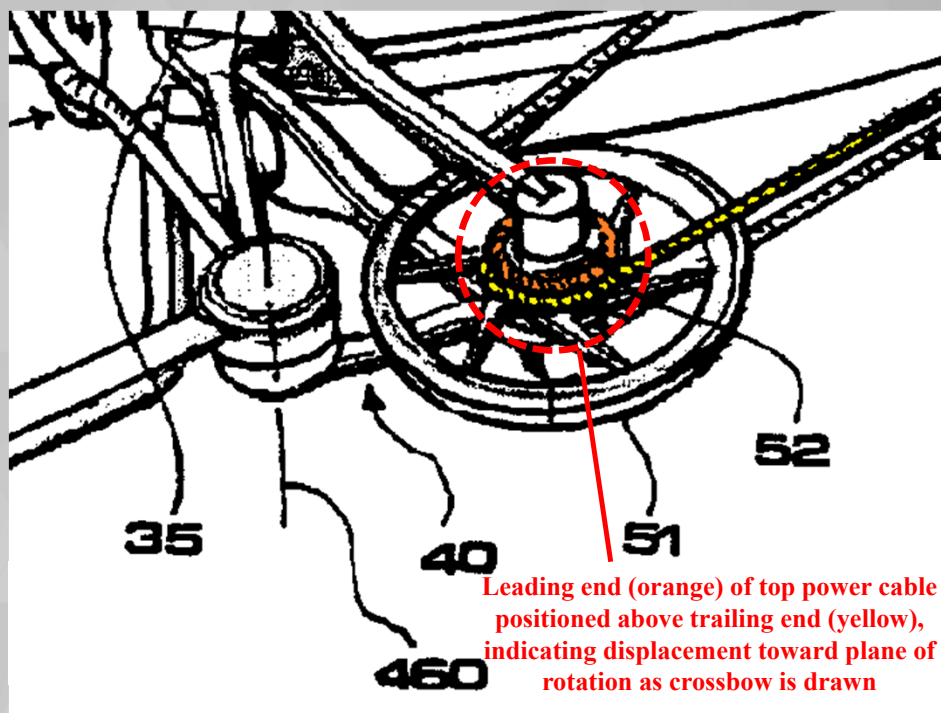
Ground 1 – Claim 1 is Not Anticipated by Stanziale '302

Stanziale '302 does not disclose a crossbow in which “the upper and lower power cables...are displaced along the first and second axes **away from the first and second planes of rotation of the first and second draw string journals.**” EX2029, ¶¶88-92.

Figure 3 highlights that the power cables are being displaced **toward** the first and second planes of rotation, rather than **away from** these planes as required by Claim 1. EX2029, ¶90.

Stephen Batzer Testimony

“upon rereading [Stanziale '302], that Stanziale does not say directly which direction they go. I think that he remains silent.”

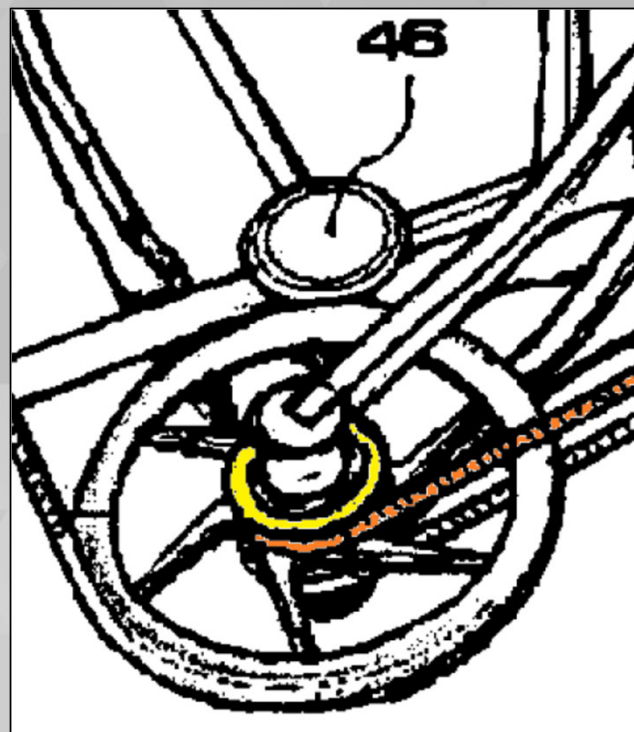


Ground 1 – Claim 1 is Not Anticipated by Stanziale '302

Stanziale '302 does not disclose a crossbow in which “the upper and lower power cables...are displaced along the first and second axes ***away from the first and second planes of rotation of the first and second draw string journals.***” EX2029, ¶¶88-92.

Petitioner mischaracterizes Figure 5 to argue Figure 3 shows displacement away from the plane of rotation.

- Petitioner suggests that the portion of the figure Petitioner colors yellow is an empty section of the journal ready to receive the power cable when the device is drawn.
- But this is directly contradicted by Figure 5 itself which, even as annotated by Petitioner, shows that the yellow portion is **wider** than the power cable itself.
- Thus, the power cable would be actively **prevented** from wrapping onto the depicted structure and away from the plane of rotation.



Reply, 13.

Ground 2 – Claim 1 is Not Rendered Obvious by Stanziale '302

No motivation to try displacing away from the draw string journal plane of rotation

Petitioner argues it would have been obvious to modify Stanziale '302 to yield “the first and second power cables...are displaced along the first and second axes away from the first and second planes of rotation of the first and second draw string journals, respectively” because, with “only two options,” i.e., displacement towards the plane of rotation or away from the plane of rotation, “it would be obvious to try each.” Petition, 36.

Petitioner fails to explain **why** a POSA would have wanted to try each configuration, particularly when Stanziale '302 depicts only one.

Neither Petitioner nor Batzer discuss the impact of modifying the direction of the power cable displacement in Stanziale '302 on the structure as a whole. EX2029, ¶¶179-191.

For example:

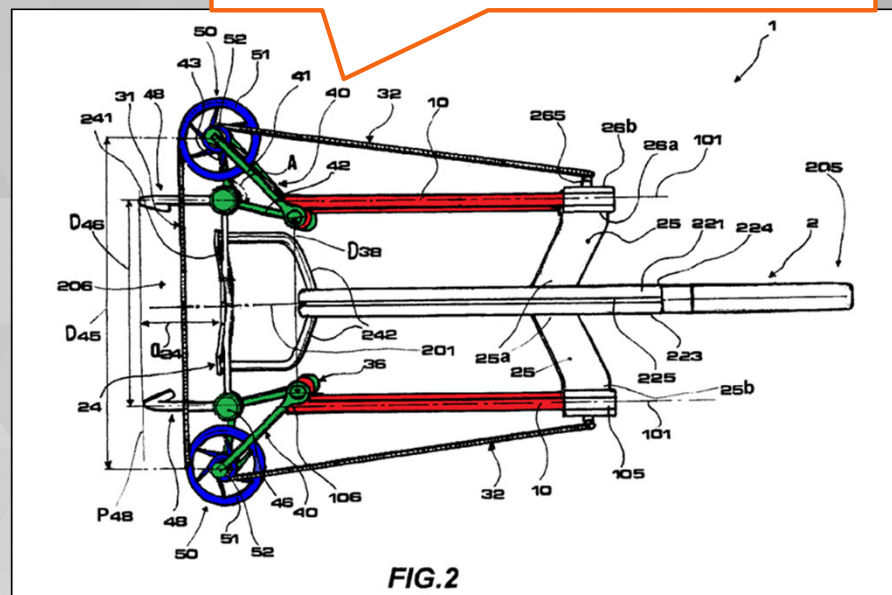
- When torque is applied to a crossbow's limb, without compensating for or neutralizing these forces, functionality of the bow suffers. EX2029, ¶183.
- Limb twist impacts arrow propulsion and results in related inaccuracies as both limbs and cams move in unwanted directions. EX2031; EX2029, ¶183.

Ground 2 – Claim 1 is Not Rendered Obvious by Stanziale '302

Modifying the direction of the power cable displacement impacts the structure

- If the torque is severe enough, various crossbow components (e.g., limbs, cams, or pulleys, or any intervening structures) may deform or fracture, resulting in catastrophic failure of the bow. EX2029, ¶184.
- Where crossbow designs fail to account for or allow for adjustment to limb deflection or alignment of cams, limb twist and cam lean can result in greater wear on components like strings and cables. *Id.*
- Modifying the displacement of the power cables not only affects the attached cam and its immediately connected components but also imposes twisting forces on other connection points and components, including any intervening structures between the cam and the limb and down the length of the limb itself. *Id.*, ¶186.
- Having more components between the cam and the limb amplifies the amount of torque acting on the limb, which in turn requires the use of a more robust limb to absorb and withstand those forces. *Id.*

Specifically, the presence of the lever 40 in Stanziale '302 between the device's cams or pulleys and their limbs introduces a number of additional joints or components that are prone to failure or warping when unplanned forces are applied to them. EX2029, ¶186.

