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(54) **Slingshot.**

(57) A slingshot or bow which can fire darts and other projectiles (21) has a power sling (2) attached to a power draw unit (5) and to a carriage (3), both of which are mounted on a guide rail (7) and are slidable thereon independently of each other. Projectiles (21) are fired when the carriage (3) is freed from the cocked position upon release of a catch (14) by pressing a trigger (13).

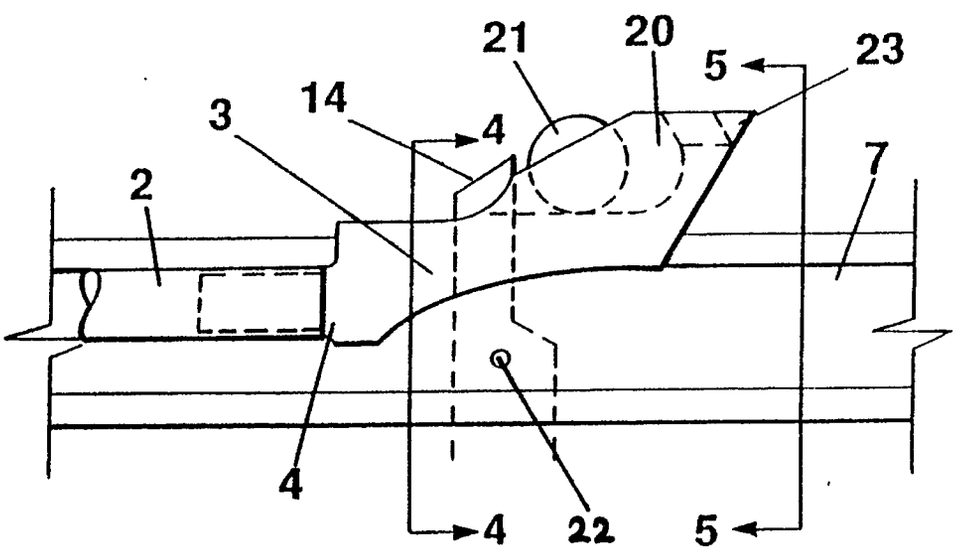

FIG. 2

EP 0 428 344 A2

SLINGSHOT

This invention relates to a slingshot or catapult; in particular, this invention provides a slingshot or catapult which is more accurate and sophisticated than the slingshots which are currently known and which in one embodiment includes a reloading mechanism.

The improvement provided by the present invention is also applicable to conventional bows (but not to crossbows) and to the compound-styled bow described, for example, in US Patent No. 3,486,495 (Allen). As used hereinafter, the term "slingshot" includes within its ambit not only catapults, but also bows (excluding crossbows) and compound-styled bows.

The primitive catapult has been known for many years and basically consists of a Y-shaped implement with a loop of elastic fastened to the end of the two prongs. It is generally used by children to shoot small stones or similar projectiles. This catapult suffers from the marked disadvantage that it tends to be inaccurate: it is difficult to draw back the elastic loop in an even manner so as to impart a precise trajectory to the projectile.

One attempt to overcome this disadvantage was made in US Patent No. 4,386,598 (Blaser) by providing a guide path for the projectile. However, this prior art catapult uses magnetic means to retain the projectile until it is fired by the sling. Obviously, some of the energy of the sling will be used to overcome the magnetic force retaining the projectile. In addition, this prior art catapult is restricted to magnetic or magnetisable projectiles. There are two further drawbacks: in the first preferred embodiment of Blaser, the projectile is fired from a bore and some of the energy imparted to the projectile can be expected to be dissipated due to collisions and friction between the projectile and the wall of the bore. In the second embodiment, a series of telescoping tubes is used and the projectile travels externally but, as admitted in the specification, there is some sacrifice of accuracy.

The present invention represents a vast improvement over the prior art described above. The slingshot of this invention not only incorporates increased accuracy but also permits the use of a wide range of projectiles, which need not be selected on the basis of magnetic properties. Thus, the slingshot of the present invention may be used in conjunction with plastic pellets or darts, for example. In addition, in one preferred embodiment, the slingshot of the invention incorporates a rapid reloading facility.

The present invention also represents a marked advance in the art of archery generally. At present, conventional bows comprise the most popular archery equipment, with cross-bows much less popular. Many archers prefer the conventional bow, because of the joy in the physical involvement of drawing back a conventional bow and releasing an arrow. However, in competitive archery there is no uniformity of bow or arrow -dif ferent competitors are permitted to use various weight bows with arrows of varying weights, lengths and diameters.

The present invention lends itself to the type of competition in which all competitors use the same shooter and the same size and weight projectiles, thus emphasising the skill of each competitor, rather than a particular combination of equipment.

