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TRIGGER MECHANISM FOR CROSSBOWS

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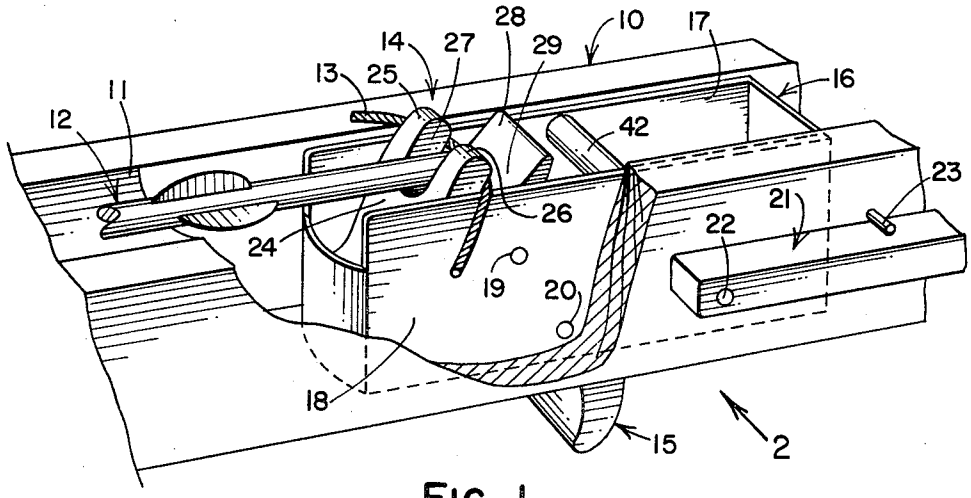


FIG. 1

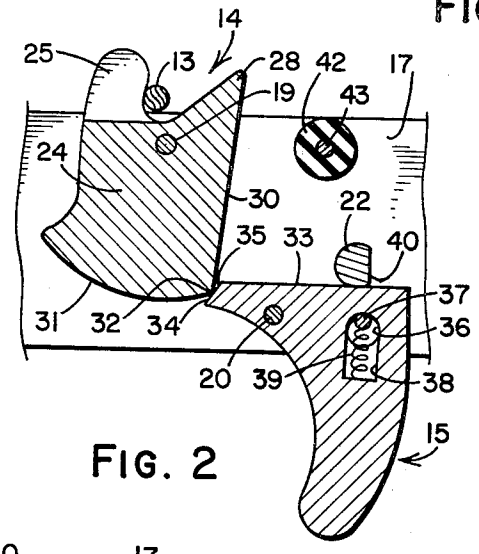


FIG. 2

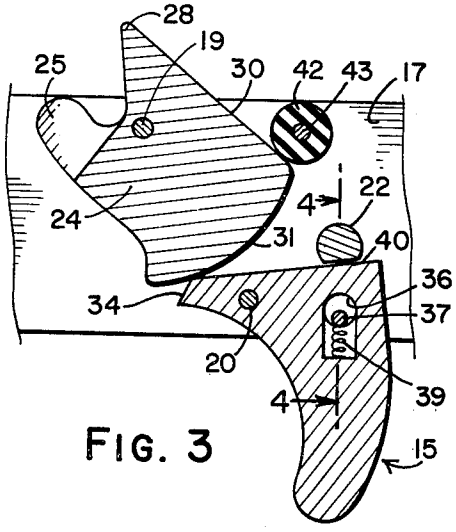


FIG. 3

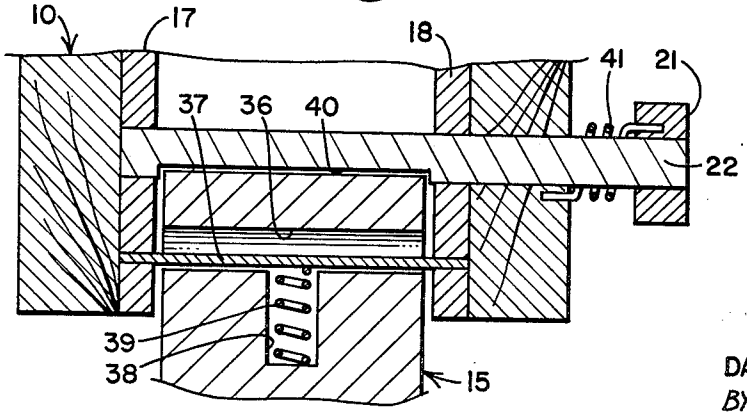


FIG. 4

INVENTOR
DAVID S. BENEDICT
BY
Elliott & Pastoriza
ATTORNEYS.