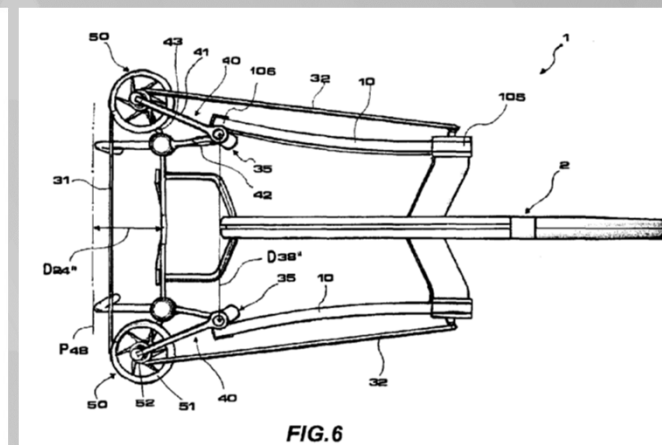
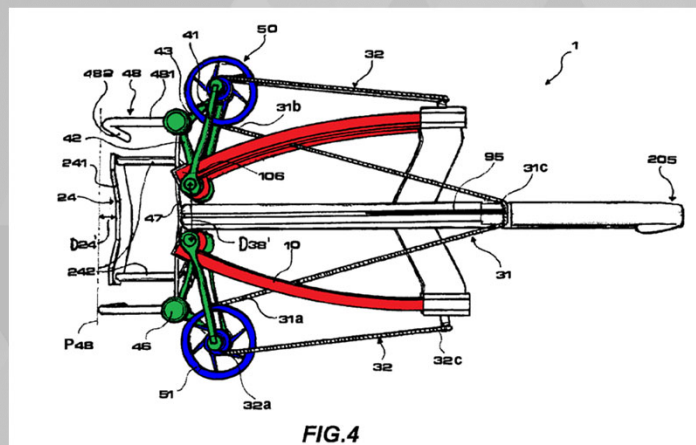
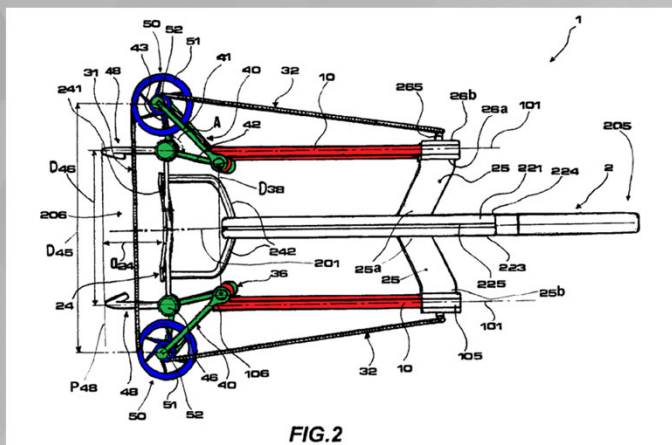


Ground 2 – Claim 1 is Not Rendered Obvious by Stanziale '302

A POSA would know that Stanziale '302's limbs are not robust enough to survive the contemplated torque

Stanziale '302 describes how the device has three different positions:

- (1) an unloaded or rest condition (Ex1007 at ¶[0134], Figs. 1-2);
- (2) a loaded condition (*id.* at ¶[0140], Figs. 3-4), and
- (3) a fully unloaded condition (*id.* at ¶[0154], Figs. 5-6).



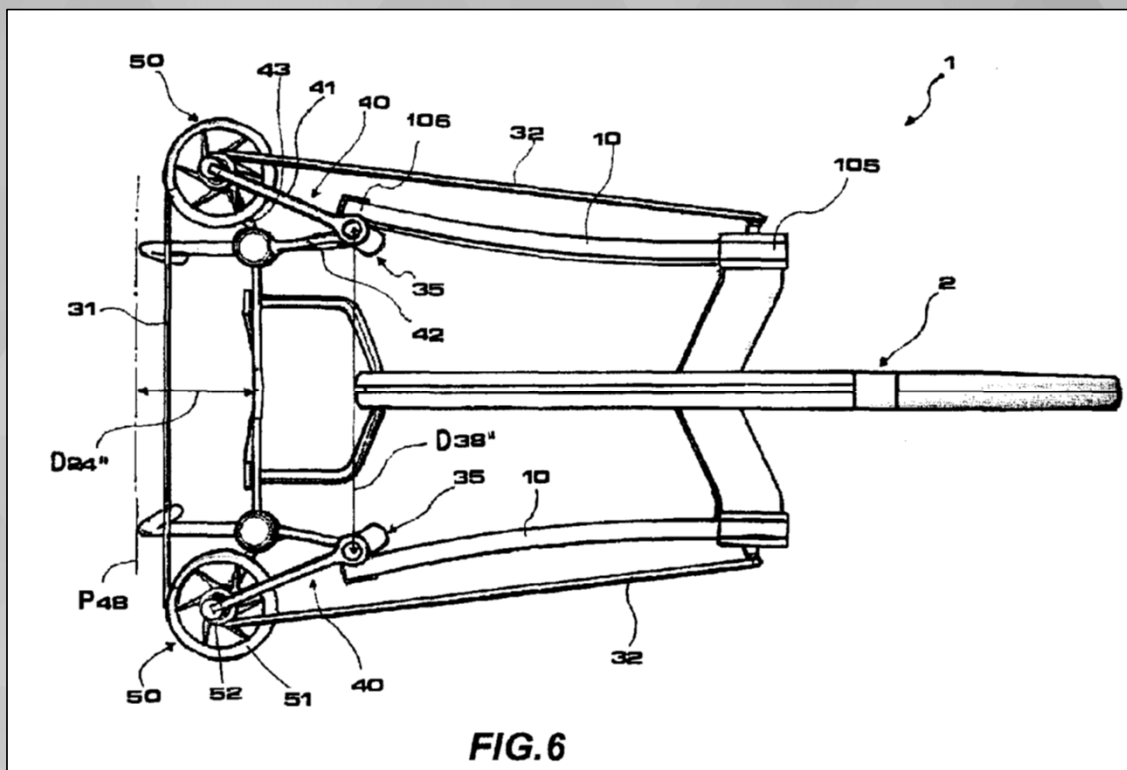
Ground 2 – Claim 1 is Not Rendered Obvious by Stanziale '302

A POSA would know that Stanziale '302's limbs are not robust enough to survive the contemplated torque

In the "fully unloaded condition," "elastic members 10 are deformed in an opposite direction with respect to the loaded condition, i.e. they are bent away from the stock 2." *Id.* at ¶[0155]; EX2029, ¶187.

Jonathan Teater Testimony (EX2029, ¶187)

"A POSA would immediately recognize this to be a severe disadvantage.... For example, residual vibration from the volume of moving parts as the bow moves from the loaded configuration to an unloaded configuration will run through the limb, resulting in stress and increasing the potential for fatigue fractures that may damage and weaken the limb to the point of catastrophic failure."

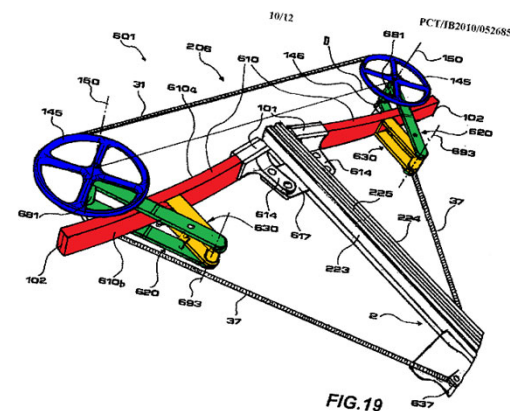
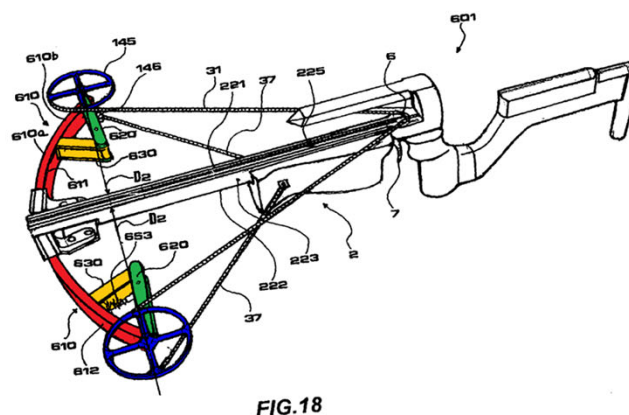
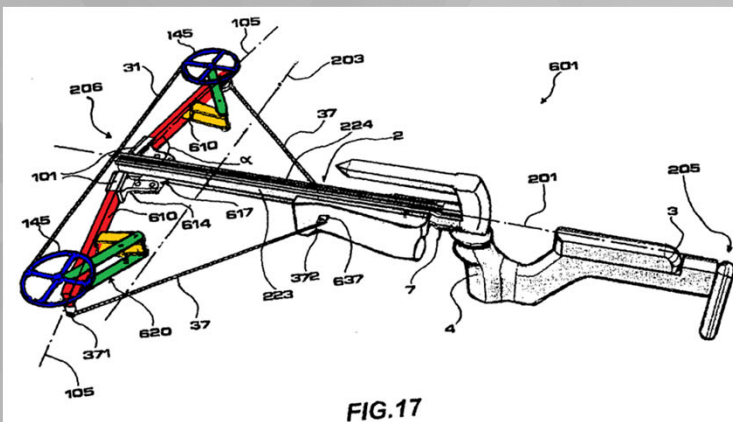


Grounds 3 & 4
WO 2011/158062 (“Stanziale ‘062”)

Ground 3 – Claim 1 is Not Anticipated by Stanziale '062

Stanziale '062 does not disclose “a first string guide mounted to the first bow limb” or “a second string guide mounted to the second bow limb” under the correct construction of “mounted to.”

This can be seen in the below annotated Figures 17-19, illustrating auxiliary arms 620 (green), stirrups 630 (yellow), pulley assemblies 145-146-147 (blue), and elastic members 610 (red):

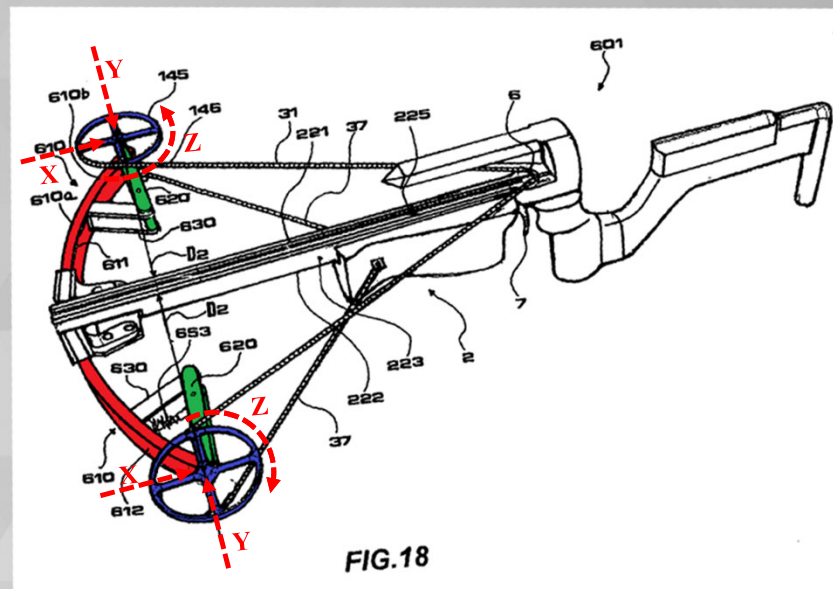


EX1011 at Figs. 17-19.