The slingshot of the present invention enables a projectile such as a steel ball or a dart ("dart" as used herein includes arrows and the like) to be fired from the shooter by releasing a catch, rather than by releasing the bowstring with the fingers, as would be the case with a conventional bow or catapult. The slingshot of the invention is easier to use than a conventional bow, because the projectile is securely held in position prior to firing, unlike an arrow in a conventional bow.

Moreover, the slingshot of this invention has decided advantages over the traditional cross-bow, because the slingshot of the present invention is not cocked ready to fire in the same way as a cross-bow, which can be fired accidentally. To cock a crossbow requires a a certain mobility which is not normally available to disabled persons, for example, who often wish to enjoy archery as a sport or in competition. In most cases, the cocking of a cross-bow requires the user to apply his weight by standing on the cocking mechanism. No such mobility is needed in the case of the slingshot of the present invention, which may be cocked and fired without the user having to stand.

In addition, the rapid reloading feature of a preferred embodiment of the present invention makes the slingshot an attractive proposition for disabled users.

Accordingly, this invention provides a slingshot for shooting projectiles, comprising:

- elongated guide means,
- a main body section attached to the guide means and including a handle,
- a power draw unit slidably mounted on the guide means,
- a carriage mounted on the guide means between the power draw unit and the main body section and slidable on the
- guide means independently of the power draw unit,
- a projectile rest located in or on the carriage,

- a power sling connected to the power draw unit and the carriage,
- a catch for holding the power sling in a cocked position, and
- trigger means for releasing the catch.

The elongated guide means may be a rail, for example, of appropriate cross-section relative to the power draw unit and the carriage, so that the power draw unit and the carriage respectively will be retained on the guide rail during operation of the slingshot and will slide smoothly thereon, with minimum "play". In one embodiment, the elongated guide rail is of "T" shaped cross-section and the power draw unit and the carriage each has rail guides embracing the cross bar of the "T". In another embodiment, the guide rail is of "C" shaped cross-section and each of the power draw unit and the carriage rides on a rail guide extending radially into the centre of the guide rail and has a bulbous projection therein to retain the power draw unit and the carriage respectively on the guide rail. Other configurations of the guide means will be apparent to one skilled in the art.

The main body section may incorporate a handle in the form of a pistol grip or similar. Most conveniently, the trigger means is located adjacent the handle for operation by the forefinger of the hand which grasps the handle.

The power draw unit may take various forms. When the slingshot of the invention is a type of catapult, the power draw unit preferably has a handle which depends below the guide means in use, so that the user may grip the main body handle with one hand (for example, the right hand) and draw or push the power draw unit away from the carriage with the other hand, thus tensioning the slingshot for firing when the carriage is in the cocked position. It will be appreciated that the slingshot of the invention may be fired by right-handed or left-handed users and that this is a further advantage of the slingshot of the invention over prior art archery equipment.

When the slingshot of the invention takes the form of a bow, the bow limbs form part of the power draw unit.

An adjustable stop may be mounted on the guide means so that the stop can be locked into an appropriate position on the guide means. In use, the power draw unit is drawn until the stop is reached, the cocked power sling is released via the catch and the projectile is fired. Use of an adjustable stop enables the slingshot of the invention to be adjusted for different arm lengths and power.

The carriage is mounted on the guide means between the power draw unit and the main body section. The power sling is connected to the carriage by any suitable means. Preferably, the connection is a permanent one, to ensure that the tension in the sling, which forms a loop between the carriage and the power draw unit, is even. Of course, even in the case of a permanent connection, the power sling should be capable of replacement if worn or damaged.

The projectile rest in or on the carriage is adapted to receive a projectile and enable its retention in or on the rest at least until the slingshot is fired. The configuration of the projectile rest will depend on the shape and nature of the projectile to be fired. If the projectiles are steel balls or substantially spherical shot, the rest may form a curved recess to receive such a projectile.

If the projectile is a dart, the rest may provide a support for the main body of the dart and preferably the rest includes means for maintaining the dart in position on the carriage until the carriage has reached the end of its launch path. These means may consist of a pivoting tongue which locates itself in a slot provided for this purpose in the dart body.

The releasable catch is operated by the trigger mechanism, preferably including a release lever adapted to release the catch and so free the power sling.

The catch may cause the power sling to be retained in any suitable manner. For example, the catch may operate to retain the carriage to which the power sling is attached. However, in the case of substantially spherical projectiles, it is preferred that the catch actually bears against a projectile when the projectile occupies the projectile rest and that the carriage is so designed that when the rest is empty the catch cannot retain the carriage. In this manner, dry firing of the slingshot is prevented.

The power sling preferably takes the form of a pair of power bands, each connected at one end thereof to the carriage and at the other end to the power draw unit. This embodiment is particularly suitable when the slingshot of the invention is in the form of a catapult. When the slingshot of the invention is in the form of a bow, the bow and bow string may comprise the power sling.

