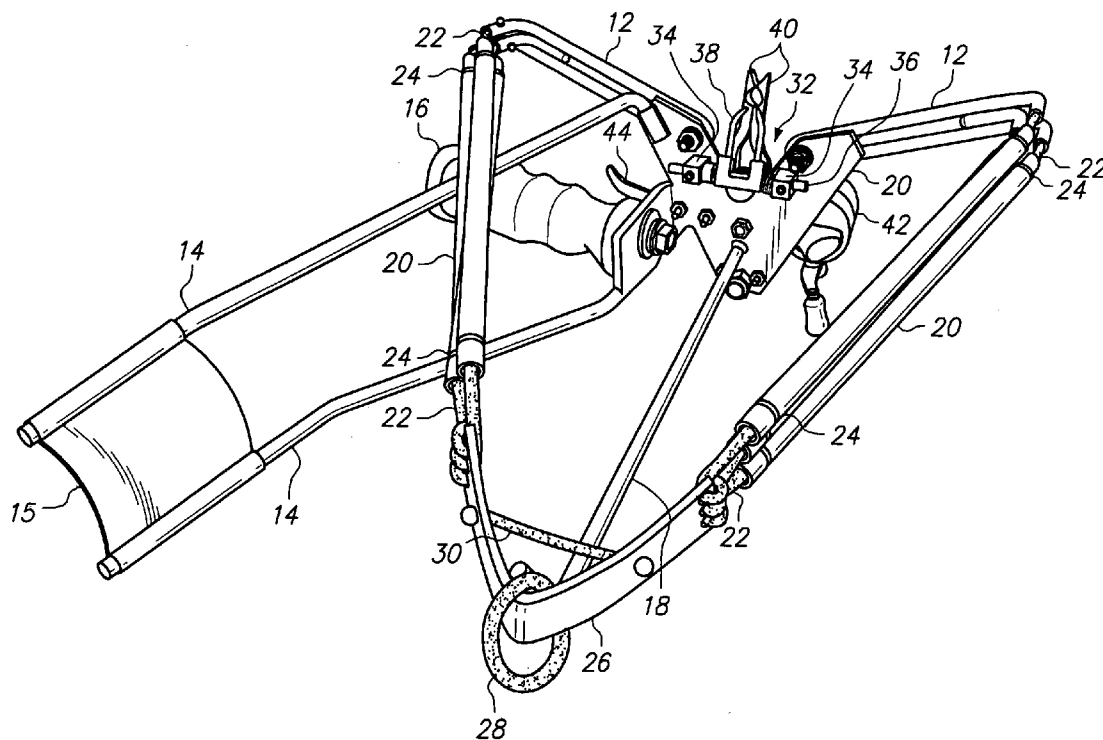




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(19) **United States**(12) **Patent Application Publication**
Thurmon(10) **Pub. No.: US 2012/0037137 A1**(43) **Pub. Date: Feb. 16, 2012**(54) **MISSILE LAUNCHING APPARATUS**(52) **U.S. Cl. 124/20.3; 124/17**(76) **Inventor: Bobby Joe Thurmon, Junction City, AR (US)**(57) **ABSTRACT**(21) **Appl. No.: 12/080,063**

A missile-launching device is described which is capable of holding an arrow in a ready-to-fire position indefinitely, but which is more compact and less cumbersome than a traditional bow or crossbow. Elastic tubes are used to propel the arrow. An arrow is held in the ready-to-fire position by stretching an missile notch portion between the elastic bands back into a rearwardly extending rest. The missile is held in place at the rear by the arrow notch portion and at the front by a trigger-activated pair of locking arms.