Ground 3 – Claim 1 is Not Anticipated by Stanziale '062

Since the string guide is not “mounted to” the bow limb, the assembly in Stanziale '062 has three degrees of freedom:

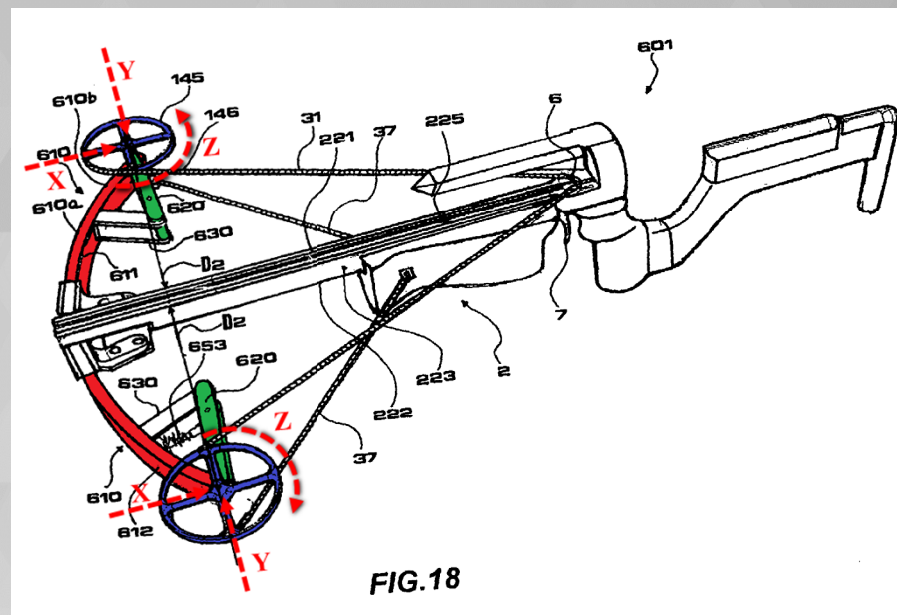
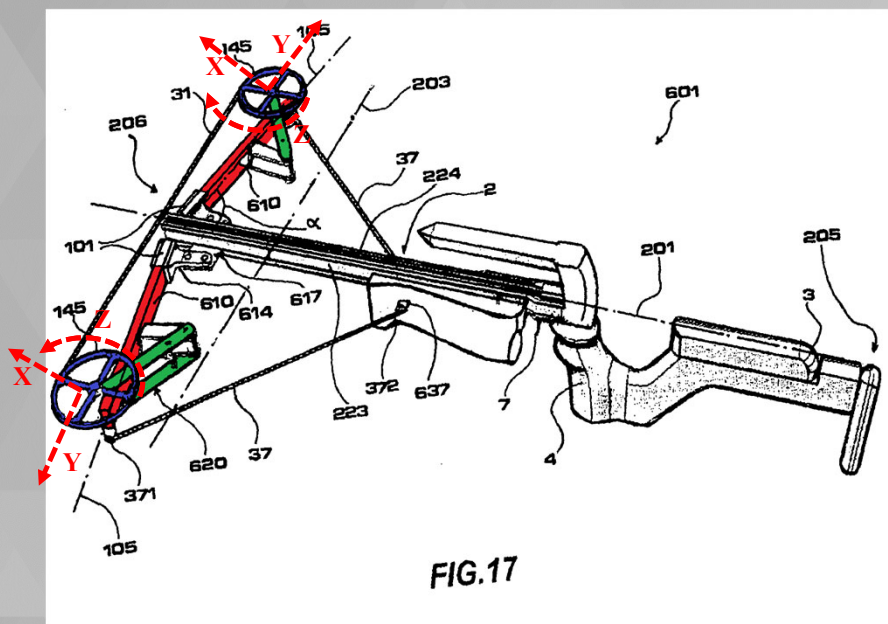
- Stanziale '062's auxiliary arm 620 is a moment arm pivotally mounted to elastic member 610 and provides two degrees of freedom between auxiliary arm 620 and elastic member 610 (i.e., translation along x- and y-axes). EX2029, ¶104.
- Pulley 145/pulley assembly 145-146-147 is rotatably mounted to auxiliary arm 620 and provides an additional degree of freedom (i.e., the pulley/pulley assembly rotate about a z-axis relative to auxiliary arm 620). *Id.*, ¶¶103-104.
- When this linkage of components is viewed as a whole, there are three degrees of freedom between the elastic member and the pulley/pulley assembly (i.e., x-axis translation, y-axis translation, and z-axis rotation). *Id.*, ¶104.



Ground 3 – Claim 1 is Not Anticipated by Stanziale '062

Because the string guide is not “mounted to” the bow limb, the assembly in Stanziale '062 has three degrees of freedom:

- Stanziale '062's Figures 17-18, annotated below, show the three degrees of freedom of pulleys 145/pulley assemblies 145-146-147 (blue) and their corresponding motion as intervening auxiliary arms 620 (green) rotate and elastic members 610 (red) move. EX2029, ¶103.



Ground 3 – Claim 1 is Not Anticipated by Stanziale '062

Stanziale '062 does not disclose a crossbow in which “the upper and lower power cables...are displaced along the first and second axes ***away from the first and second planes of rotation of the first and second draw string journals.***” EX2029, ¶¶107-113.

- Stanziale '062 says nothing about displacing power cables “along first and second axes ***away from the first and second planes of rotation of the first and second draw string journals***” as recited in Claim 1.
- Stanziale '062 fails to provide the structure of the track or groove 1461 with any meaningful boundaries, leaving a POSA with no guidance on how to implement a helical shape. EX2029, ¶¶110-111.
- A POSA would be discouraged from attempting to displace the flexible force member toward or away from the plane of rotation, particularly because Stanziale '062 lacks any information from which a POSA could determine what extent or direction of displacement would allow the disclosed device to function as intended. *Id.*, ¶112.

Stephen Batzer Testimony

“Q. Because in your view, Stanziale '062 is silent as to which direction - -

A. Yes.

Q. - - the cable would wrap?

A. Right, right.”

Ground 4 – Claim 1 is Not Rendered Obvious by Stanziale '062

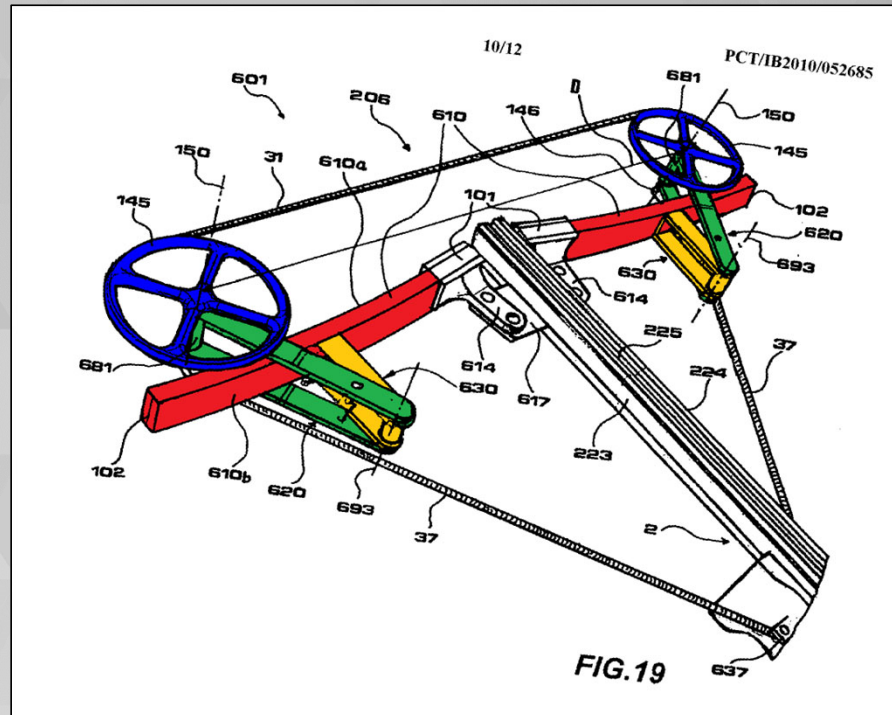
No motivation to try displacing away from the draw string journal plane of rotation

Petitioner fails to establish a motivation to modify Stanziale '062.

Modifying the direction of the power cable displacement impacts the structure

As with Stanziale '302, the presence of auxiliary arms 620 and stirrups 630 in Stanziale '062 between the device's pulleys and limbs introduces several additional joints or components that are prone to failure or warping when unplanned forces are applied. EX2029, ¶¶186-190.

A POSA would expect the same problems as in Stanziale '302 to arise in Stanziale '062's vibration-inducing design (see, e.g., EX1011 at 7:12-14 (describing Stanziale '062's device "in a rest condition, in a loaded or charge condition, and in a maximum discharge condition"), Figs. 17-19 (Fig. 19 showing reverse flexing of limbs), yielding the same unpredictable effects on the device's stability and functionality. EX2029, ¶¶179-191.

