United States Patent

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[54] **CROSSBOW**
11 Claims, 13 Drawing Figs.

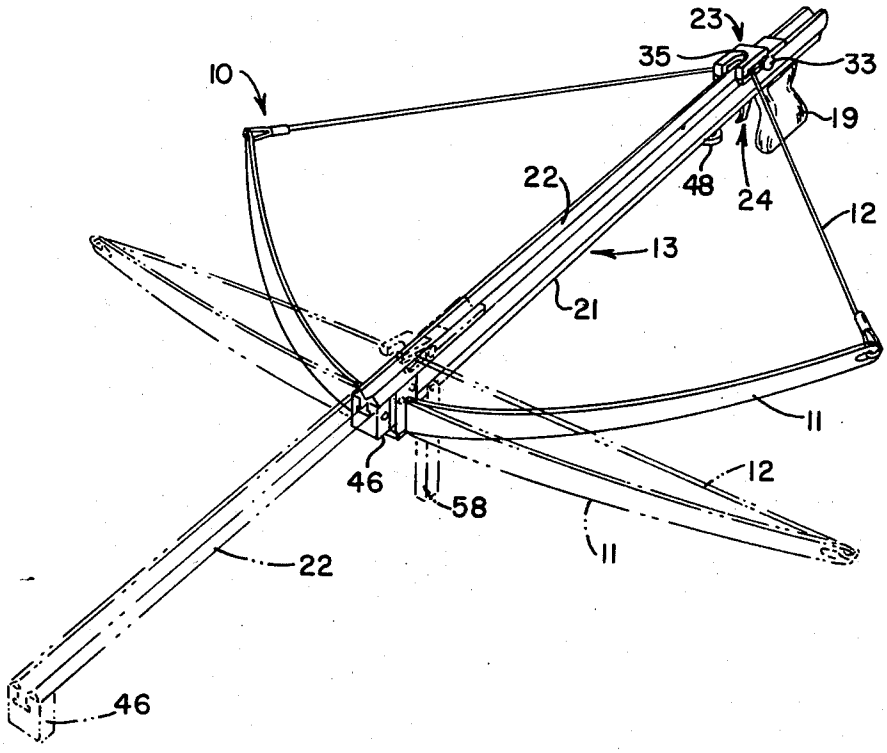
[52] **U.S. Cl.** **124/25,** 124/35, 124/41
[51] **Int. Cl.** **F41b 5/00**
[50] **Field of Search** 124/25, 24, 23, 35, 41, 22

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Primary Examiner—George J. Marlo
Assistant Examiner—William R. Browne
Attorney—Sabin C. Bronson

ABSTRACT: A crossbow including a stock having a bow mounted on one end. A launching slide for supporting the arrow and for guiding the latter during launching is mounted for lengthwise movement on the stock and includes a releasable bowstring retention means. The slide is movable from a first position extending beyond the bow-mounted end of the stock wherein the bowstring retention means engages the bowstring and to a cocked or second position overlying the stock wherein a trigger mechanism releases the bowstring retention means to thereby launch the arrow. A slide-locking mechanism is operative to hold the slide in the cocked position.



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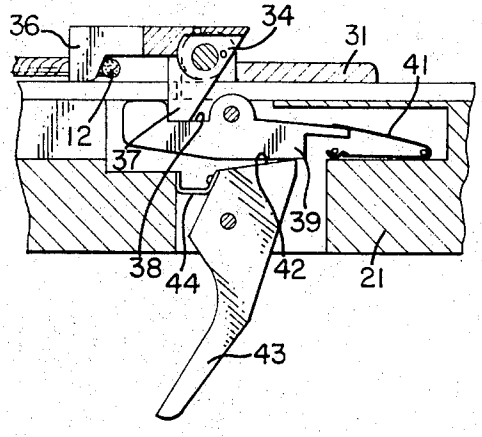