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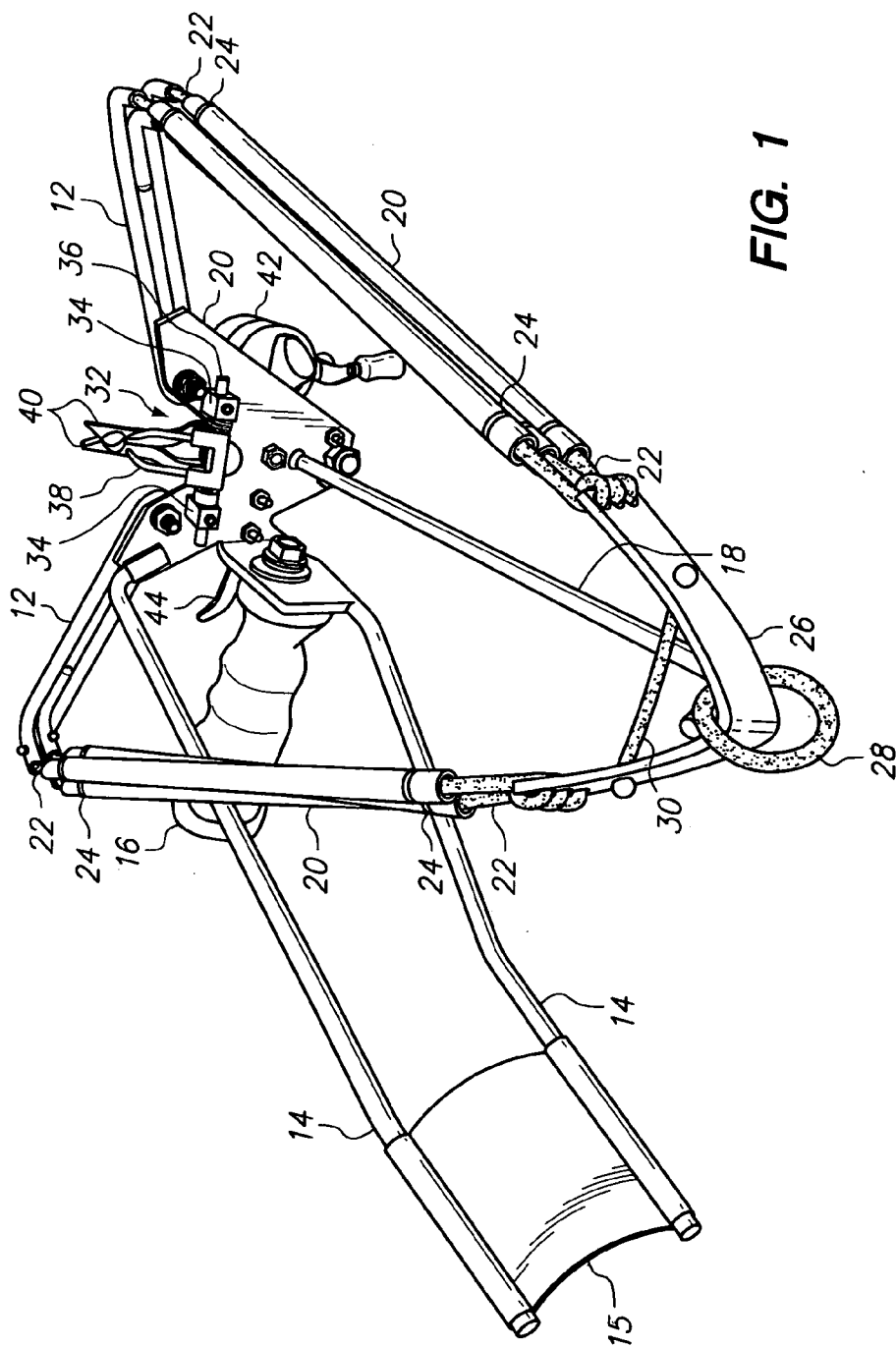