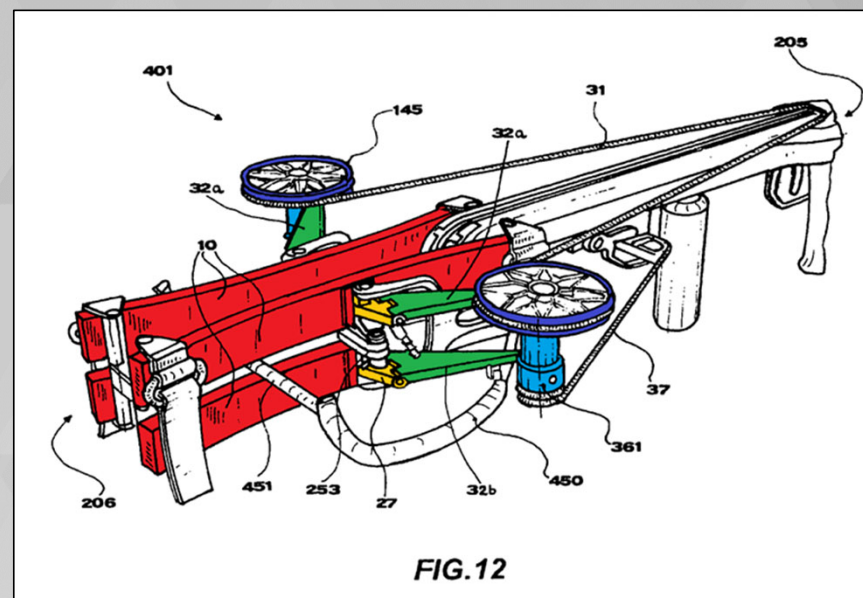
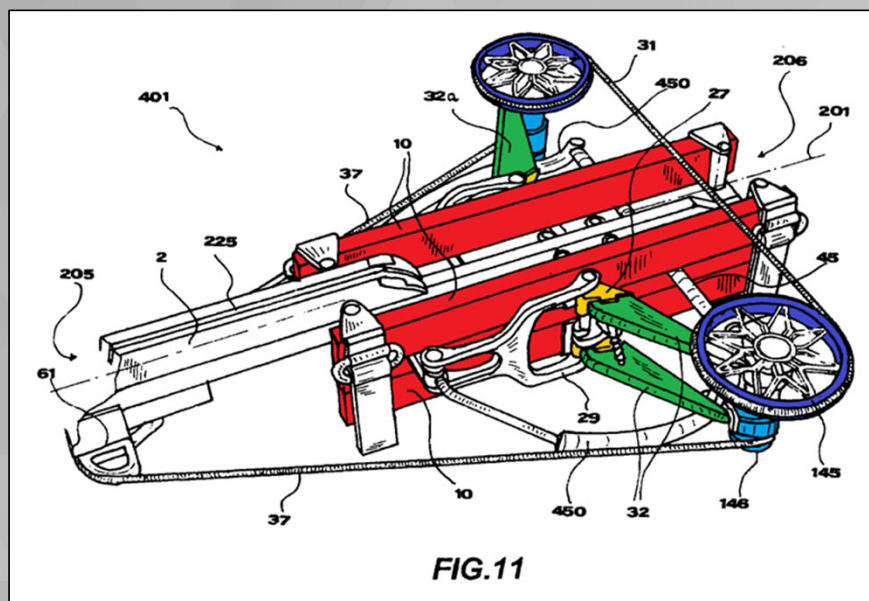


Grounds 5 & 6
WO 2011/141771 (“Stanziale ‘771”)

Ground 5 – Claim 1 is Not Anticipated by Stanziale '771

Stanziale '771 does not disclose “a first string guide mounted to the first bow limb” or “a second string guide mounted to the second bow limb” under the correct construction of “mounted to.”

This can be seen in the following annotated versions of Figures 11 and 12, which show pushing arms 32 (**green**), elements 27 (**yellow**), pulley assemblies 145-146-147 (**blue**), and elastic members 10 (**red**):



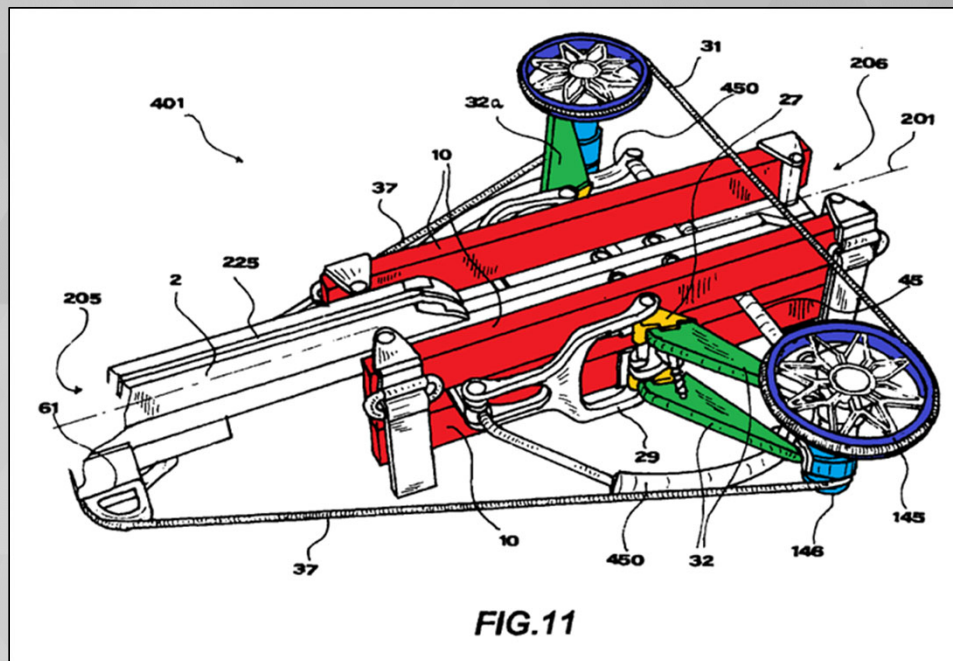
Ground 5 – Claim 1 is Not Anticipated by Stanziale '771

Stanziale '771 does not disclose “a first string guide mounted to the first bow limb” or “a second string guide mounted to the second bow limb” under the correct construction of “mounted to.” EX2029, ¶178-87.

Stanziale '771 teaches that “pushing arm 32 is...rotatably associated with the connecting element 27 thanks to hinge pin 278, said rotation taking place about a respective second rotation axis 93...” EX2029, ¶122; EX1012 13:3-5.

Meanwhile, “pulleys 145, 146 are positioned at opposite sides of the pair of pushing arms 32” and “rotate jointly about an axis of rotation 150...” EX2029, ¶123; EX1012, 15:29-30, 16:2-5.

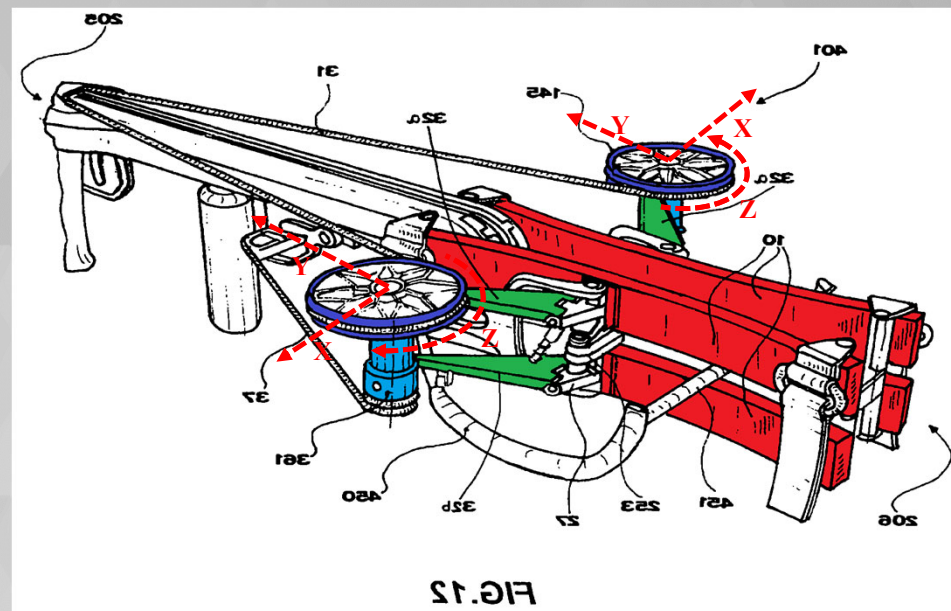
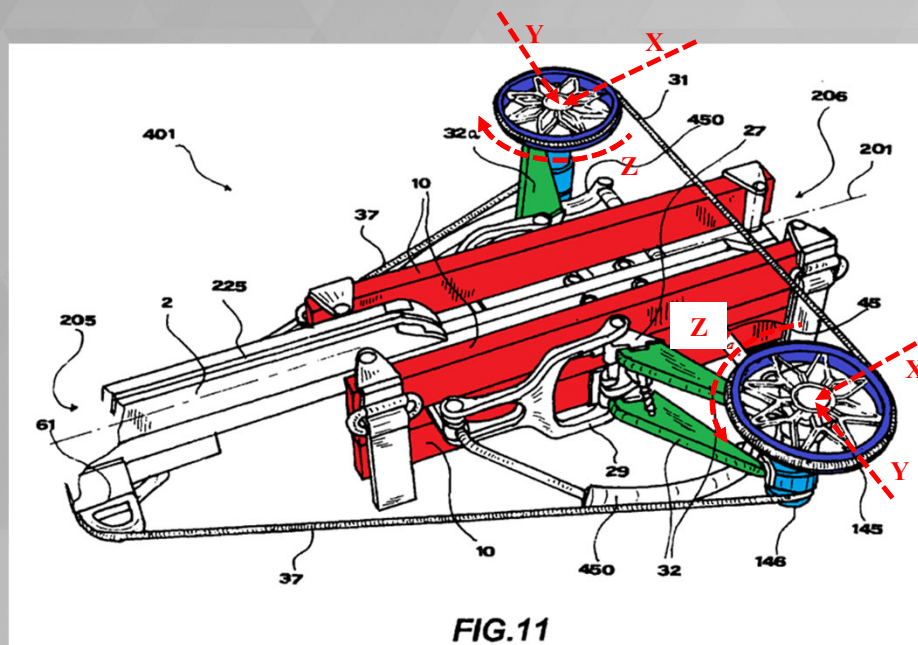
As a result, “the pulleys 145, 146 move synchronized with the respective pushing arms 32, with a combined translation and rotation movement.” EX2029, ¶124; EX1012, 18:16-18 (emphasis added).