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TRIGGER MECHANISM FOR CROSSBOWS

David S. Benedict, 8025 Farralone Ave.,
Canoga Park, Calif. 91304

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ABSTRACT OF THE DISCLOSURE

Trigger mechanism for crossbows wherein the string is smoothly released by a pivoted member so as to move in a constant plane. The pivoted member in turn is controlled by a trigger element which normally holds the pivoted member in a cocked position and by rotating the trigger, it releases the pivoted member which is pivoted to release the string by the force of the string itself. A safety lock is provided which blocks movement of the trigger to release the pivoted member and there is also included a clushion for absorbing the shock of the pivoted member when the same is released.

This invention relates generally to trigger devices and more particularly to an improved trigger mechanism for holding and releasing the string of a crossbow.

In my U.S. patent application Ser. No. 345,751, filed Feb. 18, 1964, now abandoned, there is disclosed a crossbow and a trigger mechanism therefor. The present invention relates to an improved trigger mechanism which may be utilized in place of the trigger mechanism of the above-mentioned application and providing certain advantages thereover in smooth operation and safety.

The trigger mechanism of my above-mentioned patent application and other mechanisms are constructed such that no means are included for selectively and positively holding or locking the trigger against inadvertent movement. Accordingly with such mechanisms, pressure on the trigger is all that is required to release the string and arrow with resultant disadvantages relating to safety.

Another problem associated with previous trigger mechanisms for cross bows, relates to the shock or impact of the string holding element against portions of the mechanism upon release or "firing" of the cross bow. Upon release, the string holding element rotates forwardly to strike an abutment member with sufficient impact to jar the cross bow, thereby affecting its accuracy.

With the foregoing in mind, it is accordingly a primary object of this invention to provide an improved trigger mechanism for a cross bow including selectively operable safety means for preventing inadvertent release of the mechanism.

Another object is to provide an improved trigger mechanism characterized by a smoothly operable release action, to the end that impact and shock loads on the cross bow are reduced to a minimum.

Yet another object is to provide an improved trigger mechanism which is adapted to be automatically cocked in response to drawing the bow string rearwardly into engagement with the mechanism.

Briefly, these and many other objects and advantages of this invention are attained by providing a trigger mechanism including a string holding element pivoted for movement between first and second positions. The bow string and arrow are held by the element when in its first position and are released when it moves to its second position. A cooperating strigger member is mounted in spaced relationship to the string holding element and arranged to block movement of the element from the first position when the trigger member is in a first pivoted position. Upon movement of the trigger member to a second pivoted position the string holding element is released for movement about its pivotal point to accordingly release the bow string and arrow.

The trigger mechanism includes an automatic cocking feature wherein the string holding element and the trigger member are structurally inter-related such that the trigger member is free to pivot by means of a biasing spring from its second pivoted position to its first pivoted position in response to rearward movement of the bow string into engagement with the string holding element to accordingly move the element from its second position to its first position.

The trigger mechanism further includes a locking means for selectively holding or restraining the trigger member in the first piovted position and thereby prevent movement of the string holding element from its first position to its second released position.

The mechanism is designed to release the bow string through movement in substantially one plane with a minimum of friction, and with a minimum of shock load and impact on the cross bow on which the trigger mechanism is mounted.

A better understanding will now be had by referring to a preferred embodiment thereof as shown in the accompanying drawings, in which:

FIGURE 1 is a fragmentary perspective view of the rear portion of a cross bow including the trigger mechanism of the invention;

FIGURE 2 is a fragmentary sectional view of the trigger mechanism of FIGURE 1 looking in the direction of arrow **2** in FIGURE 1;

FIGURE 3 is a fragmentary sectional view similar to FIGURE 2 showing the components of the mechanism upon release of the bow string; and,

FIGURE 4 is a fragmentary sectional view taken in the direction of arrows **4**—**4** of FIGURE 3.

Referring first to FIGURE 1, there is shown a cross bow stock **10** having a fletch groove **11** for receiving an arrow **12** as shown. In the conventional manner, the cross bow includes a bow string **13** connected to the ends of the cross bow arms (not shown). The string **13** is arranged to be held in a stretched or pulled position by a string holding element **14** constituting a portion of a trigger mechanism. A trigger member **15** cooperates with the string holding element **14** and is disposed in a position to be pulled rearwardly by a user's finger.

The trigger mechanism includes a generally rectangular housing member **16**, which as shown, includes spaced parallel sidewalls **17** and **18**. The string holding element **14** and the trigger member **15** are pivotally mounted within the housing member **16** by means of pivot pins shown at **19** and **20** respectively. The structure and inter-relationship of the holding element **14** and trigger member **15** will become clearer as the description proceeds.