It is preferred that a buffer is interposed between the power draw unit and the carriage, so that when the carriage is released under tension it does not strike the power draw unit but rather contacts the buffer which may be spring-loaded or otherwise constructed so as to reduce shock.

Preferably, the slingshot of the invention also includes a projectile magazine and means for delivering a projectile from the magazine to the projectile rest. There may also be included means for ensuring that no projectile is delivered from the magazine unless the projectile rest is in a suitable position relative to the magazine.

When the slingshot of the invention includes a projectile magazine, the configuration of the maga-

zine and the method of delivering projectiles to the projectile rest will depend to a large extent on the nature of the projectiles. For example, when the projectiles are steel balls, the magazine may be gravity-fed and it is preferred that a breech block is provided to ensure that no projectile is delivered from the magazine except when the projectile rest is in the correct position in relation to the magazine.

When the projectiles are darts or the like, they may be stacked in the magazine and urged towards the base of the magazine by a spring. Each dart may be delivered to the projectile rest by the pressure exerted by the spring, until the dart lies on the projectile rest, with a tongue in the rest locating a slot in the dart body. The tongue may be actuated for this purpose by the catch and the dart may be released when the tongue drops away from the slot during firing of the slingshot.

The invention will now be described with reference to certain preferred embodiments as illustrated in the accompanying Drawings.

In the Drawings,

Figure 1 represents a perspective view of the preferred embodiment of the slingshot of the invention (in catapult form) in which the power draw unit is shown at rest and in the drawn position (in phantom lines);

Figure 2 is a fragmentary side elevation showing details of an embodiment of the carriage, suitable for use with spherical projectiles, mounted on the guide rail;

Figure 3 is a plan view of the carriage of Figure 2;

Figure 4 represents a cross-sectional view of the carriage and guide rail of Figure 2, taken along the line 4 - 4;

Figure 5 represents a cross-sectional view of the carriage and guide rail of Figure 2, taken along the line 5 - 5;

Figure 6 is a fragmentary side elevation of the power draw unit and the carriage, incorporating the feature of a buffer and with the power sling removed for simplicity,

Figure 7 is a fragmentary side elevation of the slingshot of the invention incorporating the feature of one embodiment of a magazine (for use with spherical projectiles) shown in section,

Figure 8 details the trigger mechanism,

Figure 9 is a an enlarged cross-sectional view of the breech block shown in Figure 7,

Figure 10 shows in fragmentary side elevation another form of the carriage, adapted to carry a dart,

Figure 11 is a plan view of the carriage of Figure 10,

Figure 12 is a fragmentary side elevation of the slingshot of the invention incorporating the feature of another embodiment of a magazine (for use with darts), shown in section, and

Figure 13 is a perspective view of a dart suitable for use with the carriage of Figures 10 and 11.

Referring first to Figure 1, slingshot 1 has a power sling comprising a pair of power bands 2 connected to carriage 3 by arms 4 (see Figure 3) and to power draw unit 5 by arms 6 (see Figure 6).

Carriage 3 and power draw unit 5 are mounted on guide rail 7 which has the cross-sectional "T" shape shown in Figures 4 and 5.

Power draw unit 5 includes a handle 8 for pushing or drawing power draw unit 5 along guide rail 7 away from carriage 3. Adjustable draw stop 9 can be locked into any desired position along guide rail 7 by means of locking screw 10 so as to enable the user to adjust for the length of his arm and also to ensure that a similar force is applied to drawing the slingshot each time.

Main body section 11 has a handle 12 and a release lever 13 adapted to release a catch 14 (see Figure 2, for example). Integral with main body section 11 is a magazine chamber 15 including a cheek rest 16. Mounted above magazine chamber 15 is a rear peep sight 17 and an adjustable sight spindle 18 (see Figures 1 and 7). Front sight 19 is integral with draw stop 9 mounted on guide rail 7 as shown.

Referring now to Figures 2, 3, 4 and 5, carriage 3 which is shown mounted on guide rail 7 includes a projectile rest 20 adapted to cradle a spherical projectile 21 - for example a metal, plastic or rubber spherical pellet. For illustration purposes, projectile 21 is shown spaced from rest 20. As will be appreciated from the description below, catch 14 in the cocked position will bear against projectile 21 so that it fits snugly in rest 20 and thereby catch 14 will retain carriage 3 and power bands 2 in the cocked position. Rotation of catch 14 about pivot pin 22 - by use of release lever 13 in Figure 1 - permits the firing of projectile 21.

Cavity 23 in carriage 3 is adapted to co-operate with a breech block, as will be explained later.