Ground 5 – Claim 1 is Not Anticipated by Stanziale '771

Because the string guide is not “mounted to” the bow limb, the assembly in Stanziale '771 has three degrees of freedom:

- As shown in Figures 11-12, annotated below, there are at least three degrees of freedom between pulleys 145/pulley assemblies 145-146-147 (blue) and the elastic members 10 (red) due to the intervening pushing arms 32 (green) (i.e., x-axis translation, y-axis translation, and z-axis rotation). EX2029, ¶¶ 125-126.



EX1012, Figs. 11-12 (annotated, Fig. 12 mirrored)

Ground 6 – Claim 1 is Not Rendered Obvious by Stanziale '771

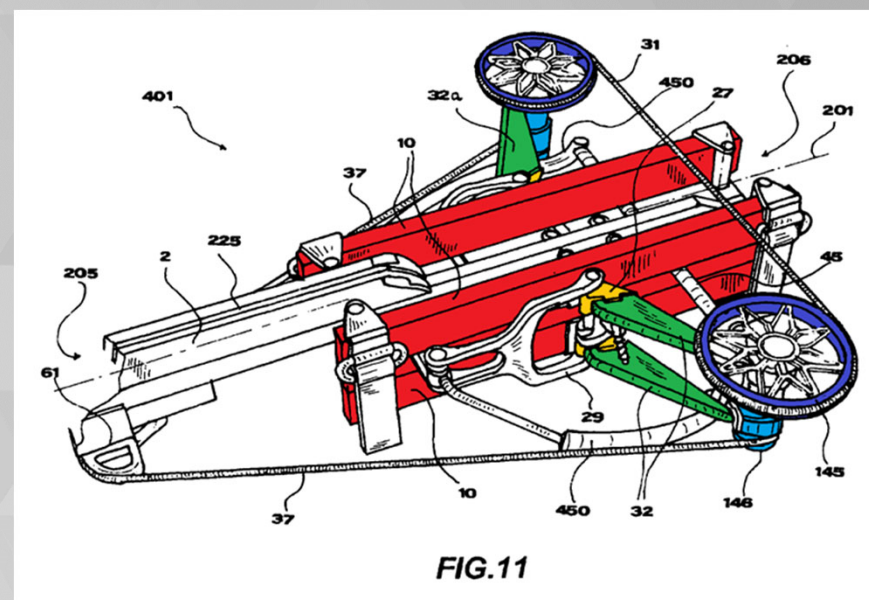
No motivation to try displacing away from the draw string journal plane of rotation

Petitioner fails to establish a motivation to modify Stanziale '771.

Modifying the direction of the power cable displacement impacts the structure

As with Stanziale '302, the presence of pushing arms 32 and elements 27 in Stanziale '771 between the device's cams or pulleys and their limbs introduces several additional joints or components that are prone to failure or warping when unplanned forces are applied to them. EX2029, ¶¶186-190.

A POSA would expect the same problems as in Stanziale '302 to arise in the Stanziale '771's vibration-inducing design (see, e.g., EX1012 at 22:34-23:1 (describing Stanziale '771's device "in a rest condition, in a loaded or charge condition, and in a maximum discharge condition"), Figs. 11-13), yielding the same unpredictable effects on the device's stability and functionality. EX2029, ¶¶179-191.



Grounds 7 & 8

U.S. Patent Pub. No. 2011/0030666 (“Darlington”) in view of U.S. Patent No. 7,578,289 (“Norkus”) / U.S. Patent Pub. No. 2012/0312287 (“Park”)

Claim 1 is Not Rendered Obvious by Darlington in View of Norkus (Ground 7) or Park (Ground 8)

Darlington discloses a compound crossbow directed to increasing accuracy and/or power.

Darlington teaches:

- that the bowstring and power cables remain “**substantially parallel to each other**” in both the drawn and relaxed positions while the orientation of the power cables and the bowstring relative to each other remain consistent throughout the draw cycle, which eliminates (or in shoot-over configurations, reduces) twisting forces and torque on the limbs to “**improve the accuracy** of the crossbow.” EX2029, ¶48.
- that a reverse draw configuration in either a “shoot-through” or “shoot-over” configuration increases the distance the bowstring can be pulled from the relaxed position to the drawn position resulting in an **increased power stroke** when compared to crossbows with conventional draw configurations. *Id.*, ¶¶48-51.

Claim 1 is Not Rendered Obvious by Darlington in View of Norkus (Ground 7) or Park (Ground 8)

Darlington teaches away from displacing the power cables away from the planes of rotation of the draw string journals

- While Petitioner admits that Darlington **does not disclose** “that the power cable journals are helical (extending in a direction perpendicular to the draw string planes of rotation), and thus [does not disclose] that the power cables are displaced along the respective axes away from the planes of rotation as the cables wrap onto the helical journals” (Petition, 48), it ignores that Darlington is not merely silent on this issue.
- Rather, Darlington expressly **teaches away** from a device with such features.

“A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant.” *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 567 F.3d 1314, 1327 (Fed. Cir. 2009) (quoting *Ricoh Co. v. Quanta Computer Inc.*, 550 F.3d 1325, 1332 (Fed. Cir. 2008)).

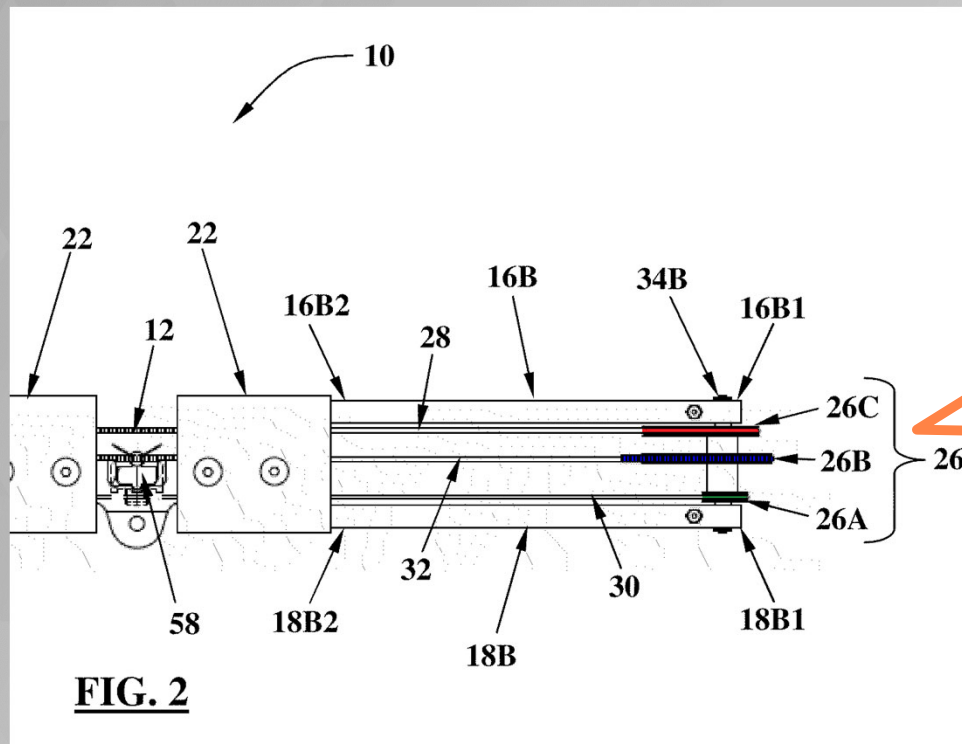
Claim 1 is Not Rendered Obvious by Darlington in View of Norkus (Ground 7) or Park (Ground 8)

Darlington teaches away from displacing the power cables away from the planes of rotation of the draw string journals

- Darlington uniformly teaches in both the “shoot-over” and “shoot-through” configurations that, for the purposes of accuracy:
 - the power cables and bowstring must be “**substantially parallel to each other**” at all times, and
 - the orientation of the power cables and the bowstring relative to each other should remain consistent throughout the draw cycle, such that **the power cables and the bowstring in the drawn position are oriented “just as” they are in the relaxed position**. EX2029, ¶¶132-133.
- Ignoring these teachings and allowing the power cable journals to be displaced away from the drawstring journals and their plane of rotation, as would occur with helical power cable take-up journals, would result in the very “twisting forces” and “torque” on the limbs that Darlington teaches as undermining its goal of increased accuracy. *Id.*, ¶51; see also *id.*, ¶141.