The trigger mechanism of the invention includes locking or safety means for preventing accidental or inadvertent release of the mechanism. Toward that end there is provided a safety lever **21** coupled to a pivot pin **22** mounted on a side of the cross bow stock **10** as shown. The safety lever **21** is pivotable downwardly when it is desired to release the mechanism. A stop pin **23** is mounted on a side of the cross bow stock **10** for holding the safety lever **21** in the position shown wherein the mechanism is incapable of being discharged or released.

The details of the arrangement of the locking means of the mechanism will become clearer as the description proceeds.

Referring still to FIGURE 1, it will be seen that the holding element **14** includes a base portion **24** from which a pair of ears **25** and **26** extend upwardly in spaced relation to define a groove **27** therebetween. The groove **27** is

defined so as to receive the rear end of the arrow **12** as shown. The holding element **14** further includes a flange portion **28** extending upwardly from the base portion **24**. The flange portion **28** is spaced rearwardly from the ears **25** and **26** so as to define a transverse groove **29** therebetween. As shown, the groove **29** is defined to receive the bow string **13**.

Referring now to FIGURE 2, it will be seen that the holding element **14** is defined in part by a flat rear edge **30** and a semi-circular bottom edge **31** joining the rear edge **30** at a corner **32**. The bottom edge **31** is defined by an arc struck from the center of the pivot pin **19** about which the element **14** is pivotable. The trigger member **15** is defined in part by a flat top surface **33** joining a front inclined edge portion **34** at a corner **35**.

When the holding element **14** is in a first position, and when the trigger **15** is in a first pivoted position as shown in FIGURE 2, it will be seen that the front edge **34** of the trigger **15** engages the rear edge **30** of the holding element **14** proximate to the corner **32**. Accordingly, the holding element **14** is restrained against pivoting in a counterclockwise direction in response to the force of the string **13**.

The trigger **15** includes biasing means for normally holding the trigger in its first pivoted position shown, along with means for limiting the extent to which the trigger is pivotable. Toward that end, and referring to FIGURE 2 and FIGURE 4, the trigger **15** includes a transverse opening **36** receiving a stop pin **37** which is coupled between the sidewalls **17** and **18** of the trigger mechanism. Since the transverse opening **36** is of a diameter greater than that of the pin **37**, it will be seen that the pivoting movement of the trigger **15** will be restrained by the engagement of the pin **37** against the walls of the opening **36**. The trigger member **15** further includes a circular recess **38** communicating with the opening **36** and receiving a coil spring **39** interposed between the bottom of the recess **38** and the pin **37**. It will thus be seen that the spring **39** acts against the bottom of the recess **38** and the pin **37** to normally bias the trigger member into the first pivoted position shown in FIGURE 2.

As shown in FIGURE 2, the trigger mechanism is locked in the cocked position due to the engagement of the pin **22** against the top surface **33** of the trigger **15**. In order to permit the trigger **15** to be "pulled" and thus pivoted counterclockwise to a second pivoted position shown in FIGURE 3, the pin **22** includes a chamfered portion **40** into which the trigger is movable upon rotation of the pin **22**. As shown in FIGURE 4, the chamfered portion **40** is designed of a length to accommodate the width of the trigger **15**.

As heretofore mentioned, the safety lever **21** is secured to an end of the pin **22** whereby downward or clockwise pivoting movement of the lever **21** from the position shown in FIGURE 1 rotates the pin **22** in a clockwise direction as viewed in FIGURES 2 and 3. As shown in FIGURE 4, the above mentioned clockwise rotation of the lever **21** and pin **22** is opposed by the force of a coil spring **41** which is received around the pin **22** in coupled relation to the stock **10** and the lever **21**.

With the pin **22** rotated into an unlocked position shown in FIGURE 3, it is apparent that the trigger **15** may then be pivoted to its second pivoted position. This movement releases the holding element **14** for pivoting movement to a second position wherein the rear edge **30** abuts against a cushion stop member **42** mounted on a pin **43**.

The operation of the trigger mechanism of the invention will now be described. With reference first to FIGURES 1 and 2, it will be seen that the trigger member **15** cannot be pivoted in a counterclockwise direction due to its engagement with the pin **22**. It is thus apparent that the string **13** and arrow **12** cannot be released until the lever **21** and pin **22** are rotated into the position shown in FIGURE 3. As shown in FIGURE 3 the trigger **15** may then be "pulled" or pivoted in a counterclockwise direction against the force of the spring **39**, until the pin **37** engages the walls of the opening **36**. At this point the front edge **34** of the trigger **15** will disengage from the rear edge **30** of the holding element **14**. Accordingly, the holding element **14** will pivot in a counterclockwise direction due to the force of the bow string **13** acting against the ears **25** and **26**.

