

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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**HUNTER'S MANUFACTURING COMPANY, INC.**  
**d/b/a TENPOINT CROSSBOW TECHNOLOGIES,**  
Petitioner,

v.

**RAVIN CROSSBOWS, LLC,**  
Patent Owner.

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Case No. **IPR2023-00407**  
Patent No. **9,354,015**

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**SUPPLEMENTAL DECLARATION OF**  
**STEPHEN A. BATZER, PH.D., P.E.**

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I, Stephen A. Batzer, declare as follows:

**I. INTRODUCTION**

1. I have personal knowledge of the matters set forth herein.

2. I have been retained to provide expert opinions on behalf of Petitioner Hunter's Manufacturing Company, Inc. d/b/a TenPoint Crossbow Technologies ("TenPoint") in the *inter partes* review ("IPR") of U.S. Patent 9,354,015 (the "'015 Patent") owned by Patent Owner Ravin Crossbows, LLC ("Ravin"). To that effect, I previously provided a declaration that was filed as Ex. 1016 to TenPoint's Petition requesting the IPR.

3. I understand that the parties have since filed the following, which I have reviewed: Ravin's Preliminary Response (Paper 9 and supporting exhibits), TenPoint's Reply to the Preliminary Response (Paper 11 and supporting exhibits), and Ravin's Sur-Reply to the Reply (Paper 12 and supporting exhibits). I also understand that the Board has instituted the requested IPR, and I have reviewed the Institution Decision (Paper 13).

4. I have been asked to provide my opinion relating to several issues implicated by these papers. This declaration supplements my previous declaration (Ex. 1016) without repeating the opinions provided therein, which remain unaltered; for those opinions, the reader is directed to the previous declaration.

5. In preparing this supplemental declaration, I have reviewed the following materials, in addition to the materials referenced above and in my previous declaration (Ex. 1016):

- U.S. Patent No. 9,879,936 (Ex. 1027);
- U.S. Patent No. 10,254,073 (Ex. 1028); and
- U.S. Patent No. 6,267,108.

6. In forming the opinions expressed in this declaration, I have considered the materials listed above, the relevant legal standards (see my previous declaration, Ex. 1016), and my own knowledge and experience in the field of archery and bows and crossbows in particular.

## **II. CONSTRUCTION OF “MOUNTED TO”**

7. The first issue addressed by this supplemental declaration is the proper construction of the claim term “mounted to,” in light of the Board’s invitation for the parties to further develop this issue. My previous declaration (Ex. 1016) discussed the construction of “mounted to” in light of the ‘015 Patent and its child U.S. Patent 9,494,379 (the “’379 Patent,” because my understanding is that statements in related patents (even if prosecuted subsequently) may inform the meaning of claims (even if issued earlier)).

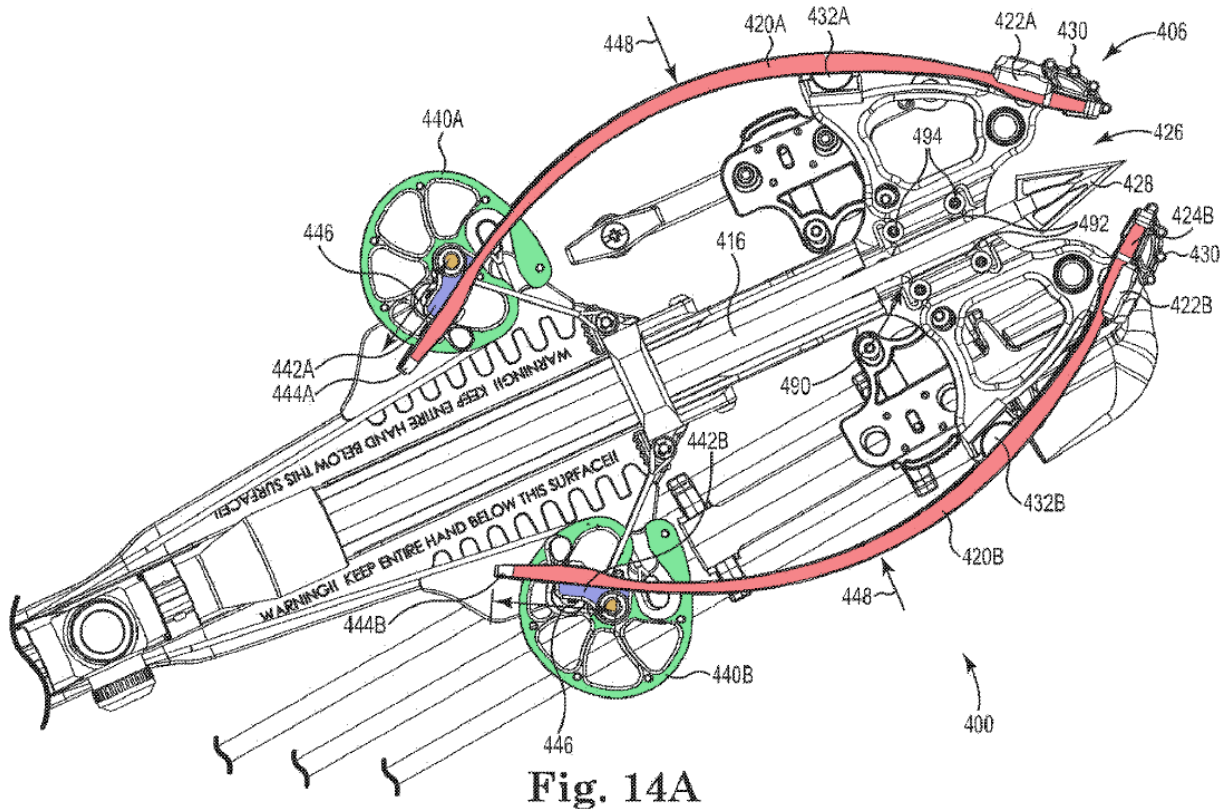
8. This supplemental declaration discusses the construction of “mounted to” in light of related U.S. Patent 9,879,936 (the “’936 Patent,” which is a child of the ‘379 Patent) and U.S. Patent 10,254,073 (the “’073 Patent,” which is a child of the ‘936 Patent), both of which claim the benefit of the ‘015 Patent.

9. Claim 1 of the ‘936 Patent recites that the first and second cams are each “mounted to the [respective] bow limb and rotatable around a [respective] axis.” This same phrasing is also used in claim 1 of the ‘015 Patent, except reciting “string guide” instead of “cam.” However, both patents explain that a “cam” is included in the term “string guide.” Ex. 1001, 4:9-11; Ex. 1027, 6:4-6.

10. Claim 9 of the ‘936 Patent (which depends on claim 1) further requires the cams to be mounted to the respective limbs “with first and second axes of rotation offset from distal tips of the bow limbs by about 1.0 inch to about 3.0 inches.” (The same narrowing is also true of the ‘936 Patent’s claim 18 as compared to its independent claim 11.)

11. The specification explains that this offset is accomplished by attaching the cams 440A, 440B to the limbs 420 using axle mounts 442A, 442B (Ex. 1027, 9:63-10:13), and the referenced Fig. 14A (shown below) confirms that the cams (green) are not actually mounted directly to the limbs (pink); rather, the axle (brown) going through each cam 440A, 440B (green) is secured to a bracket

(purple) (called axle mount 442A, 442B), which is then secured to the respective limb 420A, 420B (pink). *See also id.* at Figs. 21A, 23A. Thus, the ‘936 Patent supports that “mounted to” in this patent family is not limited to just direct mounting but also encompasses mounting through intervening components.