Claim 1 is Not Rendered Obvious by Darlington in View of Norkus (Ground 7) or Park (Ground 8)

Darlington teaches away from displacing the power cables away from the planes of rotation of the draw string journals

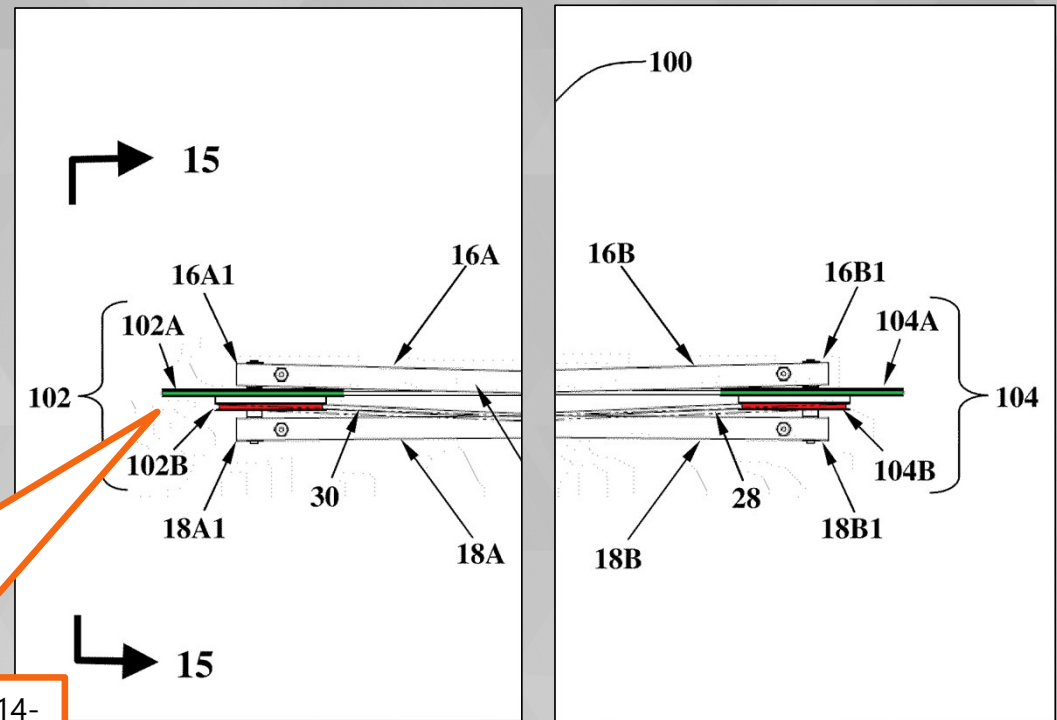


The shoot-through configuration is illustrated in the annotated excerpt of Figure 2 (showing a shoot-through configuration with first let out groove 26A in **green** for the first power cable, second let out groove 26B in **blue** for the bowstring, and take-up groove 26C in **red** for the second power cable).
EX2029, ¶142

Claim 1 is Not Rendered Obvious by Darlington in View of Norkus (Ground 7) or Park (Ground 8)

Darlington teaches away from displacing the power cables away from the planes of rotation of the draw string journals

- While Darlington's "shoot-over configuration" requires that the power cables be deflected out of the bowstring's path, Darlington cautions that deflection "may result in twisting forces being exerted on the limbs." EX2029, ¶1139.
- Thus, Darlington teaches that the "let-out grooves," which let out the bowstring, must be positioned as close as possible to the hybrid grooves, which receive both power cables, with one power cable received in a let-out portion and the other power cable received in a take-up portion. *Id.*, ¶1140.



This close orientation is illustrated in excerpted Figures 14-15 with the let-out grooves annotated in **green** and the hybrid grooves in annotated **red**. *Id.*

Claim 1 is Not Rendered Obvious by Darlington in View of Norkus (Ground 7) or Park (Ground 8)

Darlington teaches away from displacing the power cables away from the planes of rotation of the draw string journals

More specifically, Darlington teaches that:

- hybrid grooves 102B, 104B (i.e., the power cable take-up journals) should not extend away from the plane of rotation of let-out grooves 102A and 104A (i.e., the first and second drawstring journals) because doing so would increase twisting forces and torque on the limbs and is contrary to Darlington's goal of increased accuracy. EX2029, ¶140
- for both cams, the "let-out grooves" must be disposed close to the hybrid grooves. *Id.*, ¶142. Doing so ensures that the forces exerted by the power cables and bowstring on the cam and therefore the limb the cam is attached to are exerted in consistent directions throughout the draw cycle, rather than varying direction as the bowstring transitions between the relaxed position and the drawn position. *Id.*, ¶140.

Jonathan Teater Testimony (EX2029, ¶140)

"Allowing the hybrid grooves to extend away from the let-out grooves, such as by implementing a helical groove structure, would significantly harm Darlington's stated goal of improved accuracy by introducing more torque and varying forces on the limbs than Darlington deemed to be acceptable for a shoot-over configuration of a crossbow."

Claim 1 is Not Rendered Obvious by Darlington in View of Norkus (Ground 7) or Park (Ground 8)

No motivation to modify Darlington with Norkus or Park

- Petitioner posits that POSA would be motivated to combine Darlington with Norkus because:
 - “Darlington teaches the desirability of ‘a higher level of stored energy’ and increased power stroke (*i.e.*, the distance of travel of the bowstring between the drawn and released configurations), which ‘results in better performance,’” and
 - “Norkus likewise teaches the desirability of more energy storage, which is directly impacted by increased power stroke.” Petition, 49.
- Petitioner’s combination theory of Darlington with Park is predicated on a “wish[] to increase a crossbow’s power stroke.” Petition, 51.

Claim 1 is Not Rendered Obvious by Darlington in View of Norkus (Ground 7) or Park (Ground 8)

No motivation to modify Darlington with Norkus or Park

- Any purported increased power stroke in the combination bows is speculative.
 - The cams of Norkus and Park only provide for the possibility of an increased power stroke on their own.
 - Power stroke is limited by the actual movement of the bowstring between the drawn and relaxed positions.
- Given Darlington's teachings, a POSA would not have been motivated to modify or replace Darlington's cams with cams with helical power take-up journals from either Norkus or Park. EX2029, ¶¶197-203.
 - It is the reverse draw configuration of a crossbow, not any particular design of the cams, that increases power stroke relative to a crossbow with a conventional draw configuration. EX1013, [0015], [0042]; EX2029, ¶119.
- To actually increase power stroke, the crossbow of Darlington would need **further modifications** to move the drawn position further away from the relaxed position.

Stephen Batzer Testimony

Batzer conceded that "[e]very component has to be designed to work in combination with the others."

Claim 1 is Not Rendered Obvious by Darlington in View of Norkus (Ground 7) or Park (Ground 8)

No motivation to modify Darlington with Norkus or Park

- Modifications to increase power stroke would include lengthening the barrel, resulting in a longer crossbow which is inherently more unwieldy and less accurate than a shorter crossbow. EX2029, ¶204.
- Such modification may make the **crossbow worse**:

Stephen Batzer Testimony

Q. Is it always the case that if you increase the power stroke distance, you improve a crossbow's performance?

A. All other things being equal, that would be true. But when you do that, you do have to maintain that everything is in balance. You can't simply increase the crossbow draw length without other -- without validating that there is not some unanticipated consequence with the crossbow.

Q. How do you know that is the case?

A. As a mechanical engineer, I know that, that when you make a change, you still have to go through your validation process. . . But when you change fasteners and things, sometimes what you have is, I need a stronger fastener, and then instead of a fastener breaking, an underlying part will break that is more expensive than the fastener. So you have just, by making a fastener that doesn't break, that you paid when it broke, **you have made your overall product worse**. So you could imagine how increasing the power stroke could increase the energy and decrease the accuracy because you didn't make a compensatory change.

Claim 1 is Not Rendered Obvious by Darlington in View of Norkus (Ground 7) or Park (Ground 8)

No motivation to modify Darlington with Norkus or Park

- **Petitioner's proposed combination bows ignore Darlington's accuracy goal**
 - Petitioner ignores the importance of accuracy to Darlington and how accuracy may be impacted (or not) by the proposed Norkus or Park combinations.
 - Petitioner fails to address how the theoretical combination crossbows would combat the increased twisting forces on the limbs that would result from such displacement of the power cables from the bowstring plane and thus negatively impact accuracy. EX2029, ¶198.

Claim 1 is Not Rendered Obvious by Darlington in View of Norkus (Ground 7) or Park (Ground 8)

No motivation to modify Darlington with Norkus or Park

- **Petitioner's proposed combination bows ignore Darlington's hybrid cam disclosure and its impact on cam synchronization**
 - Darlington teaches that "the hybrid two-groove cam configuration [of the shoot-over configuration] also provides the benefit of improved cam synchronization." EX1013, ¶[0060].
 - Darlington's particular hybrid two-groove cam system is essential to implementing a crossbow with a shoot-over configuration (as identified by Petitioner) while achieving Darlington's improved accuracy and improved cam synchronization goals. EX2029, ¶¶132, 139-140.
 - Each hybrid two-groove cam must be arranged with the let-out grooves disposed close to the hybrid grooves to achieve an acceptable improvement of accuracy under the teachings of Darlington. *Id.*, ¶¶136, 200.
 - Each of the two hybrid groove must include both a let-out portion for receiving one power cable and a take-up portion for receiving the other power cable, which allows the two cams to sync together. *Id.*
 - Petitioner offers no explanation as to whether or how the cams of Norkus or Park can function like Darlington hybrid two-groove cams in which a single hybrid groove must accept both power cables.
 - Petitioner refers to hybrid grooves 102B and 104B merely as "grooves," omitting "hybrid" in an apparent attempt to ignore, or at least minimize, Darlington's teachings as to the hybrid function of these particular grooves necessary to practice Darlington's invention.

Claim 1 is Not Rendered Obvious by Darlington in View of Norkus (Ground 7) or Park (Ground 8)

No motivation to modify Darlington with Norkus or Park

- **Petitioner fails to weigh the benefits lost and gained by the combination bows**
 - Darlington explains at length the **advantages in accuracy** provided in its crossbow in either shoot-over or shoot-through configurations, which also has the benefit of cam synchronization. EX2029, ¶¶132-144, 199-207.
 - Darlington also explains that **increased power stroke** can be achieved using a **reverse draw configuration**, rather than a conventional draw configuration, while **still reaping the benefits of improved accuracy and cam synchronization** provide by Darlington's cam systems. *Id.*, ¶198.
 - Petitioner offers no reason or motivation for a POSA to trade Darlington's cams, with their accuracy and cam synchronization advantages, for the Norkus or Park cams for the **mere potential** of an increased power stroke.
 - No POSA would make such a combination when **Darlington itself teaches** that is **possible to have improved accuracy, improved cam synchronization, and increased power stroke** over conventional crossbows by using Darlington's cams in a crossbow arranged in a reverse draw configuration. *Id.*, ¶205.

Claim 1 is Not Rendered Obvious by Darlington in View of Norkus (Ground 7) or Park (Ground 8)

No motivation to modify Darlington with Norkus or Park

- **Petitioner improperly used hindsight**
 - Dr. Batzer admitted he used Patent Owner's crossbows that purportedly practice Claim 1 as a roadmap for his opinion that the combinations of bows in his declaration and Petition would work.

Stephen Batzer Testimony

Q. What is the basis for your statement that you are confident that your proposed combination bows in the various grounds are operable?