FIG. 3

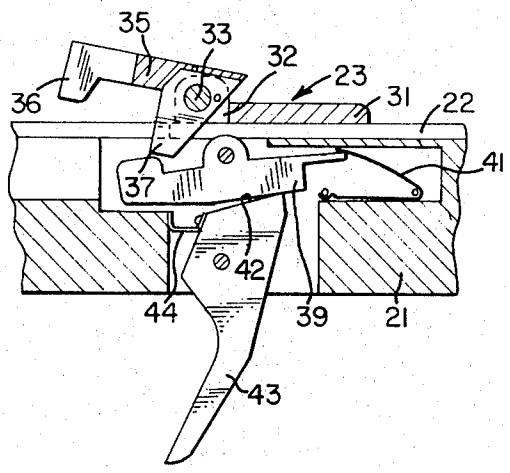


FIG. 4

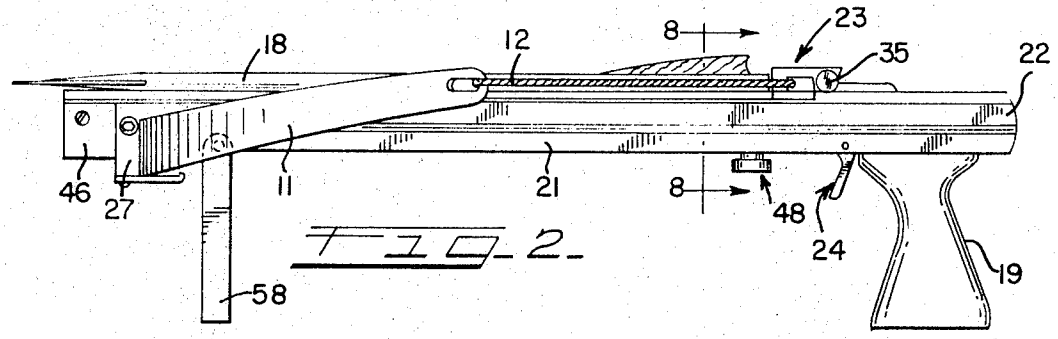


FIG. 2

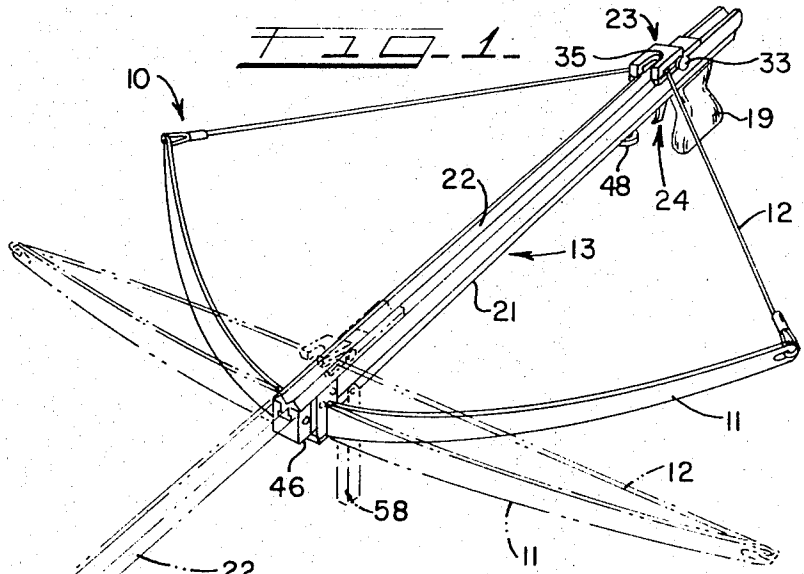


FIG. 1

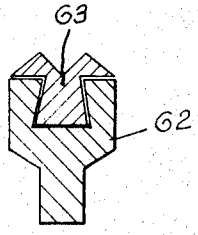


FIG. 12

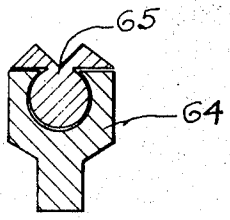
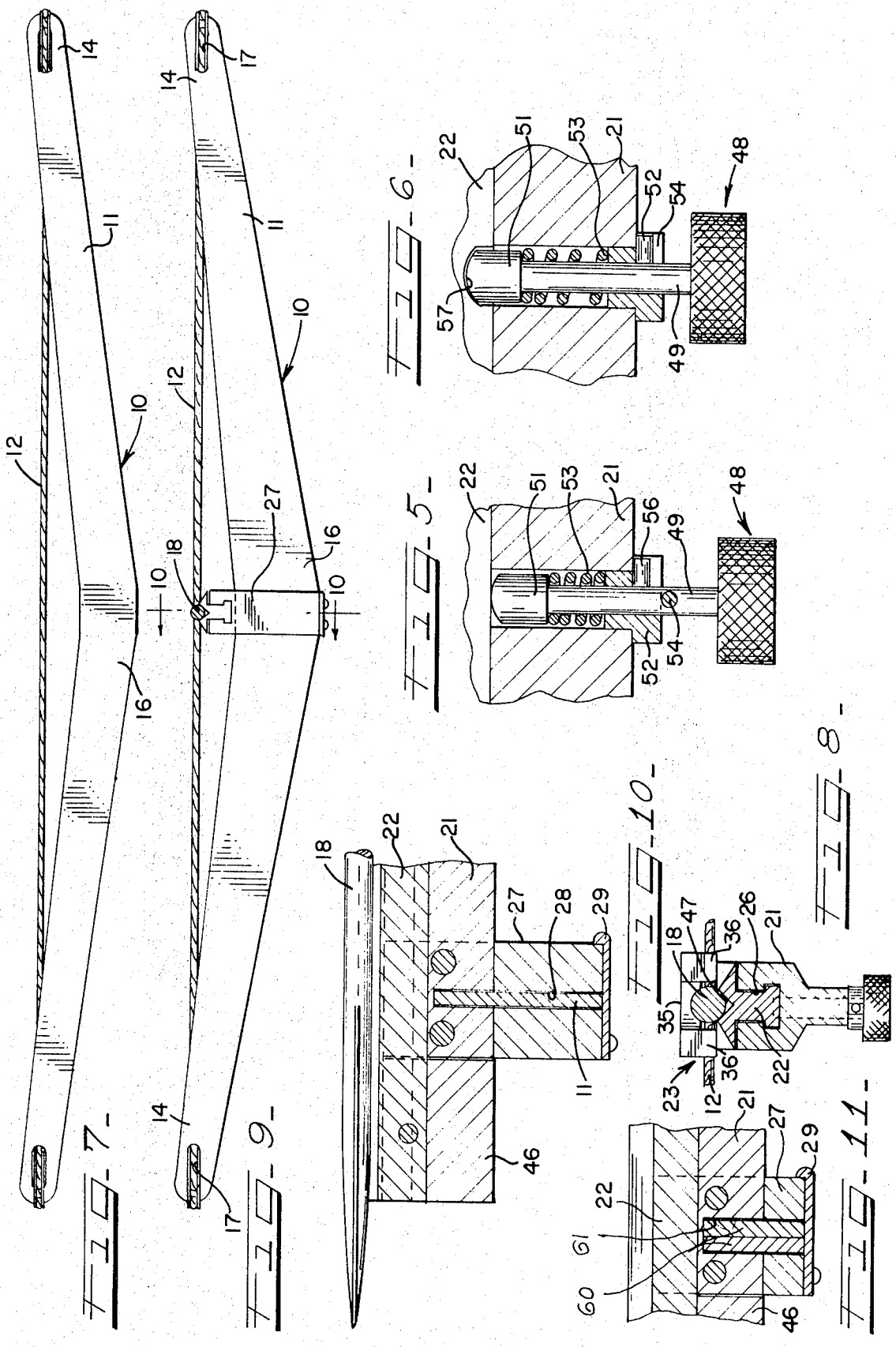


FIG. 13

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FIG. 7
FIG. 9
FIG. 6
FIG. 5
FIG. 8
FIG. 10
FIG. 11
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CROSSBOW

BACKGROUND-SUMMARY-DRAWINGS

The present invention relates to crossbows and more particularly to a new and improved structure for cocking the crossbow.

Early crossbows were cocked manually by grasping the bowstring with the fingers of both hands so as to draw the string into engagement with the trigger mechanism. This procedure was awkward, slow and limited the cocking force of the crossbow structure to the strength of the crossbowman's hands and arms.