12. Neither have I seen, in my review of the intrinsic evidence to the ‘015 Patent, any statements made by Ravin that exclude the above-discussed indirect mounting from the scope of “mounted to.”

13. Turning to the ‘073 Patent, its independent claims provide more details on the mounting. Claim 1 recites that the first and second string guides are

each “mounted to the [respective] flexible limb by a [respective] axle mount and rotatable around a [respective] axis located a fixed distance from the [respective] flexible limb by the [respective] axle mount.” (The ‘073 Patent’s independent claims 11 and 15 are similar.) The specification parallels this language, stating: “Cams 440A, 440B (‘440’) are attached to the limbs 420 by axle mounts 442A, 442B (‘442’).” Ex. 1028, 10:47-48. These statements confirm that when this patent family refers to the string guides as being “mounted to” the limbs, they are not limited to just direct mounting but rather include mounting through intervening components.

14. Under Ravin’s proposed construction (i.e., “mounted to” encompasses only direct mounting), this ‘073 Patent claim limitation would then essentially read: each “string guide [is directly] mounted to the . . . limb [indirectly] by a[n] . . . axle mount and rotatable around a[n] . . . axis located a fixed distance from the . . . flexible limb by the . . . axle mount.” It is evident that such a reading is internally inconsistent (i.e., two components cannot be mounted to each other directly and indirectly simultaneously) and thus incorrect.

15. Furthermore, as shown in the preceding paragraph, this patent family uses “mounted to” and “attached to” synonymously. Claim 1 of the ‘936 Patent recites “first and second bow limbs attached to a riser.” But claim 1 of the ‘073

Patent recites a crossbow that has “first and second flexible limbs attached to a center rail,” though its specification explains that the “[l]imbs 420 are attached to the riser 404,” which itself is “mounted at the distal end 406” of the center rail 402. Ex. 1028, 9:10-11, 10:34-35. And none of the figures show a crossbow with limbs attached directly to the center rail – all are mounted to the riser, which is mounted to the center rail. Thus, the riser 404 is an intervening component.

16. These related patents, which I understand are part of the ‘015 Patent’s intrinsic evidence, further confirm my opinion that mounting, as used in claim 1, can be done through intervening components and is not restricted exclusively to direct mounting.

17. My previous declaration (Ex. 1016) addressed Ravin’s argument from the related district court case, which Ravin repeated in its Preliminary Response, that this claim term must be construed “to allow only rotation about a fixed axis.” The ‘073 Patent likewise discloses “a center rail 402 with a riser 404 mounted at the distal end 406 . . . .” Ex. 1028, 9:10-11. It also discloses that an “arrow rest 750 is mounted to distal end 776 of the center rail 402 . . . .” *Id.* at 18:5-6. And its claim 31 recites “an optical scope mounted to a scope mount on the crossbow.” There is no indication that any of these mounted components must rotate (but only about one fixed axis); indeed, as I explained previously, such movement would

severely compromise the operation and accuracy of the crossbow. Thus, it is my opinion that a person of ordinary skill in the art (“POSA”) would not construe the claim term “mounted to,” which is used throughout the claims and specifications of this patent family, as required to allow rotation, but only along a single axis, prohibiting all other movement.

### **III. JOURNALS OF THE CAM OF KEMPF ‘871**

18. The second issue addressed by this supplemental declaration is regarding the journals of the cam disclosed by the asserted prior art U.S. Patent 7,836,871 (“Kempf ‘871,” Ex. 1014).

19. My previous declaration (Ex. 1016) discussed the relevant technological field, including vertical bows and crossbows, including cams used on them to secure, wind, and unwind the bowstring and any power cables. It also explained how Kempf ‘871 discloses two string guides, each of which has a draw string journal and a power cable take-up journal. Ravin’s Preliminary Response does not dispute that Kempf ‘871 discloses two string guides, nor does it contest that the pulley 28 does disclose a “first draw string journal” (called outer track) 30 and a “first” “power cable take-up journal” (called inner track) 32. Ravin’s argument appears to be that the disclosed cam 36 of Kempf ‘871 has neither a draw string journal nor a power cable journal. I strongly disagree.

20. Ravin appears to make this argument only because Kempf '871 has no express callout number and arrow pointing to the cam's outer track (receiving the bowstring 48) and to the cam's inner track (receiving the cable 44). But just because these callout numbers and arrows are missing from the explanatory figures (in contrast to those shown for the pulley 28) does not mean that the underlying structural features are actually absent from the crossbow.

21. My previous declaration was able to cite to callout 30 on the pulley 28 to pinpoint this journal because such callout exists in Kempf '871's figures. Because the figures do not include a similar callout for the cam 36, I was unable to cite to a callout number, but a POSA would readily confirm that such a draw string journal is certainly there; archery cams are so constructed, everywhere and always. A POSA would understand that the journal is necessarily required in order to receive the bowstring 48, both when static (e.g., in the fully cocked position or fully released position) and when moving (e.g., when being cocked or being fired).

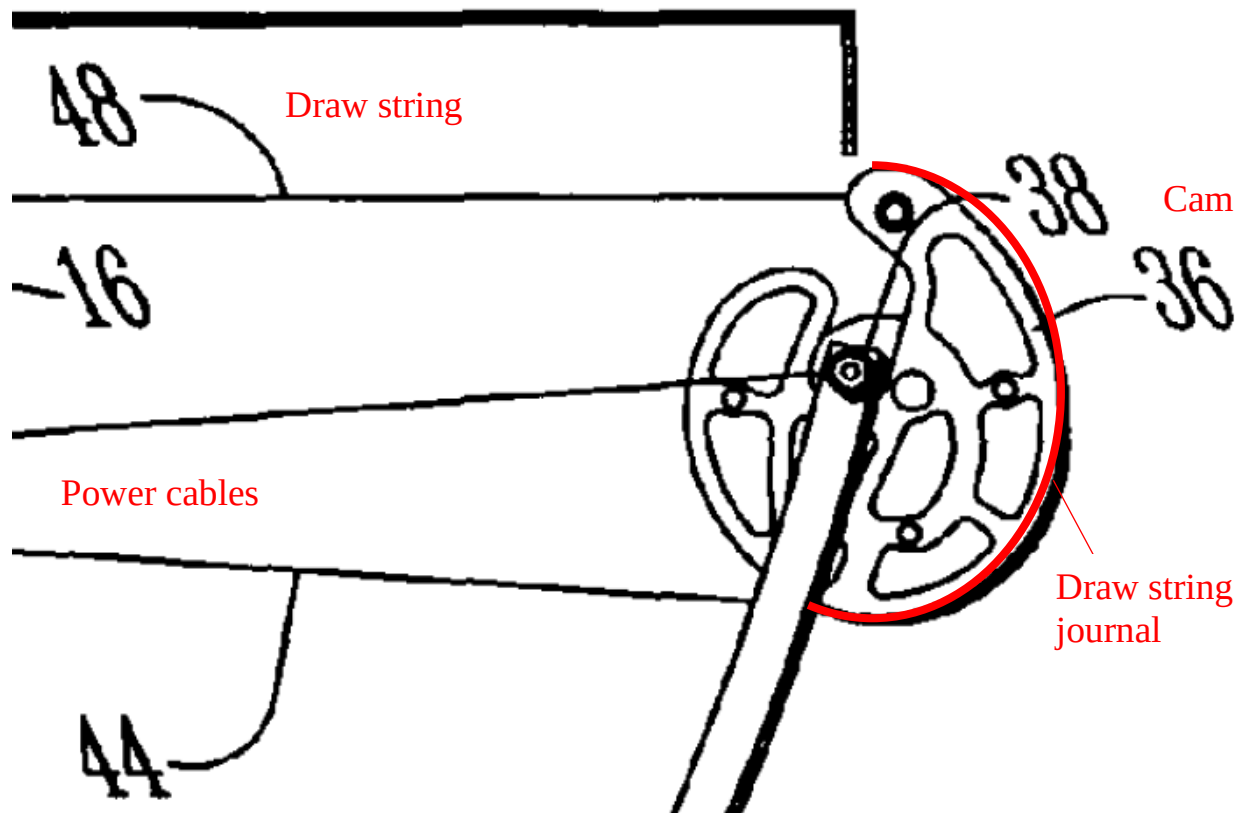
22. Claim 1 of Kempf '871 recites, *inter alia*, two string guides, "a first string coupled to said first string guide and to said second string guide," and "a second string coupled from a first contact on said first string guide . . . to a second contact on said second string guide . . . ." *See also* Ex. 1014, 2:59-67. Claim 10 (which depends on claim 1) recites that "said first string guide is a cam." Thus,