A. If a technology works for Norkus and it works for Ravin, which it does, it would work moving Norkus over as a new aspect of the Darlington bow. Though, of course, engineering and analysis would have to be done. You can't simply cut and paste from one into the other without having compensatory design changes.

Grounds 9, 10, 11
U.S. Patent No. 7,836,871 ("Kempf '871")
in view of Norkus, Park, Stanziale '302

Claim 1 is Not Rendered Obvious by Kempf '871 in View of Norkus (Ground 9) or Park (Ground 10) or Stanziale '302 (Ground 11)

Kempf '871 does not disclose “the second string guide comprising... a second helical power cable take-up journal.”

Kempf '871 only discloses outer track (30) as part of pulley (28)—the first string guide. EX2029, ¶150; EX1014, 3:57-59, Fig. 1. The cam (36)—the second string guide—does not have an outer track (30). EX2029, ¶150; EX1014, 3:64-66, Fig. 1.

Kempf '871 only discloses outer track (30) as part of pulley (28) but never discloses an embodiment with two pulleys (28), as such Kempf '871 cannot disclose two outer tracks (30). EX2029, ¶115

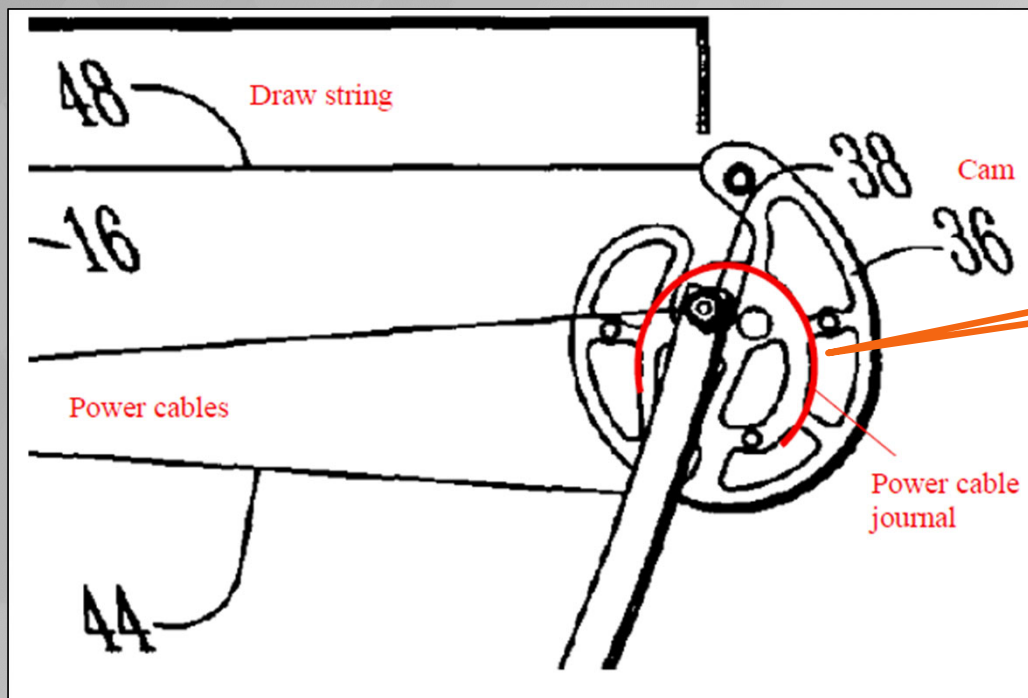
As with outer track (30), neither Kempf '871's primary embodiment (teaching one pulley (28) and one cam (36)) nor its alternative embodiment (teaching two cams) discloses two inner tracks (32). EX2029, ¶¶156-158; EX1014 at 3:57-59; *see also id.* at 3:64-4:19 (discussing cam (36) and not disclosing any outer track (30)), Fig. 1 (showing only one outer track (30), located on pulley (28)), Fig. 10 (same).

Kempf '871's alternative embodiment provides that “two synchronized cams...may be used in place of the cam (36) and pulley (28).” EX1014, 4:12-13 (emphasis added). However, as previously discussed, only pulley (28) has an inner track (32); cam (36) does not. EX2029, ¶1158.

Nothing in Kempf '871 suggests that the “two synchronized cams” in the alternative embodiment would incorporate an inner track (32). *Id.*

Claim 1 is Not Rendered Obvious by Kempf '871 in View of Norkus (Ground 9) or Park (Ground 10) or Stanziale '302 (Ground 11)

Kempf '871 does not disclose “the second string guide comprising... a second helical power cable take-up journal.”



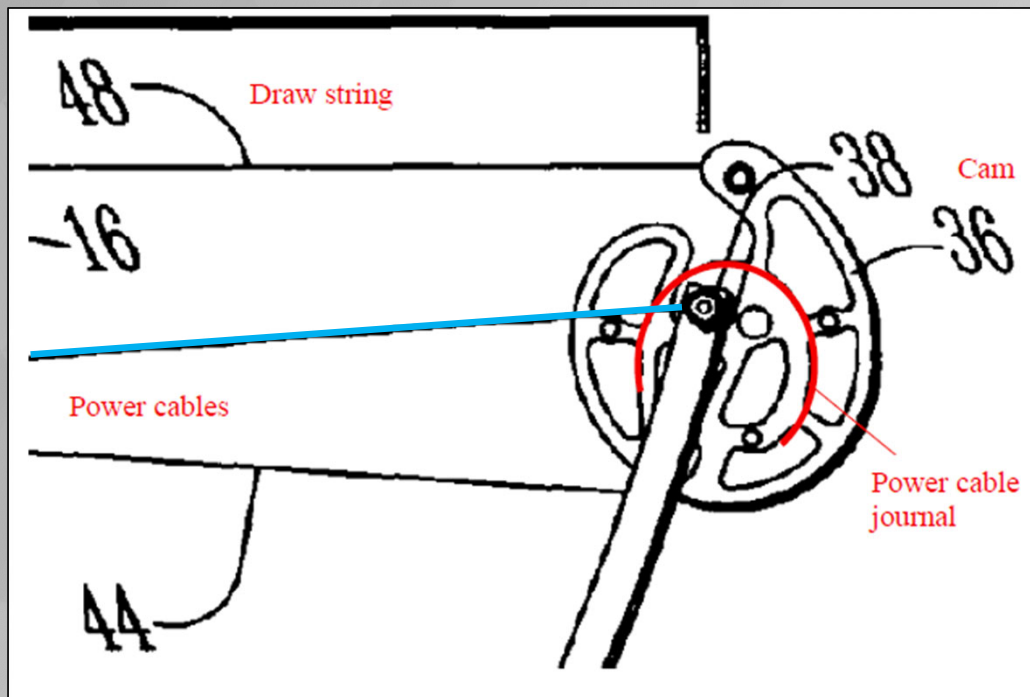
Petitioner now identifies this structure as the power cable journal in Kempf '871's cam.

However, even a cursory review of the figure cited highlights that this supposed feature **does not even contact the power cables, let alone serve as a power cable take-up journal.**

EX1037, ¶116

Claim 1 is Not Rendered Obvious by Kempf '871 in View of Norkus (Ground 9) or Park (Ground 10) or Stanziale '302 (Ground 11)

Kempf '871 does not disclose “the second string guide comprising... a second helical power cable take-up journal.”



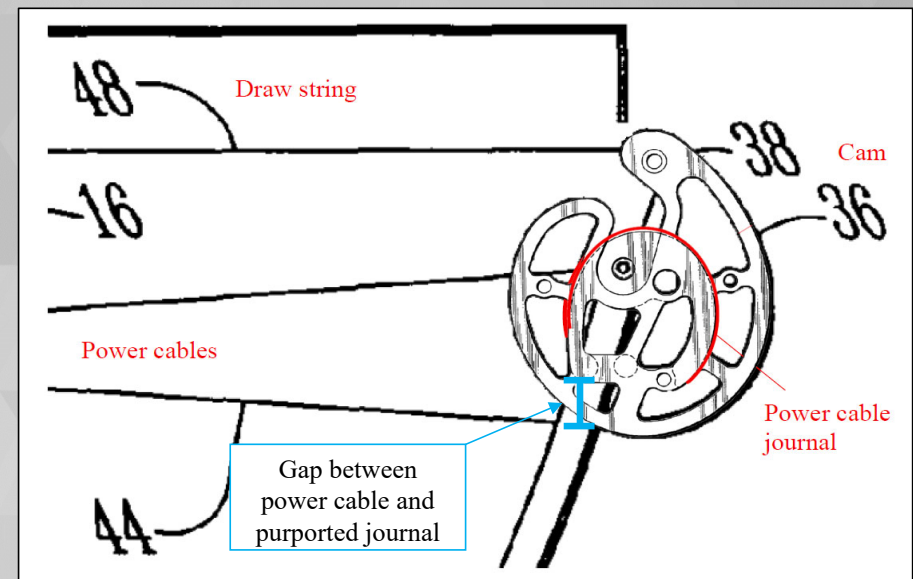
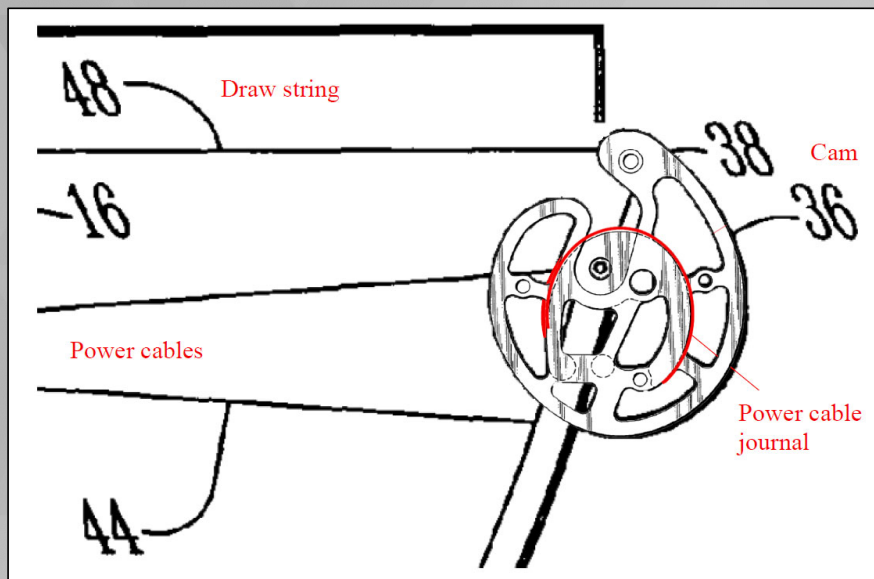
As shown in the annotated figure, the top power cable 44 (blue) is instead attached to a fixed anchor point on the cam, which is shown without any journal or other groove that would take up the power cables. It does not sit within a groove formed by the supposed power cable take-up journal Petitioner identifies.