As the crossbow became a military weapon, the structure was strengthened to increase the energy. These latter military structures had mechanical advantage devices to cock the bow, as for example, small winches, windlasses, cord and pulley, screw and handle and the like. These prior devices were cumbersome, expensive, mechanically complex, time consuming to cock and difficult to manipulate.

It is a principal object of the present invention to provide a new and improved crossbow which overcomes the difficulties encountered heretofore and which is provided with a means to simply and rapidly cock the bow.

It is a further object to provide a crossbow-cocking structure which is constructed and arranged so that the manual cocking force required limited only by the force which can be exerted by the user's body.

It is still a further object to provide a crossbow having a minimum weight to stored energy ratio.

It is another object to provide a crossbow having a separable bow and stock structure to facilitate the storing thereof.

It is still another object to provide the cocking arrangement with means for launching the arrow in the intended line of flight to assure accuracy for hunting and fishing.

It is still a further object to provide a crossbow with a wide bow so as to increase the energy storing and releasing capacity thereof.

It is another object to provide a crossbow having a width sufficient in area to permit the user's foot to cock the crossbow under the weight of the user's body.

It is a further object to provide a crossbow with leaf spring arrangement so as to increase the energy storing and releasing capacity thereof.

The foregoing objects are achieved generally by a crossbow structure including a cocking structure having a stock on which the bow is mounted. An arrow launching slide having a releasable bowstring retention means is slidably mounted on the stock between a first position extending beyond the stock in which the bowstring retention means grasps the bowstring, and a second cocked position overlying the stock in which the bow is cocked. A trigger mechanism on the stock is operative to release the bowstring retention means to uncock the bow and launch the arrow with the energy stored during cocking.

Referring now to the accompanying drawings forming part of this application, wherein like reference characters indicate like parts:

FIG. 1 is a perspective view of the crossbow embodying the structure of the present invention with the fully cocked position shown in solid lines and the position preparatory to cocking shown in phantom lines.

FIG. 2 is a side elevation of the crossbow in the cocked position.

FIG. 3 is an enlarged fragmentary view partially in cross section of the crossbow slide and showing in detail the combination bowstring retaining release mechanism in the cocked position.

FIG. 4 is a view similar to FIG. 3, but showing the bowstring retaining device and release mechanism in the uncocked position after the bowstring has been released.

FIG. 5 is a fragmentary side elevation of the stock and slide showing the slide locking device when the slide is disengaged prior to cocking the crossbow.

FIG. 6 is a fragmentary side elevational view showing the slide-locking device engaged with the slide when the crossbow is fully cocked.

FIG. 7 is a front view of the crossbow.

FIG. 8 is a cross section taken on the line 8–8 of FIG. 2.

FIG. 9 is a front elevational view of another embodiment of a crossbow.

FIG. 10 is a cross-sectional view taken on the lines 10–10 of FIG. 9.

FIG. 11 is a cross-sectional view of a leaf spring bow arrangement.

FIG. 12 is a cross-sectional view, similar to FIG. 8, embodying a guide rail with a guiding slot and arrow launching slide.

FIG. 13 is a cross-sectional view similar to FIG. 12 embodying a guide rail with a guiding slot and arrow-launching slide, but of a slightly different design.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, there is shown a crossbow 10 comprising generally a bow 11 having a bowstring 12 and a stock 13. The bow 11 is preferably made from metal, steel, aluminum or the like, so as to impart maximum energy storing capacity to the crossbow. The ends 14 are each inclined slightly upwardly from the central portion 16. Each of the ends 14 is provided with elongated openings 17 through which the respective ends of the bowstring 12 are looped and fastened. The outer edges at the ends may be notched so as to accommodate the bowstring 12 and thereby provide alignment of the latter in the cocked position and during launching of an arrow 18.

The bowstring 12 may be made from any suitable steel cable, or the like, and should be capable of assuming the stresses imposed thereon during cocking. As shown in particular in FIGS. 7 and 9, the bow center section 16 is vertically spaced from the arrow 18 supported in the stock. With this arrangement the draw force is above the draw plane, unlike a conventional bow. Thus in the bow structure illustrated the forward movement of the arrow is augmented by the coupled action of the resultant force of the draw plane of the bow 11 and the draw force of the bowstring 12.