Kempf '871 discloses two string guides (one of which is a cam) that are “coupled” to two strings (i.e., bowstring and power cable).

23. Kempf '871 characterizes archery cams as known prior art. *Id.* at 1:9-27. It cites, for example, to U.S. Patent 6,267,108, which discloses cams on a vertical bow and a crossbow. Kempf '871 shows one example of a cam's construction in Fig. 3, but it also notes that the cam “may be constructed in a manner known in the art,” which further reinforces that cams would be well-known to a POSA. Ex. 1014, 4:5-7.

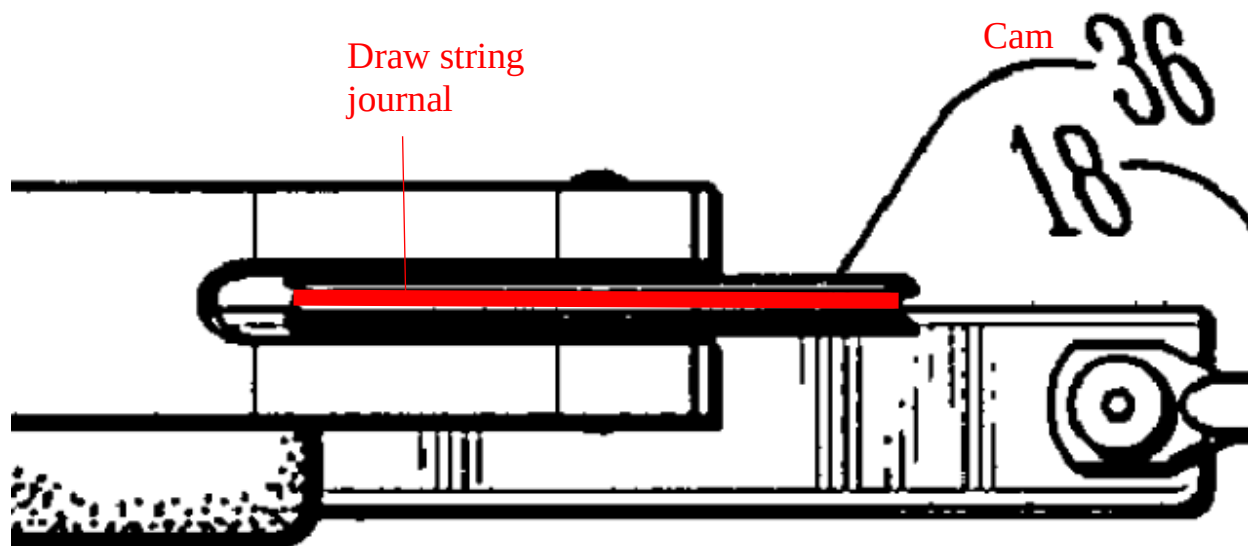
24. Kempf '871 also explains that the string guides “may be coupled to a bowstring (48) and, if desired, one or more cables [44] in any manner known in the art . . . .” *Id.* at 4:13-15. Again, this reinforces that a crossbow cam receiving a bowstring and a power cable is well-known to a POSA, and a POSA would also know how this is accomplished (i.e., through journals, also known as tracks, grooves and guides).

25. The figures of Kempf '871 show the cam receiving the string and cable. For example, looking at the cam 36 in Fig. 1 of Kempf '871, a POSA would understand that its draw string journal would run along the outer perimeter of the cam, where the bowstring 48 contacts and wraps around the cam, as indicated in red in the below excerpt:

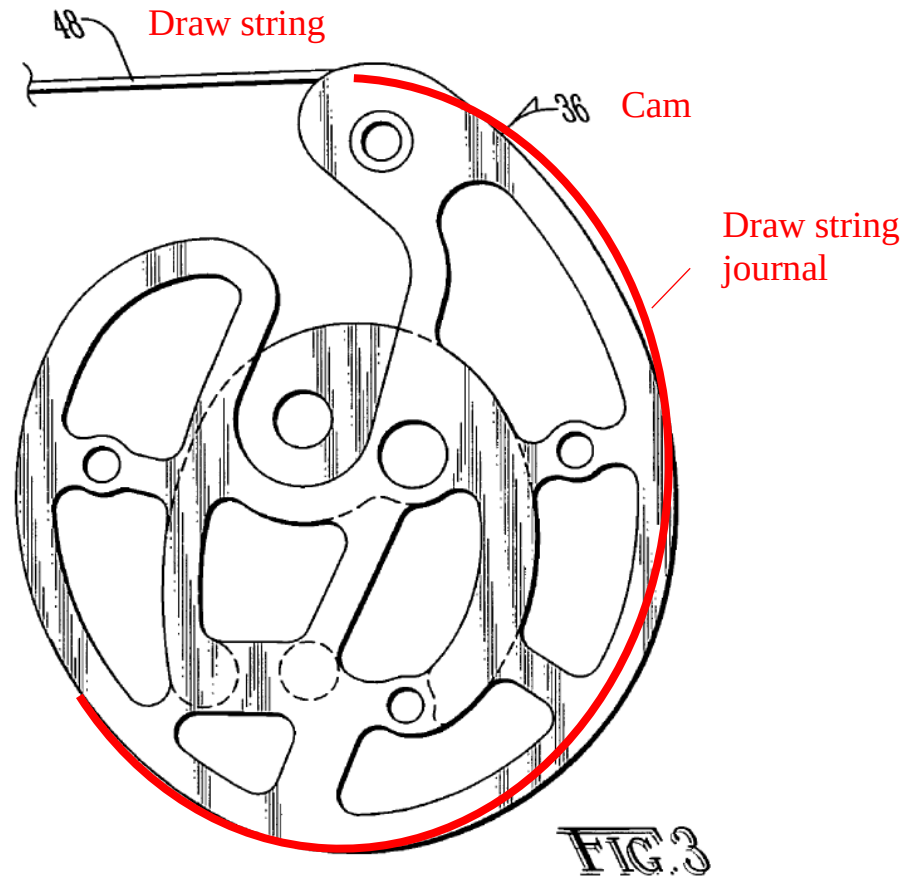


26. A POSA would readily understand that the cam necessarily must have such a journal (i.e., groove or track for the string), because without it, the disclosed string would reliably slip off the cam and not permit the crossbow to be drawn.