FIG. 1

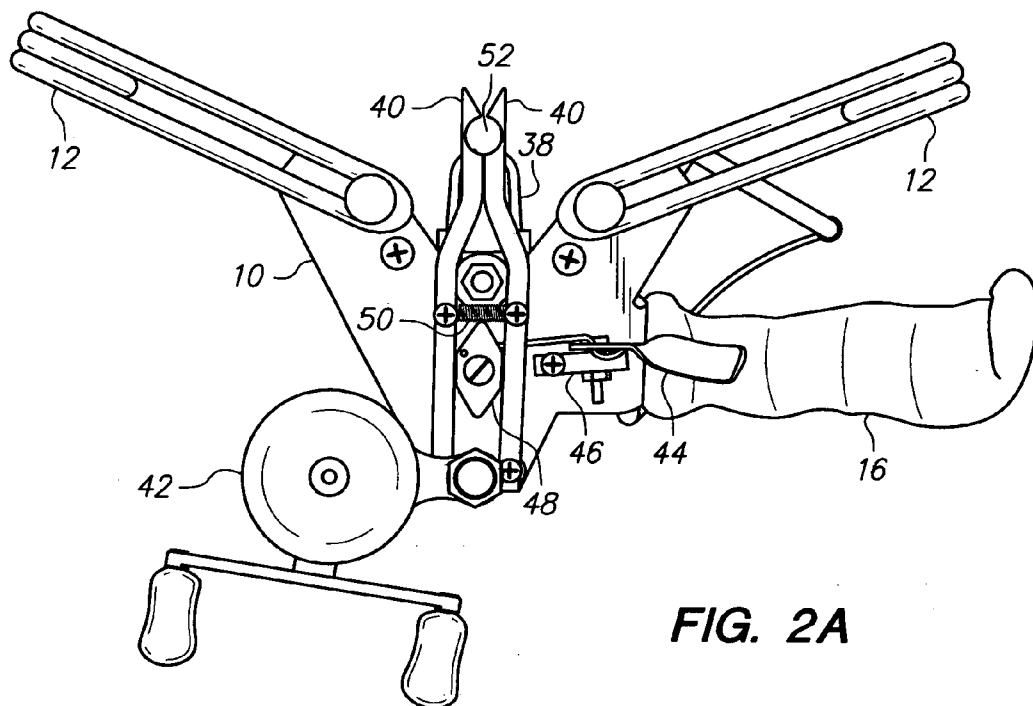


FIG. 2A

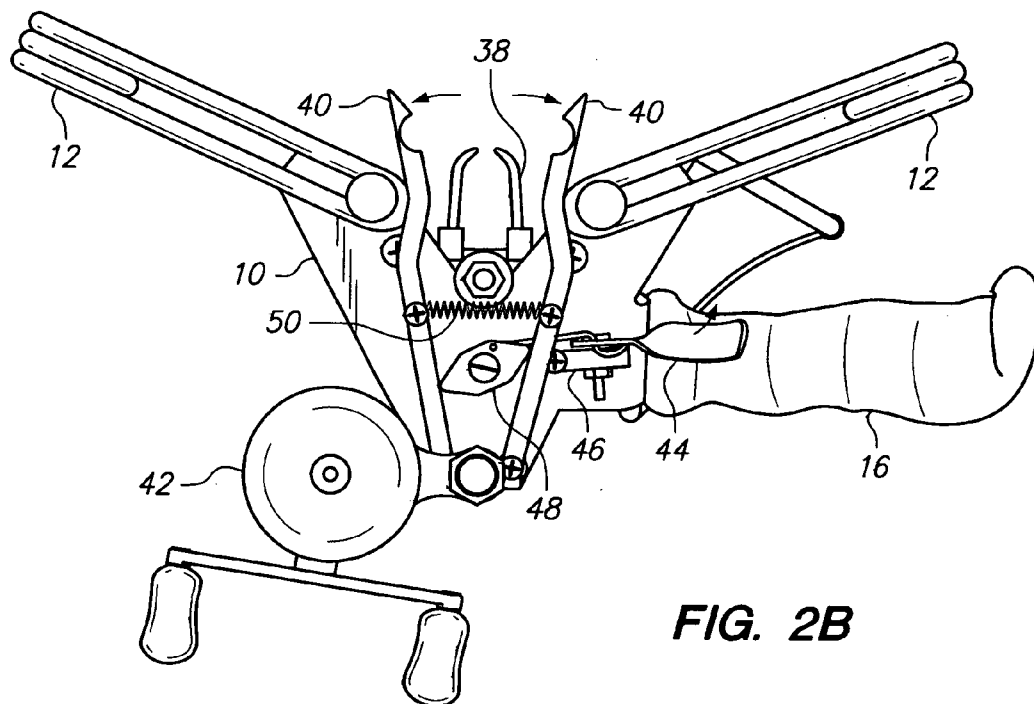


FIG. 2B

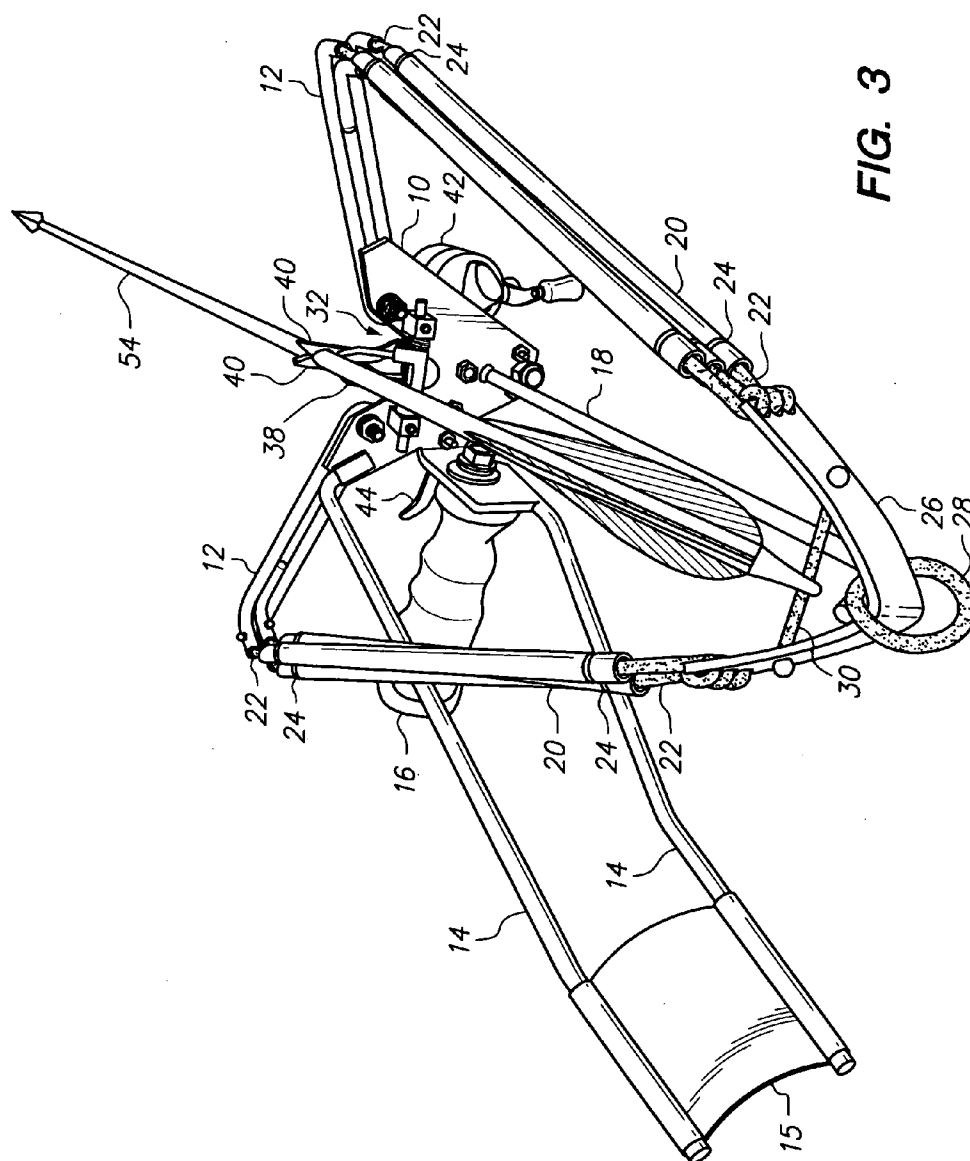
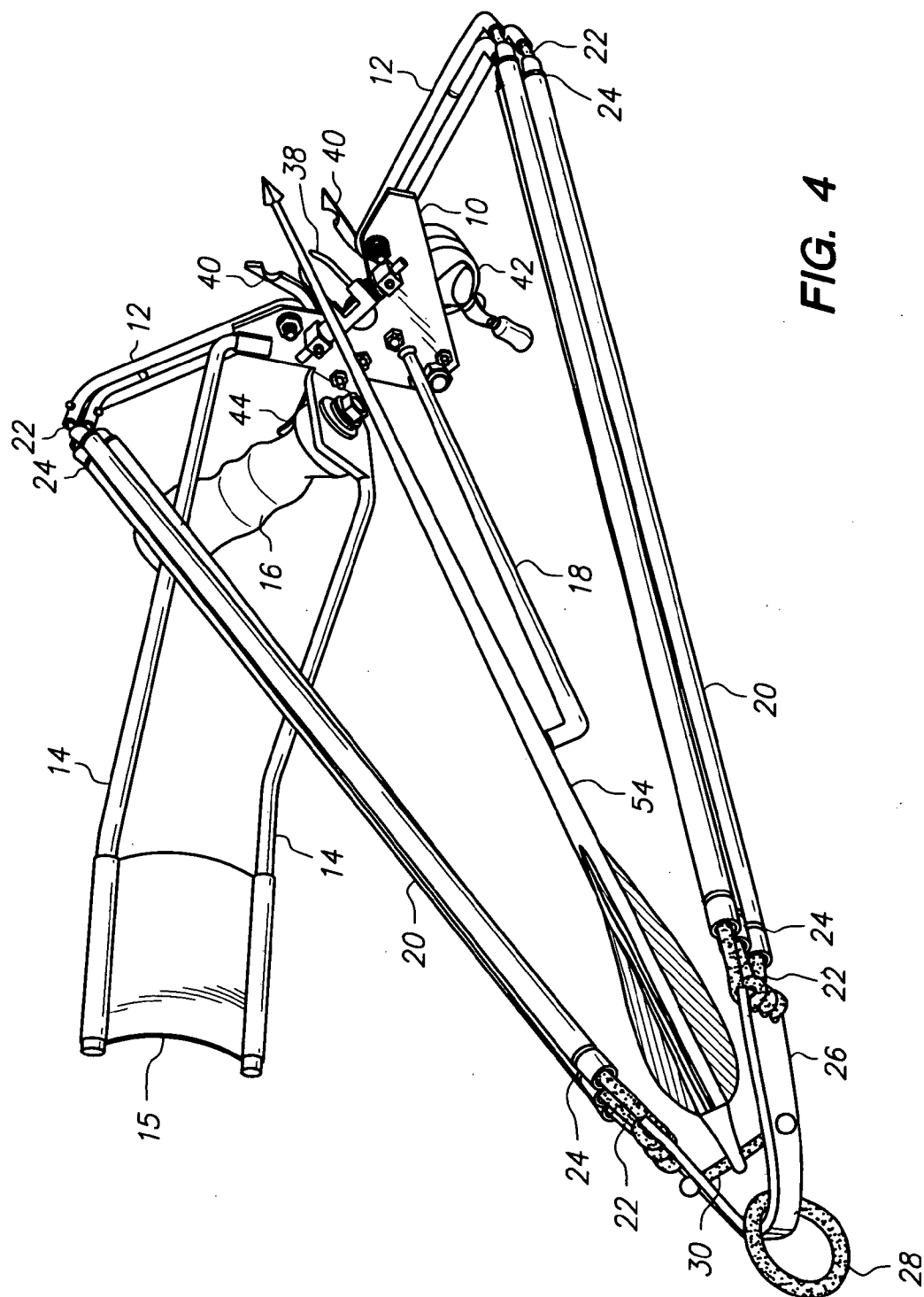


FIG. 3



MISSILE LAUNCHING APPARATUS**CROSS-REFERENCE TO RELATED APPLICATIONS**

[0001] Not applicable.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[0002] Not applicable.