The stock 13, as shown in particular in FIGS. 1 and 2, includes generally a handle 19 extending from the underside of a launching guide rail 21 on which there is mounted for lengthwise sliding movement an arrow-launching slide 22. Mounted on the inner end of the launching slide 22 is a releasable bowstring retention mechanism 23. A trigger assembly 24 for uncocking the bow 11 and releasing the bowstring retention mechanism 23 is supported on the stock 13 adjacent the handle 19.

As shown in FIG. 8, the launching guide rail 21 is of substantially T-shape in cross section along the length thereof. Extending lengthwise of the rail 21 is an inverted T-shaped groove 26 in which the slide 22 is disposed. The slide 22 is contoured complementarily to the groove 26 so as to be retained therein. At the left end as viewed in FIGS. 2 and 10, there is attached a bow mounting block 27 having an open ended slot 28 formed on the underside for accommodating the upper edge portion of the bow 11 therein. Fastened to the underside of the bow mounting block 27 is a clip spring 29 having a curled lip which engages the lower edge of the bow 11. In this manner the bow 11 is mounted on stock 13. Obviously the stock 13 and bow 11 may be separated and reassembled by disengaging or engaging the clip spring 29 and sliding or inserting the bow in the mounting block slot 28.

The releasable bowstring retention mechanism 23 as shown in FIGS. 3 and 4 comprises a supporting hinge plate 31 which is fixedly mounted on the top surface of the launching slide 22. The hinge plate 31 includes a pair of upstanding hinge ears 32 which support a hinge pin 33 extending through depending ears 34 of a latch member 35. The latch member at one end is formed with a pair of downwardly depending gripper fingers which grip the bowstring 12 during cocking, as more fully to

be explained hereinafter. Located at the opposite end of the latch member **35** intermediate the sides thereof is a latch plate **37**.

The latch plate **37** in the cocked position of the bow **11**, as shown in FIG. **3**, is seated in a notch of a release plate **39** pivotally supported in a recess formed in the guiding rail **21**. Biasing the release plate **39** to the latched position shown in FIG. **3** is a looped spring **41**. In engagement with the underside of the plate **39** is an edge **42** of a trigger **43**. The trigger **43** is normally biased by a spring **44** to the position of FIG. **3**. Upon pulling the trigger against the force of spring **44** the edge **42** is operative to turn the plate **39** counterclockwise, as shown in FIG. **4**, against the force of spring **41**. In this position the latch plate **37** is clear of the notch so that the taut bowstring cants the finger **36** clear thereof whereupon the arrow **18** is is released. In connection with the construction of the bowstring retention assembly **23**, it should be mentioned that various types of safety features may be incorporated therein to prevent accidental firing or uncocking.

The latch plate **37** is so constructed that it engages the base of the groove **26** in the guide rail **21** during sliding movement to the uncocked position in a manner maintaining the gripper fingers in the up-position shown in FIG. **4**. When the slide **22** is extended to the phantom line position corresponding to the uncocked position of bow **11**, the latch plate enters a groove (not shown) formed in the groove base so that the fingers grip the bowstring **12**.

The launching slide **22** is provided with a stop plate **46** which serves to provide a rest against which the crossbow **10** is abutted during cocking. As shown in FIG. **8**, the upper face of the slide is formed with a launching groove **47** in which the arrow **18** is disposed. The launching groove **47** may assume various configurations to achieve maximum guidance of the arrow. As shown, the launching groove **47** is of a depth to accommodate an arrow with three fletches.

To retain the launching slide **22** in the cocked position shown in full lines in FIG. **2**, there is provided a slide-locking mechanism **48** shown in FIGS. **5** and **6**. The slide-locking mechanism includes a shaft **49** having an enlarged head **51**. The shaft **49** is journaled in a bushing **52** against which one end of a biasing spring abutts. The other end of the spring **53** abutts against the underside of the head **51** so that the shaft is normally urged upwardly. For overcoming the action of the spring **53** so as to permit free sliding movement of the launching slide to the uncocked position, a pin **54**, radially extending from the shaft, is positioned below the collar of the bushing **52** as shown in FIG. **5**. Normally during cocking of the crossbow **10** the pin **54** is positioned in a slot **56** in the collar so the spring **53** biases the head into engagement with the underside of the launching slide **22**. Thus when the slide **22** reaches the fully cocked position, the head **51** enters an opening **57** provided in the slide so as to prevent further sliding in either direction.