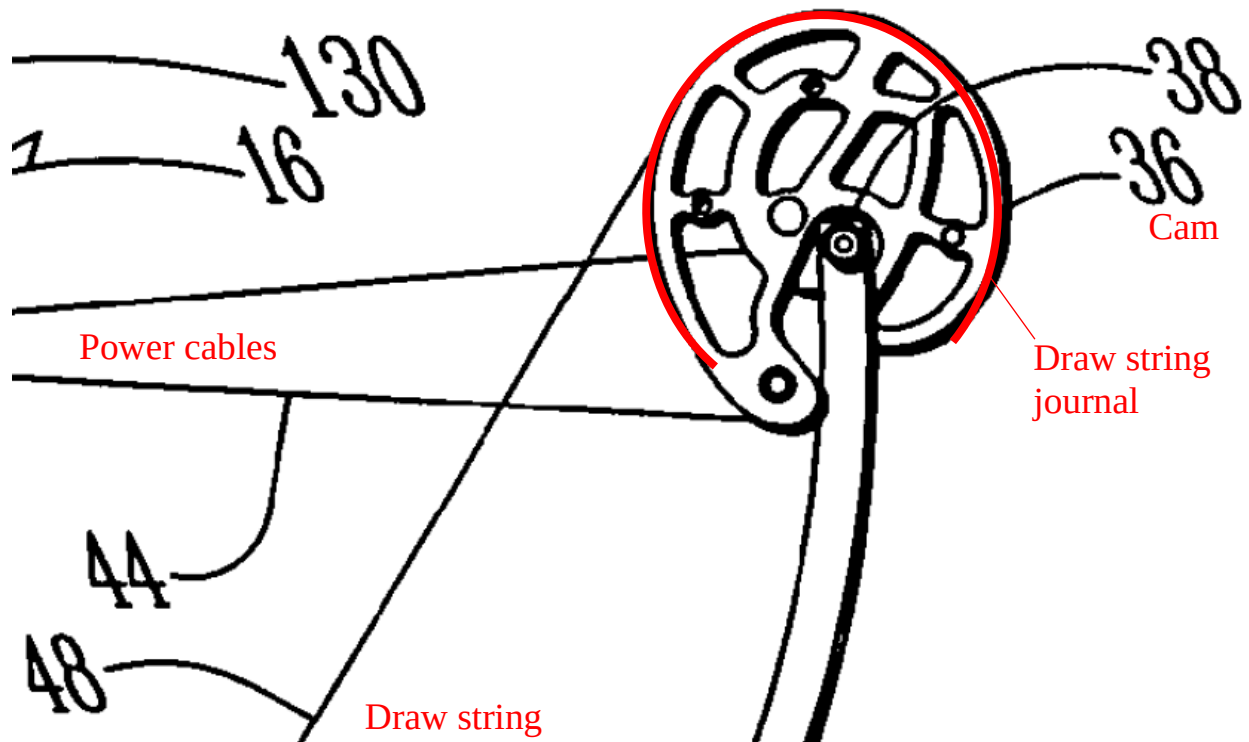
27. The side view of the cam in Fig. 2 (excerpt shown below) shows the draw string journal that necessarily exists to receive the draw string, though no callout number is provided for this feature:



28. Fig. 3 is similar to the excerpt of Fig. 1 shown above and shows where the string 48 would be received and wind on the cam's journal:



29. Fig. 10 (excerpt of cam shown below) is similar to Fig. 1, except with the cam rotated due to the bowstring being drawn and the crossbow cocked:

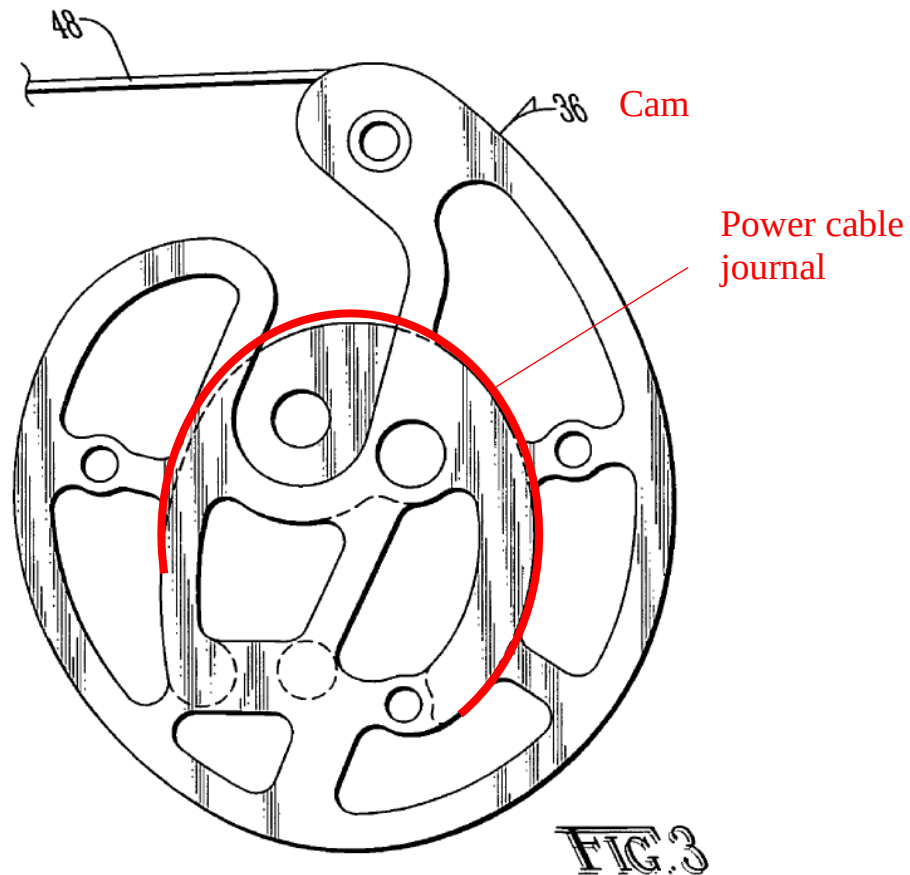


30. While none of these figures include a callout number for the bowstring journal, it necessarily is there in order for the crossbow to receive the string and function as disclosed in these figures. Thus Ravin is categorically wrong when it states in its Preliminary Response that the cam of Kempf '871 does not have an outer track for the string.