BACKGROUND OF THE INVENTION

[0003] 1. Field of the Invention

[0004] The present invention relates to devices for launching projectiles, and in particular to slingshot-like weapons adapted for the launching of arrows and the like.

[0005] 2. Brief Description of the Related Art

[0006] The sling has been used since prehistoric times for hunting and warfare. Generally speaking, a sling consists of a short strap or pouch for receiving a stone, bullet, or other missile, with a string attached to each end of the strap. To launch a missile, the operator first spins the sling to build up speed, then releases one of the strings. When the string is released, the missile exits the strap or pouch, hurling forward in a line tangential to the arc of the circle formed by the spinning sling. A sling allows a missile to be hurled with much greater force than could be achieved with simple arm motion.

[0007] The slingshot is a relatively modern weapon that, like the sling, also features a strap or pouch to receive a missile. In the case of the slingshot, however, the strings are replaced by elastic tubes or bands, most commonly made from vulcanized rubber. These tubes are attached to a support member usually formed in a "Y" shape. The elastic tubes are each attached to one of the arms of the "Y," and the bottom stem of the "Y" support is used as a handle. The slingshot is fired by first holding the support in one hand and gripping the pouch holding the missile with the other, pulling the pouch backwards to stretch the elastic tubes or bands, then releasing the pouch to launch the missile. The launch speed of the missile is dependent upon the resiliency of the elastic tubes and the distance to which they are stretched prior to release.

[0008] The desirability of developing an effective slingshot-like weapon capable of launching shafted missiles, such as arrows, rather than blunt missiles, such as stones and bullets, has long been recognized. A slingshot is more compact and easier to use than a traditional bow or crossbow. This is an especially important consideration for hunters, who often must travel significant distances by foot through dense foliage. Under these circumstances, a traditional bow is difficult to transport due to its bulkiness, and may create a significant amount of noise as it contacts brush, which can disturb game animals. While crossbows are generally more compact than traditional bows, they still include a transverse bow portion much wider than a traditional slingshot. This bow portion of the crossbow, like a traditional longbow or compound bow, may be cumbersome, and easily catches on brush as a hunter moves. On the other hand, arrows and other shafted missiles have significant advantages over blunt projectiles, such as a stone or sling bullet. Due to their shape and spin characteristics during flight, arrows may be fired much more accurately and at much greater distances than a typical sling or slingshot missile. They also may be fitted with various types of heads adapted specifically to their application,

such as the steel-bladed heads commonly used on modern hunting arrows. Such heads are far more effective hunting weapons than blunt missiles. For these reasons, few hunters use slingshots for hunting despite the advantages offered by their compact shape and size.

[0009] One of the difficulties facing the designer of a slingshot-like weapon for launching arrows or other shafted missiles is to provide an effective means of supporting the forward end of the arrow prior to launch. U.S. Pat. No. 2,645,217 to Fisher teaches an arrow guide disposed between the arms of a Y-shaped support member. The arrow guide includes a notch to receive the arrow. U.S. Pat. No. 4,877,007 to Olson teaches a similar support, except in the case of Olson the support is connected to fittings attached to the elastic members of the device rather than directly to the support member arms. U.S. Pat. No. 3,455,288 to Knerr teaches a support with a circular bore sized to receive the arrow shaft, the bore also including radial slots through with the feathers of the arrow are intended to pass during launch. U.S. Pat. No. 4,873,963 to Lemmen teaches an "arrow sling device" with hinged gates that close together to form an arrow seat aperture. The gates open forwardly in response to pressure from the arrow fletching, thereby allowing the fletched portion of the arrow to pass through during launch. U.S. Pat. No. 3,018,770 to Saunders teaches a "sling bow" with an arrow rest including two support prongs. The forward end of the arrow shaft sits between the outwardly bent ends of the two support prongs prior to launch.

[0010] It may be seen that while each of the arrow support mechanisms discussed above do provide a means for resting an arrow prior to launch when using a slingshot-type weapon, they do not provide a secure means for holding an arrow in place prior to launch. In each case, the operator must hold the rearward end of the arrow at the strap or pouch with tension in the elastic bands or tubes in order to maintain the device in a ready-to-fire configuration. The operator will quickly tire of holding the device in this manner, and thus it is impractical to draw an arrow into the ready-to-fire position until just prior to launch. While this is not a significant disadvantage in some applications, such as target shooting, it is an important issue when using such a device for hunting. Any movement by the hunter prior to launch raises the risk that the hunter will be seen by the targeted game animal, thus causing the animal to run away and likely spoiling the opportunity to target the animal. The severity of this problem is increased because such weapons generally have a much shorter effective range than firearms, and thus even small movements by the hunter are more likely to be seen by the game animal at these closer ranges. In addition, it will be difficult or impossible for a hunter to run or move quickly when holding such a weapon in the ready-to-fire position. Such movements are often necessary during hunting, such as when a hunter must quickly proceed to a new position in order to intercept a moving game animal. It would also be desirable to keep a weapon in a ready-to-fire state during routine movements while hunting, since the hunter may be surprised by an encounter with a game animal and otherwise would have no opportunity to fire in such a situation.