Assuming now that the crossbow **10** has been fired and that the latch member **35** is in the inclined position shown in FIG. **4**, to again cock the bow **10**, the slide-locking mechanism is retracted to the position shown in FIG. **5**. The launching slide **22** is forwardly moved to the phantom line position of FIG. **1** at which time the latch plate **37** assumes an engaged position in notch of release plate **39** and the fingers **36** grasp the bowstring **12**.

The slide-locking mechanism is returned to the locking position shown in FIG. **6**. A foot pedal **58** is pivotally mounted on the launching guide rail **21** and positioned normal to the latter. The crossbow is then rested on the slider-mounted stop plate **46** against the ground or some convenient unyieldable structure. The weight of the user is then applied on the foot pedal so that the launching slide **22** and launching guide rail **21** slide into overlying relationship. When the opening **57** in the slide **22** aligns with the slide-locking mechanism, the head **51** enters the opening **57** and prevents further sliding movement.

The arrow may then be positioned within the launching groove and the crossbow is ready for firing upon pulling of the trigger mechanism **24** as described heretofore.

In FIG. **11**, I have shown a leaf spring type of bow **60** within the open ended slot **61** in bow-mounting block **27**. The leaf spring bow **60** comprises a plurality of spring leaves of progressively shorter length.

In FIG. **12** there is shown another arrangement of the launching guide rail **62** and arrow-launching slide **63**, complementarily formed in cross section so that the slide will be retainably aligned within the slot.

In FIG. **13** there is shown still another arrangement of launching guide rail **64** and arrow-launching slide **65** which are also complementarily formed in cross section so that the slide will be retainably aligned within the slot.

Although the embodiments constructed in accordance with the present invention have been described with the requisite particularity, the disclosure is of course exemplary. Changes in details of construction, in size, configuration and arrangement of components and materials, and in modes of application will be apparent to those versed in the art and may be resorted to without departing from the scope of the invention as set forth in the following claims.

I claim:

1. A crossbow comprising a bow, a bowstring attached to the ends of said bow, and a stock on which said bow is mounted at one end thereof, said stock having a launching guide rail, extending toward the user from the belly of the bow, a grooved launch slide for supporting an arrow thereon and guiding the latter during the launching thereof, means mounting a said slide for sliding movement between a first uncocked position in which said launching slide extends outwardly of said guide rail to a second cocked position overlying said guide rail, means on said launching slide for releasably retaining said bowstring after said bowstring has been drawn from said first position to said second cocked position, and trigger means positioned on said stock and slide for releasing said bowstring-retention means when said launching slide is in said second position to launch said arrow with the energy stored by the bent bow and taut bowstring during the movement from said first to said second position.

2. The invention as defined in claim **1** wherein the draw plane of the center section of the bow is spaced from the draw plane of the bowstring.

3. The invention as defined in claim **1** wherein said releasable retention means is mounted on the end of the launching slide nearest the user.

4. The invention as defined in claim **1** wherein said bow is comprised of a plurality of spring leaves.

5. The invention as defined in claim **1** wherein means is provided for locking said launching slide in said second cocked position.

6. The invention as defined in claim **5** wherein said bow is mounted adjacent the end of the launching guide rail beyond which said slide extends in said first uncocked position.

7. The invention as defined in claim **6** wherein a footrest is pivotally mounted on said guide rail adjacent the end on which said bow is mounted and adapted to receive the force of the user's foot when the launching slide and launching guide rail assume an overlying relationship during the cocking of the bow.

8. The invention as defined in claim **7** wherein a handle is attached adjacent the end of the stock opposite to that on which said bow is mounted.

9. The invention as defined in claim **8** wherein said guide rail is formed with a guiding slot, and said launching slide is formed with a cross section complementary to the guiding slot so as to be retainably aligned therein.

10. The invention as defined in claim **6** wherein said bow is detachably mounted on said stock.

11. The invention as defined in claim **5** wherein said slide-locking means includes a spring-biased plunger seatable in an opening in said launching slide when the latter is in said second cocked position.