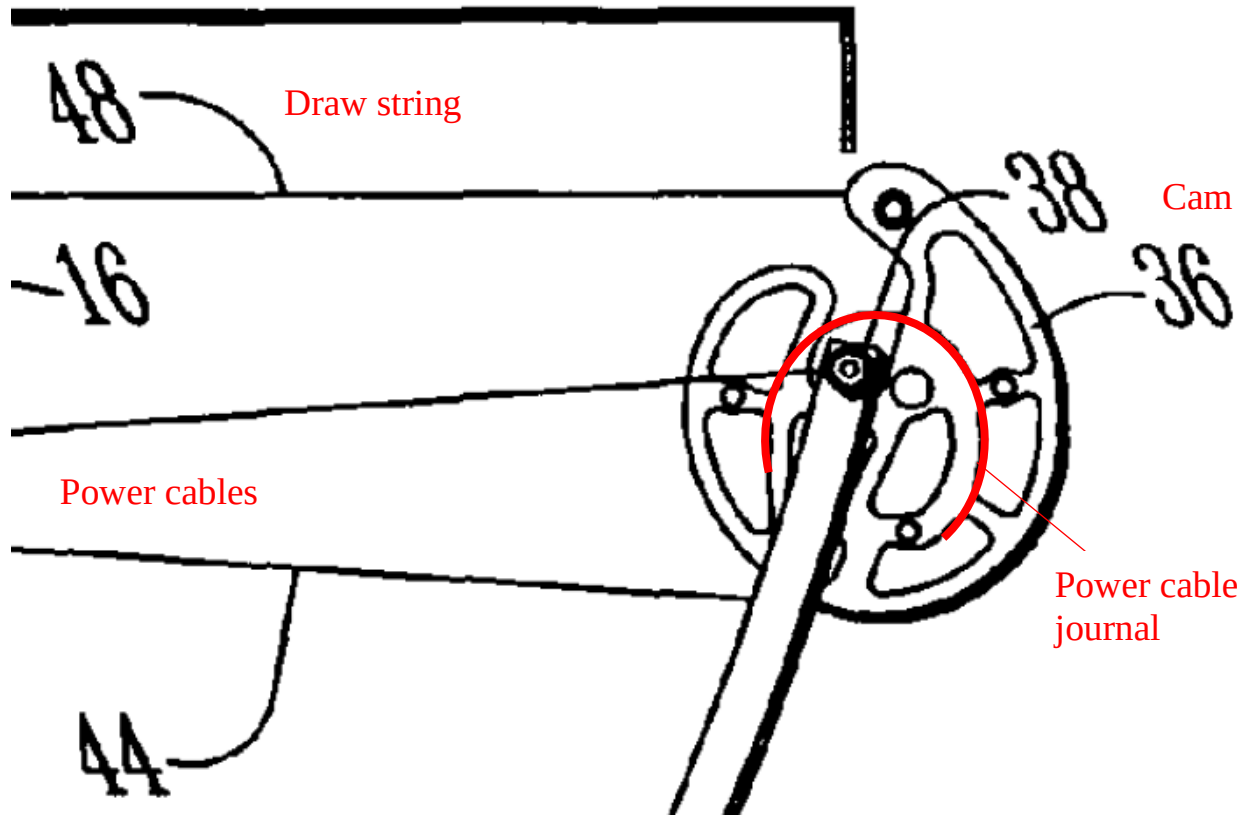
31. The same is true for the cam's journal that receives the power cable 44. My previous declaration (Ex. 1016) was able to cite to callout 32 on the pulley 28 to pinpoint this journal because such callout exists in Kempf '871's figures. Because the figures do not include a similar callout for the cam 36, I was unable to cite to a callout number, but a POSA would readily confirm that such a power

cable journal is certainly there. A POSA would understand that the journal is necessarily required in order to receive the cable 44, both when static (e.g., in the fully cocked position or fully released position) and when moving (e.g., when being cocked or being discharged), as explained above.

32. The cam close-up in Fig. 3 of Kempf '871 further shows the dashed (unlabeled) inner track or journal for receiving the cable 44, which would wrap on the journal:



33. Fig. 1 shows the cam of Fig. 3 on a limb with the other components:



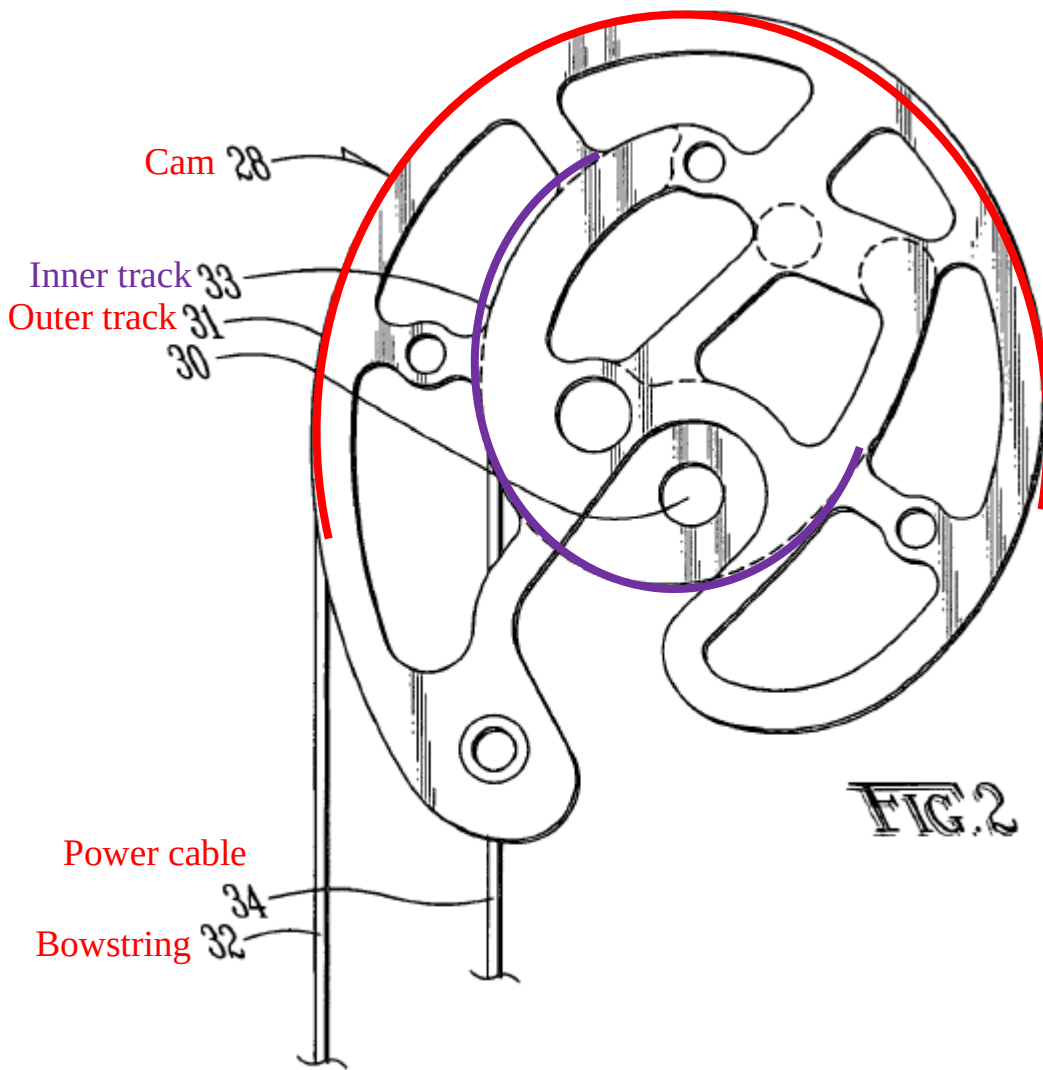
34. A POSA would readily understand that the cam necessarily must have such a power cable journal (i.e., groove or track for the cable), because without it, the disclosed cable would slip off the cam and not permit the crossbow to be drawn. While none of these figures include a callout number for the power cable journal, it necessarily is there in order for the crossbow to receive the cable and function as disclosed in these figures. Thus Ravin is categorically wrong when it

states in its Preliminary Response that the cam of Kempf '871 does not have an inner track for the cable.

35. This is supported by U.S. Patent 7,708,001 ("Kempf '001," Ex. 1008), which was cited during the prosecution of the '015 Patent and lists the same inventor as Kempf '871.

36. Fig. 4 of Kempf '001 and Fig. 10 of Kempf '871 are very similar, as both show cocked crossbows with the same configuration of the string guides (cam and pulley), bowstring, and power cables, the difference being that the limbs of Kempf '001 extend from the riser in a rearward direction (away from the foot stirrup), whereas the limbs of Kempf '871 extend from the riser in a forward direction (toward the foot stirrup).