[0011] By contrast to the slingshot-like arrow launching devices described above, crossbows may be locked in a ready-to-fire position indefinitely, then released by simply pulling a trigger. The hunter may even engage in running or other strenuous activity while the crossbow is held in a ready-to-fire state, an important advantage when pursuing game on foot as

explained above. For these reasons, crossbows have proven to be much more popular than any of the prior slingshot-like hunting devices adapted to fire arrows, despite the greater bulkiness, complexity, and very poor rate of fire intrinsic to crossbows. It will be seen then that the development of a slingshot-type hunting device capable of shooting shafted missiles such as arrows, but also capable of being held in a ready-to-fire position for an indefinite duration much like a crossbow, would be highly desirable.

BRIEF SUMMARY OF THE INVENTION

[0012] The present invention is directed to a missile launching device that is capable of being locked in a ready-to-fire position for an indefinite period of time. A missile locking mechanism that may be opened and closed by the operator, such as by the use of a trigger in certain embodiments, to hold the shaft of a shafted missile in place in the device. In certain embodiments, the device further comprises a notching mechanism that holds the end of an arrow or other shafted missile in a notched and ready-to-fire position.

[0013] In one aspect, the invention is directed to an apparatus for launching missiles, comprising a frame, at least one pair of elastic members connected to the frame and engageable with a rearward end of a missile, a support extending rearwardly from the frame and engageable with the at least one pair of elastic members when the at least one pair of elastic members is at least partially extended rearwardly from the frame, and a missile holder selectively engageable with a forward portion of a missile wherein the missile is locked into position with respect to the apparatus when the missile holder is engaged.

[0014] In another aspect, the invention is directed to a missile-launching apparatus, comprising a frame comprising a handle and an arm rest, at least one crossarm connected to the frame at least one elastic member, wherein the at least one elastic member is connected to the at least one crossarm, and a missile locking assembly connected to the frame.

[0015] In still another aspect, the invention is directed to a missile weapon, comprising a frame assembly comprising a missile locking assembly, a resilient member connected to the frame assembly, a resilient member support extending rearwardly from the frame assembly, and a missile comprising a shaft and a notch, wherein the missile is fitted to the resilient member at the notch and fitted to the missile locking assembly at the shaft.

[0016] It is therefore an object of the present invention to provide for a missile-launching device that is capable of being locked in a ready-to-fire position.

[0017] It is a further object of the present invention to provide for a missile-launching device that may be carried in a ready-to-fire position while the operator engages in strenuous or quick movements.

[0018] It is also an object of the present invention to provide for a missile-launching device that is relatively compact and unencumbering.

[0019] It is also an object of the present invention to provide for a missile-launching device that may be fired and reloaded quickly.

[0020] It is also an object of the present invention to provide for a missile-launching device that is relatively accurate and capable of striking a target at a significant range.

[0021] These and other features, objects and advantages of the present invention will become better understood from a consideration of the following detailed description of the

preferred embodiments and appended claims in conjunction with the drawings as described following:

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0022] FIG. 1 is a perspective view of a preferred embodiment of the present invention.

[0023] FIG. 2A is a partial cut-away perspective view of the portion of a preferred embodiment of the present invention adapted to hold the shaft portion of an arrow when the device is in the "closed" position.

[0024] FIG. 2B is a partial cut-away perspective view of the portion of a preferred embodiment of the present invention adapted to hold the shaft portion of an arrow when the device is in the "open" position.

[0025] FIG. 3 is a perspective view of a preferred embodiment of the present invention similar to FIG. 1, but with an arrow in a ready-to-fire position.

[0026] FIG. 4 is a perspective view of a preferred embodiment of the present invention, similar to FIG. 3 but shown as the arrow is being fired.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

[0027] With reference to FIG. 1, the preferred embodiment of the present invention may be described. Frame plate **10** provides a mounting point for crossarms **12**. There are six crossarms **12** in the preferred embodiment, but the invention is not so limited and any number of crossarms may be employed as appropriate to the materials utilized in the construction of the device. Brace bars **14** extend rearwardly from the left side of frame plate **10**, and are used to support brace **15** that fits against the left arm of the user when the device is fired. It may be noted that the configuration illustrated in FIG. 1 is appropriate to a right-handed shooter, although the device could be constructed in a mirror-image form for a left-handed shooter within the scope of the invention.

[0028] Also extending from the left side of frame plate **10** is handle **16**, which is preferably formed into a shape that is easily gripped by the left hand of the shooter. Strap support **18** extends rearwardly from the center back of frame plate **10**, and features a tail portion with a right-angle bend. Various other constructions of strap support **18** are possible within the scope of the invention, provided that they are operable to engage strap **26** when the device is in the ready-to-fire position. Frame plate **10**, crossarms **12**, brace bars **14**, and strap support **18** are preferably formed of steel, aluminum, or any other sufficiently strong material. Handle **16** may be preferably formed of a steel bar core with a plastic or rubber outer-covering for both strength and comfort during use.