As the holding element **14** pivots from its first position shown in FIGURE 2 to its second position shown in FIGURE 3, the arcuate edge **31** will slide in contact with the corner **35** of the trigger **15**. Since the spring **39** is biasing the corner **35** into contact with the edge **31**, it will be appreciated that the motion of the holding element **14** will be somewhat constrained. Accordingly, the rear edge **30** will strike the cushion stop member **42** with less impact than would occur if the holding element **14** were to pivot in a completely unrestrained manner. It will thus be apparent that shockloads, vibrations, and the like are reduced to provide greater accuracy in the use of the cross bow. Moreover, the ears **25** and **26** are constructed such that the bow string **13** is released to move in substantially a single plane along the top of the cross bow stock **10**.

The trigger mechanism may be reset or cocked into the position shown in FIGURE 2 by simply pulling the bow string **13** rearwardly or to the right against the flange **28** of the holding element **14** when positioned as shown in FIGURE 3. As the string **13** is moved against the flange **28**, the holding element **14** will pivot in a clockwise direction until the front edge **34** of the trigger clears the arcuate surface **31**. At this point the spring **39** will pivot the trigger in a clockwise direction until the top portion of the opening **36** engages the pin **37**. The holding element and trigger will thus be engaged as shown in FIGURE 2.

As the trigger **15** pivots into its first pivoted position shown in FIGURE 2 it will be apparent that the top surface **33** of the trigger **15** will move out of engagement with the chamfered portion **40** of the pin **22**. This movement permits the spring **41** (FIGURE 4) to rotate the pin **22** and lever **21** in a counterclockwise direction until the lever **21** engages the stop pin **23** (FIGURE 1). The pin **22** will thus be disposed in a locked position as shown in FIGURE 2, thereby preventing pivoting movement of the trigger **15**. Accordingly, the trigger mechanism cannot be released until the lever **21** is again moved downwardly as above described.

From the foregoing description it will be evident that the present invention provides a greatly improved trigger mechanism characterized by smooth and safe operation.

Various changes falling within the scope and spirit of the invention will occur to those skilled in the art. Accordingly the invention is not to be though of as limited to the specific embodiment set forth.

What is claimed is:

1. A crossbow trigger mechanism for holding and releasing a crossbow string, comprising in combination: holding means for the string pivotable between first and second positions for holding and releasing the string respectively; trigger means engaging a portion of said holding means to retain said holding means in said first position when said trigger means is in a first pivoted position, said trigger means being pivotable to a second pivoted position out of engagement with said portion to permit said holding means to pivot to its second position for releasing the string; and locking means for selectively holding said trigger means in said first pivoted position to retain said holding means in said first position, said locking means being manually rotatable from a locking position to permit pivoting of said trigger means to said second pivoted position, whereby said holding means is pivotable to said second position to release the string, said locking means including biasing means for automatically rotating the locking means back to its locking position after pivoting of said trigger means from said second pivoted position back to said first pivoted position, where-

by said locking means holds said trigger means in said first pivoted position.

2. The subject matter of claim 1, including spring means in said trigger means for biasing said trigger means into said first pivoted position as said holding means is pivoted from said second position to said first position.

3. The subject matter of claim 1, in which said locking means includes a pin positioned above said trigger means, said pin having a chamfered portion defined therein for receiving a top portion of said trigger means when said trigger means is in said second pivoted position, and lever means coupled to said pin for rotating the pin against the force of said biasing means, wherein said chamfered portion is rotatable out of engagement with said trigger means when the trigger means is in said first pivoted position.

4. A crossbow trigger mechanism for holding and releasing a crossbow string, comprising in combination: a string holding element including first and second spaced ears defining a groove therebetween for receiving the rear end of an arrow, said element further including a flange spaced from said ears defining a transverse groove therebetween for receiving the crossbow string; pivot means for said element disposed below said transverse groove and permitting rocking movement of said element between first and second positions; a trigger member having a top surface terminating in an upper corner end engaging a rear edge of said element below said pivot means when in said first position, said trigger member being pivoted below said top surface such that pivoting movement of said trigger member moves said upper corner end out of engagement with the rear edge of said element to permit said element to pivot about said pivot means to said second position; and locking means engaging said top surface of said trigger member for holding said trigger member against rotation when said locking means is in a locked position, said locking means being rotatable to an unlocked position to permit said trigger member to be pivoted out of engagement with the rear edge of said element to permit said element to pivot to said second position.

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RICHARD C. PINKHAM, Primary Examiner

W. R. BROWNE, Assistant Examiner

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124—41, 40, 25