37. Fig. 2 of Kempf '001 is virtually identical to Fig. 3 of Kempf '871 except rotated 90 degrees and also showing the received power cable 34:



38. Kempf '001 states: "The cam (28) is preferably constructed as shown in FIG. 2, having an outer track (31) and an inner track (33), but may be constructed in any manner known in the art." Ex. 1008, 2:24-27. This express affirmation confirms what a POSA would necessarily understand regarding the same cam shown in Fig. 3 of Kempf '871, namely, that it necessarily has an outer track (i.e., draw string journal) and an inner track (i.e., power cable journal).

39. Thus for the above reasons, a POSA would readily understand that the cam of Kempf '871 unquestionably has a draw string journal and a power cable journal, thus meeting the “second draw string journal” and “second” “power cable take-up journal” of claim 1 of the '015 Patent.

#### **IV. POWER CABLES DISPLACING “AWAY FROM” THE PLANES OF ROTATION IN THE STANZIALE REFERENCES**

40. The third issue addressed by this supplemental declaration is regarding disclosure by the three asserted Stanziale prior art references of the power cables being displaced “away from” the planes of rotation.

41. Claim 1 of the '015 Patent states that “as the bow is drawn from the released configuration to the drawn configuration the first and second power cables wrap onto the first and second helical, [sic] power cable take-up journals and 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.”

42. My previous declaration (Ex. 1016) explained how this claim limitation is met by three Stanziale prior art references, namely, U.S. Patent App. Pub. No. 2012/0125302 (“Stanziale '302,” Ex. 1007), WIPO Int'l Pub. No. WO 2011/158062 (“Stanziale '062,” Ex. 1011), and WIPO Int'l Pub. No. WO 2011/141771 (“Stanziale '771,” Ex. 1012). From Ravin's challenges to this claim limitation in its Preliminary Response, the Board appears to have accepted that the

Stanziale references insufficiently disclose the power cables displacing “away from” the respective planes of rotation. Specifically, the Board believed that the predicate factual determination for the “obvious to try” rationale was not adequately addressed.

**A. Stanziale ‘771**

43. As an initial note, Stanziale ‘771’s figures actually disclose the power cables being displaced “away from” the draw string journal planes of rotation.

44. For example, comparing Figs. 4 (uncocked) and 5 (cocked) shows the power cable 37 wrap around the helical power cable journal 1461 and extend downwards along the axis 150, away from the draw string 31 within the plane of rotation of the co-axial draw string journal 1451 as the crossbow is drawn:

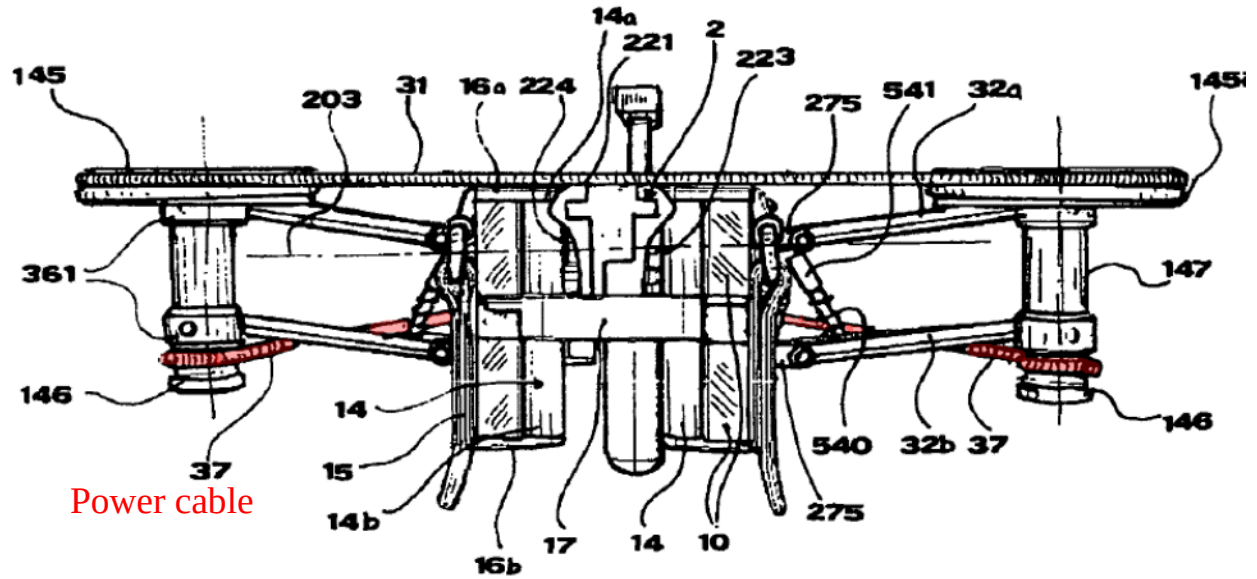


**FIG. 4**

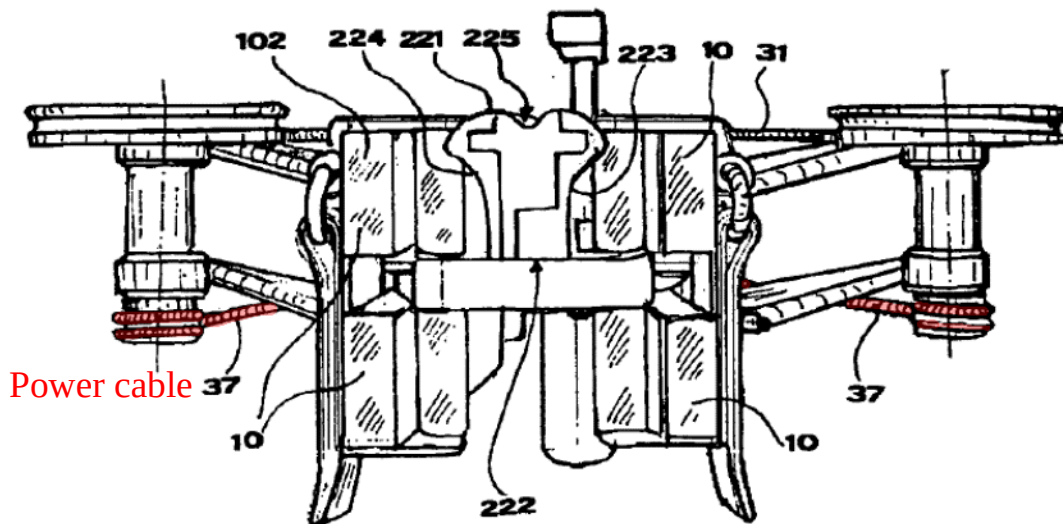
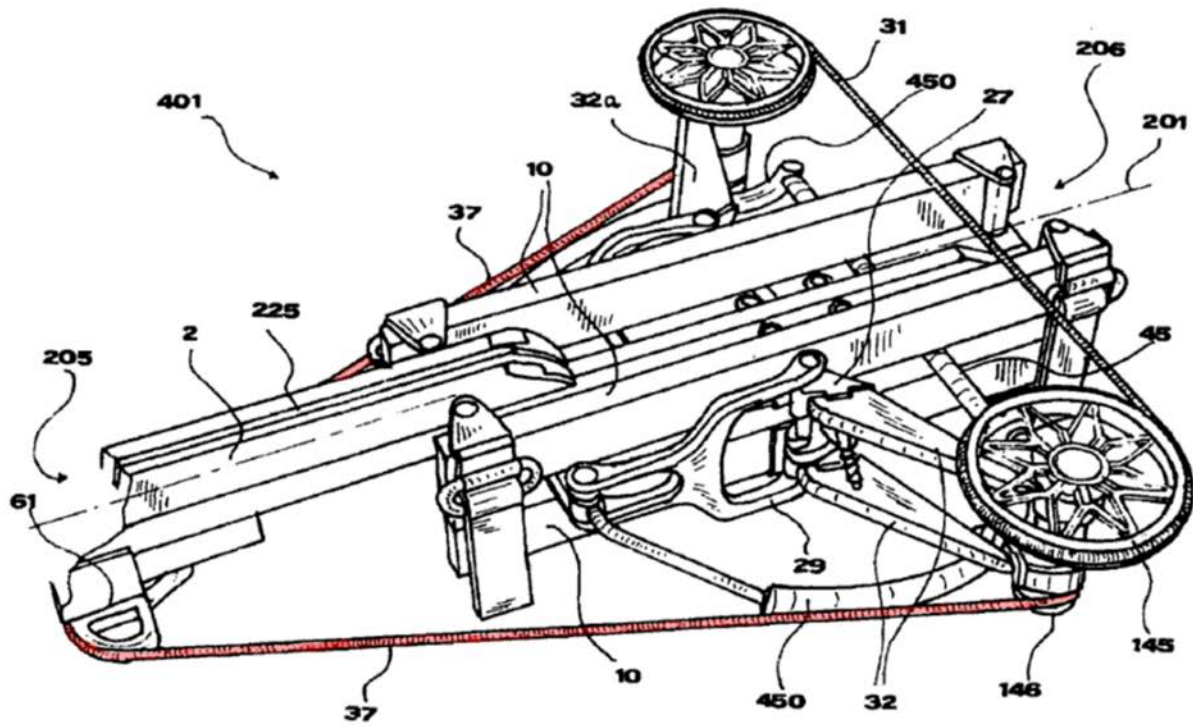