EX1037, ¶116 (blue annotations added).

Claim 1 is Not Rendered Obvious by Kempf '871 in View of Norkus (Ground 9) or Park (Ground 10) or Stanziale '302 (Ground 11)

Kempf '871 does not disclose “the second string guide comprising... a second helical power cable take-up journal.”

- The **lower power cable does not interact with the supposed power cable take-up journal**, as demonstrated by comparing the supposed journal in Figure 3 (which sits entirely within the footprint of the cam body) and the location where the lower power cable would intersect with the cam depicted in Figure 1.



The above retains Petitioner's annotations but shows the more detailed cam depicted in Fig. 3 superimposed over the limb-mounted cam in Fig. 1

There is a significant gap (blue) between the lower power cable and the structure that Petitioner identifies as the power cable take-up journal

Claim 1 is Not Rendered Obvious by Kempf '871 in View of Norkus (Ground 9) or Park (Ground 10) or Stanziale '302 (Ground 11)

No motivation to modify Kempf with Norkus or Park or Stanziale '302

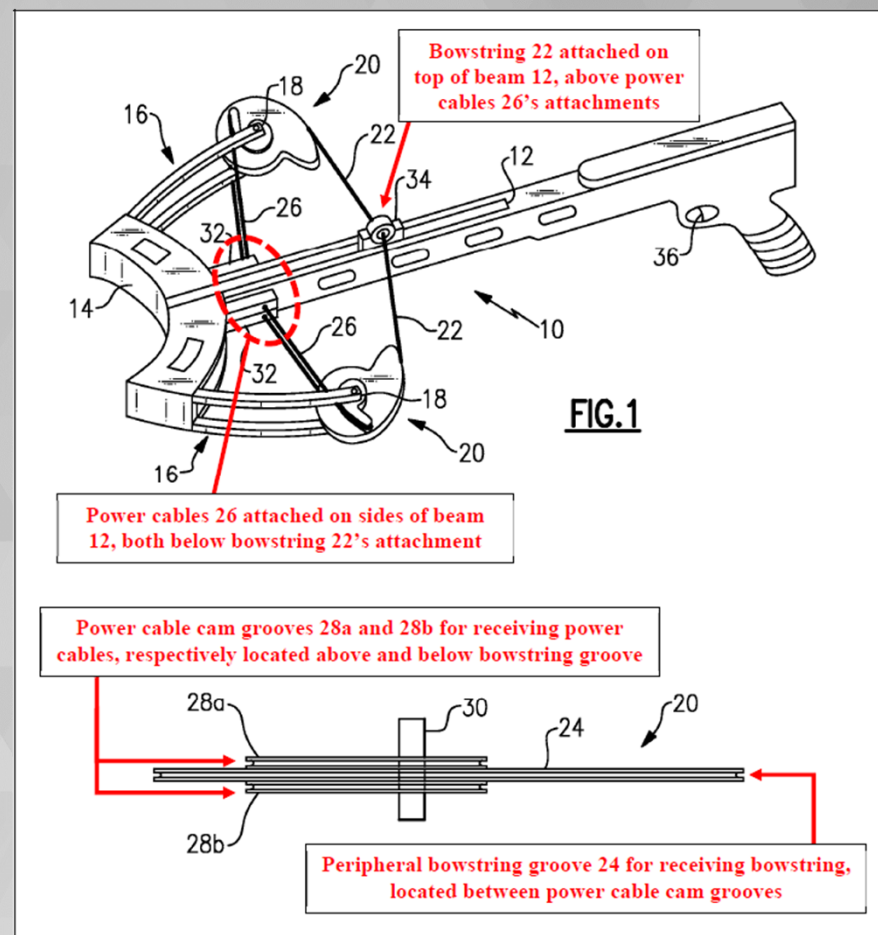
- Petitioner does not say why a POSA would seek to modify Kempf '871 specifically with the helical power cable journal disclosed in Park, Norkus, and Stanziale '302 to meet the claim elements requiring a helical power cable take-up journal extending in a direction perpendicular to the planes of rotation of the draw string journal and that the power cables be displaced away from the planes of rotation of the draw string journals. Petition, 55-56.
- The mere existence of overlapping, generic teachings regarding “the desirability of increasing a crossbow’s draw length or power stroke, which increases its potential power and thus speed,” (Petition, 55-58), is insufficient motivation for a POSA to combine Kempf '871 with each of these references.

Ground 12
U.S. Patent Pub. No. 2011/0308508 (“Islas”)
in view of Darlington and Park

Claim 1 is Not Rendered Obvious by Islas in View of Darlington and Park (Ground 12)

Islas would be rendered inoperable if modified as Petitioner proposes.

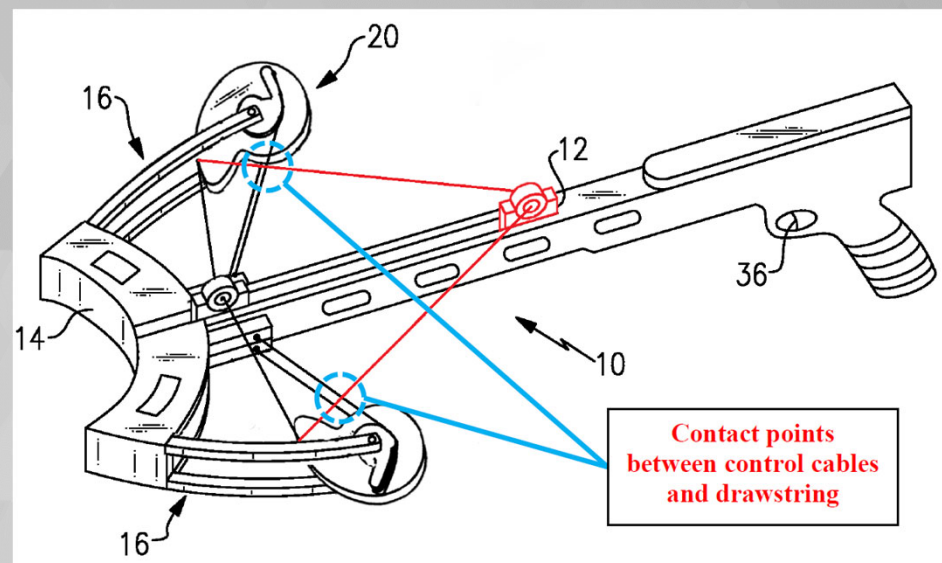
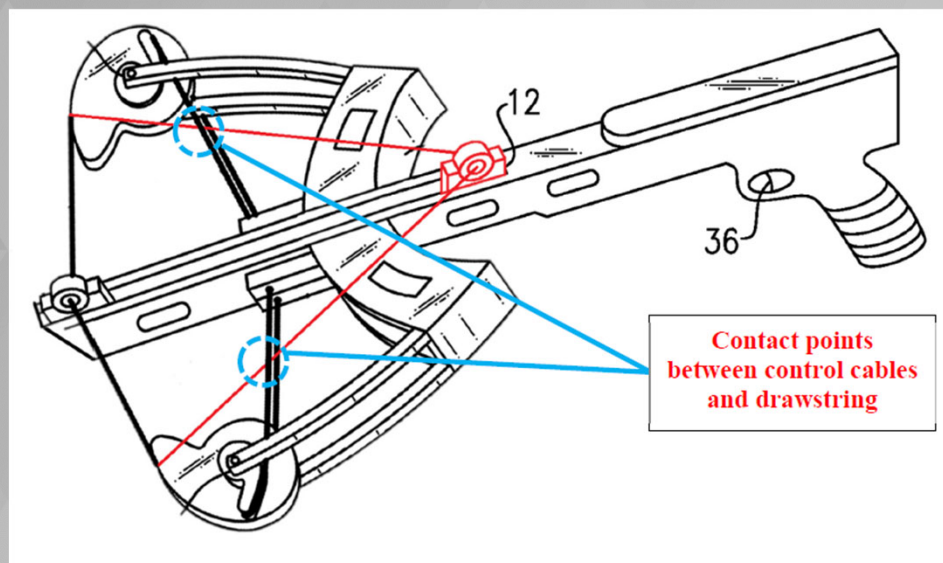
- Islas discloses that the power cables are attached to the stock through anchor points positioned on the sides of the stock but are attached to the cams via two grooves 28a and 28b positioned on the top and bottom of each cam, respectively. EX1015 at ¶[0013], Fig. 1, Fig. 4.
- Islas further discloses that the drawstring is attached to a string release mounted on top of the stock and to each cam via a peripheral channel 24 positioned between grooves 28a and 28b. EX1015 at ¶[0013]-[0014], Fig. 1, Fig. 4.
- Thus, “simpl[y]” reconfiguring the Islas device so that “the string [is] adjacent the down-range side of the string guides 20 in a released configuration, such that the string translates from the down-range side toward the up-range side while being drawn” as Petitioner argues, would render the device inoperable as it would cause the drawstring to contact the power cables when the modified device was drawn.



Claim 1 is Not Rendered Obvious by Islas in View of Darlington and Park (Ground 12)

Islas would be rendered inoperable if modified as Petitioner proposes.

- Islas would be rendered inoperable due to conflict between the drawstring and the power cables regardless of whether a reverse-draw configuration were implemented by reversing the orientation of the limbs or by reversing the orientation of the cams alone.





RAVIN®

Thank You