[0029] Attached at the outward ends of each of crossarms **12** is an elastic tube **20**. Preferably, strong rubber tubing such as used in medicine and laboratories may be employed for elastic tube **20**. Alternatively, any other resilient and sufficiently strong material could be used, such as elastic bands. In the preferred embodiment, crossarms **12** are not attached directly to each tube **20**, but instead an attachment cord **22** is employed for that purpose. The reason for this construction is to reduce wear on the ends of elastic tube **20** if, for example, the forward end of each tube **20** were simply stretched over the extending end of the corresponding crossarm **12**. In the preferred embodiment, attachment cords **22** are knotted inside each end of each tube **20**, and a hose claim **24** as known

in the art is placed in front of the knot to prevent tube 20 from disengaging with its attachment cords 22 during use. Each of the two sets of tubes 20 are attached at one end of strap 26. In alternative embodiments, one set of tubes 20 could be used, with each end attached to an opposing crossarm 12. Strap 26 could then be omitted in alternative embodiments. In the preferred embodiment, strap 26 is formed of leather, or any other sufficiently strong and pliable material. Pull ring 28 is fitted over strap 26. It may be seen that by applying rearward pressure to pull ring 28, the user will pull strap 26 rearwardly, thereby stretching elastic bands 20 as the distance between strap 26 and crossbars 12 increases. Notch string 30, which may be formed of cord or a similar material, extends between the two interior sides of strap 26 in the preferred embodiment. Any other means of engaging the rear of an arrow or other shafted missile may be used in alternative embodiments.

[0030] Arrow rest assembly 32 is preferably attached at the upper end of frame plate 10 on its rearward side. Two arrow rest blocks 34 are mounted at frame plate 10, and arrow rest shaft 36 passes through them in a direction orthogonal to the direction of travel of an arrow launched from the device. Rest 38, which includes two prongs as shown in FIG. 1, is mounted to arrow rest shaft 36 such that it may pivot forwardly and rearwardly. Preferably, rest 38 is biased rearwardly by a spring or other resilient means (not shown), such that rest 38 extends in a generally vertical direction when an arrow is not present. In this manner, a “floating” rest assembly 32 is preferably provided for the shaft of an arrow to be fired using the device. The floating construction provides stability to the arrow as it is fired. The structure and function of arrow holder arms 40 and trigger 44, which is linked to arrow holder arms 40, will be described more fully below.

[0031] Also shown in FIG. 1 is optional reel 42, which is mounted at the forward side of frame plate 10. Reel 42 may be of any conventional type that is employed in fishing or like pursuits. By attaching a monofilament or other line extending from reel 42 to an arrow fired from the device, a targeted fish or other game animal may be reeled back to the user just as if a traditional fishing rod and reel were employed. In embodiments of the invention in which fishing is not an intended application, reel 42 may be omitted, or may be removed when not needed and reattached for fishing applications. Reel 42 may be employed for applications other than fishing, such as retrieving practice arrows.

[0032] Turning now to FIGS. 2A and 2B; the operation of the arrow holder mechanism of the preferred embodiment of the present invention may be described. It may be seen that arrow holder arms 40 are mounted at the front side of frame plate 10 in a pivoting manner, preferably by a screw, bolt, or the like at the lower end of each of arrow holder arms 40. FIG. 2A shows the device when it is in the “closed” position, such as when no arrow is present or when an arrow is locked in the ready-to-fire position. Arrow holder arms 40 comprise facing concave portions that form a circular arrow holder opening 52 that is sized to receive the shaft of the arrow to be launched by the device. The forward end of an arrow may thus be locked into place with the device in a ready-to-fire position without concern about the forward end of the arrow slipping from arrow rest assembly 32 due to the user’s movements.

[0033] In order to fire an arrow, or to load an arrow into the device, trigger 44 is depressed in the direction shown by the adjacent arrow in FIG. 2B. Depression of trigger 44 on trigger mount 46 causes a rotation of cam 48 from a vertical orientation to a horizontal orientation, which causes arrow holder

arms 40 to be pushed laterally and pivoted from their downward ends, thus moving apart from each other in the direction indicated by the adjacent arrows of FIG. 2B. After the arrow is fired, or an arrow is loaded depending upon the operation being performed, trigger 44 may be released. Spring 50 then draws arrow holder arms 40 back together, pivoting cam 48 back to a vertical orientation. It may be noted that while spring 50 is employed in the preferred embodiment, any other resilient member or other return means may be employed in alternative embodiments of the invention to return arrow holder arms 40 to the “closed” position.