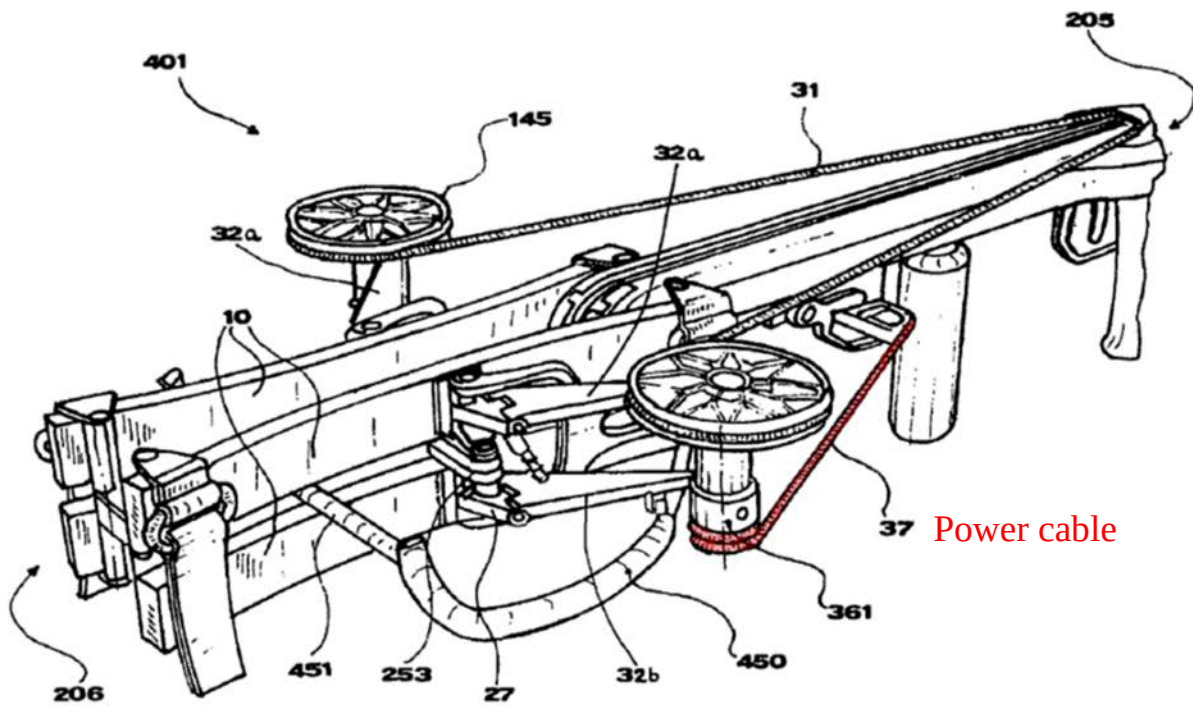
**FIG. 5**

45. Comparing Figs. 11 (uncocked) and 12 (cocked) of Stanziale '771 confirms the same – that the power cable 37 wraps around the helical power cable journal 1461 and extends downwards along the axis 150, away from the draw string plane of rotation as the crossbow is drawn:



Power cable

FIG. 11



Power cable

FIG. 12

46. If there were any doubt on this point (which there is not), it would nevertheless be obvious to displace the power cables “away from” the draw string journal planes of rotation as is discussed below.

47. The Stanziale ‘771 journals 1461 that receive the power cables 37 are helical and thus wind (about the axis of rotation 150) a plurality of turns of the cable, one adjacent the other. Ex. 1012, 16:34-17:5, Figs. 5, 8-10A, 12. In other words, when the crossbow is drawn, the power cables 37 received in the journals 1461 are displaced along the axis of rotation 150 by virtue of the physical geometry of the helical journals 1461.

48. The rotation axis 150 of the power cable journals 1461 is also the rotation axis 150 of the draw string journals 1451 (i.e., the two journals 1461, 1451 share a common axis of rotation 150). *Id.* at 16:2-5, 18-20, 17:22-26, 18:2-6, 25:11-23, Figs. 1-10A, 11-13, 18-19.

49. Each draw string journal 1451 has a plane of rotation (e.g., formed by the wound string 31) necessarily perpendicular to the axis of rotation 150. *Id.* at 25:11-23, Figs. 1-4, 18-19.

50. Thus, because (a) the journals 1461 receiving the winding power cables 37 are helical in design, (b) the power cable journals 1461 and draw string journals 1451 share a common axis of rotation 150, and (c) the draw string journal

planes of rotation are perpendicular to the axis of rotation 150, then the power cables 37 must necessarily be displaced along the axis of rotation 150 perpendicular to the planes of rotation. The only remaining question is regarding the direction of displacement. And even on this question, there are only two possible options: toward the planes of rotation or away therefrom. With only two available options and one of them required to be chosen, a POSA would find it obvious to try each, as one direction - or the other direction – could conceivably or likely provide an incremental benefit for any conceptual crossbow design, confirming that the claimed limitation (of cable extension “away from” the planes of rotation) would be obvious even if it were not already expressly disclosed by Stanziale ‘771.

## **B. Stanziale ‘302**

51. Turning to Stanziale ‘302, the journals 521 that receive the power cables 32 are helical and thus wind (about the axis of rotation 450) a plurality of turns of the cable, one adjacent the other. Ex. 1007 [0106], [0124]-[0128], Figs. 1-4, 9, 11. In other words, when the crossbow is drawn, the power cables 32 received in the journals 521 are displaced along the axis of rotation 450 by virtue of the helical journals 521.