[0034] Turning now to FIGS. 3 and 4, the operation of a preferred embodiment of the invention may be described in greater detail. FIG. 3 illustrates the preferred embodiment of the invention in a ready-to-fire configuration, with an arrow 54 loaded. To load the device, the user first grips pull ring 28 and positions strap 26 such that it is pulled rearward farther than and just above the rearward end of strap support 18. Strap 26 is then lowered until it rests on the upturned end of strap support 18. It may be seen that the preferred embodiment may be held in this position indefinitely, without any strain upon the user. While gripping the preferred embodiment at handle 16, the user then depresses trigger 44, which causes arrow holder arms 40 to open outward. An arrow is then placed such that arrow rest 38 supports its forward end, and the notch at the rear of the arrow is fitted onto notch string 30. Once positioned in this manner, the user may release trigger 44, which due to the force of spring 50 (shown in FIGS. 2A and 2B) causes arrow holder arms 40 to return to the “closed” position, trapping the shaft of arrow 54 in holder opening 52. It may be seen that in this configuration, the user may move about, even run at speed, without disturbing the position of arrow 54 with respect to rest 38 and notch string 30, and thus the preferred embodiment will be maintained in the ready-to-fire position even during strenuous physical movement such as may be performed while hunting.

[0035] FIG. 4 illustrates a preferred embodiment of the present invention just as an arrow 54 is being fired. Trigger 44 is depressed in order to release the forward end of arrow 54 by the opening of arrow holder arms 40. The user then pulls back on pull ring 28 until elastic tubes 20 are at the desired tension for the release of arrow 54. It will be seen that the shaft of arrow 54 slides across arrow rest 38 during this process. Arrow 54 is aimed at the target, and then pull ring 28 is released. The tension in elastic tubes 20 causes the arrow to slide forward rapidly across arrow rest 38. As arrow 54 leaves the device, the notch portion on the rearward end of arrow 54 disengages from notch string 30. The arrow then proceeds to its target in an otherwise conventional manner.

[0036] The present invention has been described with reference to certain preferred and alternative embodiments that are intended to be exemplary only and not limiting to the full scope of the present invention as set forth in the appended claims.

What is claimed is:

1. An apparatus for launching missiles, comprising:
 - a. a frame;
 - b. at least one pair of elastic members connected to said frame and engageable with a rearward end of a missile;
 - c. a support extending rearwardly from said frame and engageable with said at least one pair of elastic members when said at least one pair of elastic members is at least partially extended rearwardly from said frame; and

- d. a missile holder selectively engageable with a forward portion of a missile wherein the missile is locked into position with respect to the apparatus when said missile holder is engaged.
2. The apparatus of claim 1, wherein said frame comprises at least one pair of crossarms, and each of said at least one pair of elastic members is connected to one of said at least one pair of crossarms.
3. The apparatus of claim 2, further comprising a strap connecting each pair of said at least one pair of elastic members.
4. The apparatus of claim 3, wherein said strap comprises a notching member adapted to receive a notch at the rearward end of the missile.
5. The apparatus of claim 1, wherein said missile holder comprises a pair of missile holder arms.
6. The apparatus of claim 5, wherein each of said missile holder arms comprise a concave segment adapted to fit a shaft of a missile when said pair of missile holder arms are closed together.
7. The apparatus of claim 6, further comprising a trigger in communication with said pair of missile holder arms wherein activation of said trigger causes said pair of missile holder arms to open.
8. The apparatus of claim 7, further comprising a resilient member in communication with said pair of missile holder arms wherein said resilient member biases said pair of missile holder arms to close together.
9. The apparatus of claim 1, further comprising a missile rest connected to said frame.
10. The apparatus of claim 9, wherein said missile rest comprises a resilient member and wherein said resilient member is operable to bias said missile rest rearwardly.
11. A missile-launching apparatus, comprising:
- a frame comprising a handle and an arm rest;
 - at least one crossarm connected to said frame;
 - at least one elastic member, wherein said at least one elastic member is connected to said at least one crossarm; and
 - a missile locking assembly connected to said frame.
12. The apparatus of claim 11, wherein said missile locking assembly comprises a pair of locking arms adapted to receive a shaft of a missile therebetween.
13. The apparatus of claim 12, wherein said missile locking assembly further comprises:
- a trigger;
 - a trigger arm connected to said trigger; and
 - a cam linked to said trigger arm, wherein said cam is positioned between said pair of locking arms.
14. The apparatus of claim 13, further comprising a resilient member comprising two ends, and wherein each of said resilient member ends are connected to one of said pair of locking arms.
15. The apparatus of claim 12, wherein each of said locking arms comprises an indentation adapted to receive a shaft of a missile.
16. The apparatus of claim 11, further comprising a support extending rearwardly from said frame and engageable with said at least one elastic member.
17. A missile weapon, comprising:
- a frame assembly comprising a missile locking assembly;
 - a resilient member connected to said frame assembly;
 - a resilient member support extending rearwardly from said frame assembly; and
 - a missile comprising a shaft and a notch, wherein said missile is fitted to said resilient member at said notch and fitted to said missile locking assembly at said shaft.
18. The missile weapon of claim 17, wherein said resilient member support comprises a resilient member rest adaptable to receive said resilient member when said resilient member is at least partially stretched rearwardly from said frame assembly.
19. The missile weapon of claim 17, wherein said missile locking assembly comprises a pair of locking arms and a trigger mechanism.
20. The missile weapon of claim 19, wherein said trigger mechanism comprises a trigger and a cam in communication with said trigger, wherein said cam is positioned between said pair of locking arms.

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