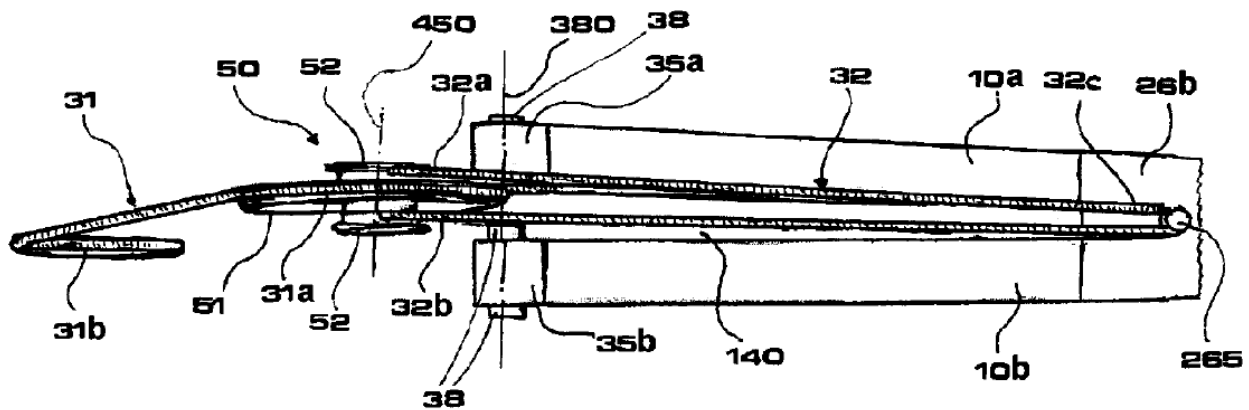


**FIG. 11**

52. The rotation axis 450 of the power cable journals 521 is also the rotation axis 450 of the draw string journals 511 (i.e., the two journals 521, 511 share a common axis of rotation 450). *Id.* at [0099], [0102], [0105], [0121], [0127], Figs. 1, 3, 9, 11.

53. Each draw string journal 511 has a plane of rotation (e.g., formed by the wound string 31) perpendicular to the axis of rotation 450. *Id.* at [0105], [0121]-[0122], [0164], Figs. 1-4, 9, 11.

54. Thus, because (a) the journals 521 receiving the winding power cables 32 are helical in design, (b) the power cable journals 521 and draw string journals 511 share a common axis of rotation 450, and (c) the draw string journal planes of rotation are perpendicular to the axis of rotation 450, then the power cables 32 must necessarily be displaced along the axis of rotation 450 perpendicular to the

planes of rotation. The only remaining question is regarding the direction of displacement. And even on this question, there are only two possible options: toward the planes of rotation or away therefrom. With only two available options and one of them required to be chosen, a POSA would find it obvious to try each in an effort to optimize a particular crossbow design.

55. A POSA would still further have a reason to particularly have the cables be displaced “away from” the planes of rotation (rather than toward), as explained in my previous declaration (Ex. 1016). Namely, because the power cable journals 521 are on both (or opposite) sides of the draw string journal 511 (that forms the plane of rotation), having the cables 32 extend away from the plane of rotation would avoid interference with the draw string 31. *See id.* at Fig. 11. This additionally confirms that the claimed limitation (of cable extension “away from” the planes of rotation) would be obvious.

### **C. Stanziale ‘062**

56. Turning to Stanziale ‘062, the journals 1461 that receive the power cables 37 are helical and thus wind (about the axis of rotation 150) a plurality of turns of the cable, one adjacent the other. Ex. 1011, 16:2-4, 16:33-17:9, 28:10-21, 29:17-21, Figs. 17-18, 22. In other words, when the crossbow is drawn, the power

cables 37 received in the journals 1461 are displaced along the axis of rotation 150 by virtue of the helical journals 1461.

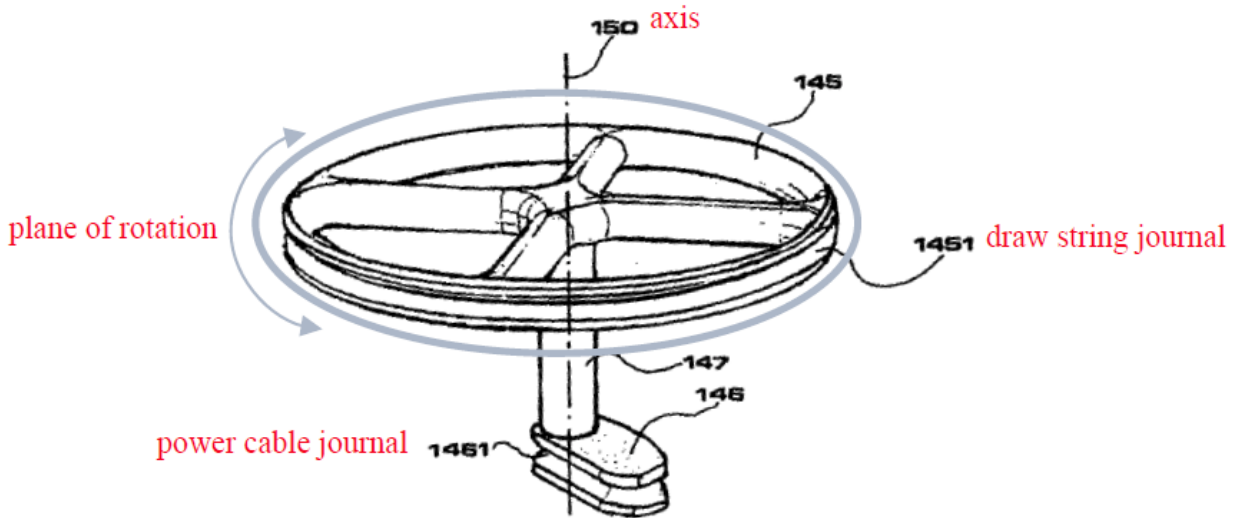


**FIG. 22**

57. The rotation axis 150 of the power cable journals 1461 is also the rotation axis 150 of the draw string journals 1451 (i.e., the two journals 1461, 1451 share a common axis of rotation 150). *Id.* at 27:34-28:9, 28:17-21, Figs. 17, 19-20, 22.

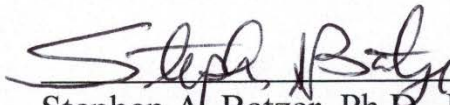
58. Each draw string journal 1451 has a plane of rotation (e.g., formed by the wound string 31) perpendicular to the axis of rotation 150. *Id.* at 16:20-22, 27:34-28:9, 28:17-21, Figs. 17, 19-20, 22.

59. Thus, because (a) the journals 1461 receiving the winding power cables 37 are helical in design, (b) the power cable journals 1461 and draw string

journals 1451 share a common axis of rotation 150, and (c) the draw string journal planes of rotation are perpendicular to the axis of rotation 150, then the power cables 37 must necessarily be displaced along the axis of rotation 150 perpendicular to the planes of rotation. The only remaining question is regarding the direction of displacement. And even on this question, just like with the above Stanziale references, there are only two possible options: toward the planes of rotation or away therefrom. With only two available options and one of them required to be chosen, a POSA would find it obvious to try each for the purpose of design optimization, confirming that the claimed limitation (of cable extension “away from” the planes of rotation) would be obvious.

I, Stephen A. Batzer, having been warned that willful false statements and the like are punishable by fine or imprisonment or both (18 U.S.C. § 1001), do hereby declare under penalty of perjury that all foregoing statements made of my own knowledge are true and that all foregoing statements made on information and belief are believed to be true.

Date: 18 AUG 2023

  
Stephen A. Batzer, Ph.D., P.E.