To prevent dry-firing, carriage 3 includes a slot 24 (shown in Figure 5) through which catch 14 will pass if there is no projectile in rest 20.

Figures 4 and 5 show carriage 3 mounted on guide rail 7, with rail guides 25 (see Figure 5) retaining carriage 3 on guide rail 7.

Figure 6 illustrates the optional buffer which may be included in the slingshot of the invention. Buffer 26 has a buffer stop 27 secured to extension 28 of power draw unit 5 by means of a spring 29 held by spring retaining pin 30. After release, carriage 3 strikes buffer 26 at contact point 31. This arrests further progress of carriage 3 and the momentum of projectile 21 (not shown in this Figure)

causes it to continue towards its target. For ease of illustration, power band 2 has been omitted from this Figure.

Figure 7 illustrates an embodiment of the reloading option of the slingshot of the invention. Magazine chamber 15 shown in Figure 1 is occupied by a gravity-fed magazine 32 containing a projectile race 33 adapted to receive spherical projectiles 21 through aperture 34 protected by sliding magazine cover 35. Projectiles 21 are delivered one at a time to projectile rest 20 in carriage 3 via breechway 36. Sliding breech block 37 occupies breech chamber 38 and is urged towards carriage 3 by breech block spring 39 secured by spring retaining pin 40. Upon release of catch 14, power band 2 contracts to propel carriage 3 away from breech block 37 which then travels in the same direction until breech block stop 41 hits abutment 42.

In this position, tongue 44 (see Figure 9) on breech block 37 closes breechway 36 sufficiently to prevent any of projectiles 21 in race 33 passing through breechway 36. When carriage 3 is drawn over catch 14 to the cocked position, by pulling handle 8 of power draw unit 5 towards main body handle 12 (buffer 26 engaging carriage 3 at buffer contact point 31), breech block 37 is displaced, tongue 44 is withdrawn from breechway 36 and the next projectile 21 drops into rest 20. In this configuration, tongue 44 fits into cavity 23 in carriage 3 (refer Figures 2 and 3) to help locate breech block 37 behind carriage 3.

To again fire the slingshot, handle 8 is pushed away from handle 12 until stop 9 is reached, release lever 13 is operated to deflect catch 14 as explained below, carriage 3 is released and propelled forward until it strikes contact point 31 on buffer 26 as already described.

Details of the trigger mechanism are illustrated in Figure 8. Roller 45 is rotatably mounted on axle 46. Catch 14 is tensioned by spring 47 secured by pin 48. Release lever 13 pivots around pin 49. When the power sling is in the cocked position, carriage 3 pushes against catch 14 which pivots about pin 22, at the same time engaging roller 45. When lever 13 is pulled towards main body handle 12, roller releases catch 14 which can then pivot further until it encounters abutment 54, by which time carriage 3 is freed from catch 14. Release lever 13 is biassed towards its upright position by spring 50 and pin 51 and recoil of lever 13 is limited by release lever stop 52.

When carriage 3 is in the form of the embodiment in Figures 10 or 12, and carriage 3 is drawn over catch 14 to the cocked position, catch 14 is able to be deflected into cavity 53 by the base of carriage 3. When carriage 3 is in the form of the embodiment in Figures 2 - 5, and carriage 3 is drawn over catch 14 towards the cocked position, catch 14 passes through slot 24 and cocking does not occur until projectile 21 occupies rest 20.

In both cases, unintended release of carriage 3 is prevented by the straight side 55 of catch 14 and engagement of catch 14 with roller 45, as explained above.

Tension adjusting screw 56 provides adjustment of the amount of force required to release catch 14, to suit individual tastes.

Turning now to Figures 10, 11 and 12, carriage 3 is designed to carry darts 64 (Figure 12) or similar projectiles and includes as part of the projectile rest a propelling tongue 57 adapted to be located in a slot in the dart body, to be explained below. In the firing position, tongue 57 can pivot about pin 58 until it reaches stop 59 and in the retracting position tongue 57 can also pivot about pin 58 until it reaches stop 74.

The dart 64 of Figure 13 has a dart body 69, a point 70, a plurality of flights 71, a stem 72 and a slot 73 passing through dart body 69. (Alternately, dart 64 could be made with a cavity in the underside of dart body 69 instead of having a slot 73 which passes through dart body 69.)

When carriage 3 is moved to the cocked position on guide rail 7, catch 14 pushes tongue 57 upwardly to the firing position. Tongue 57 is then located in slot 73 of dart body 69, either by positioning a dart manually on carriage 3 (Figures 10 and 11) or by delivering a dart from the magazine in chamber 15 (Figure 12). (In the alternate form of the dart referred to above, tongue 57 would engage the cavity in the underside of dart body 69.) When catch 14 is released by triggering release lever 13, carriage 3 is freed. The force applied to carriage 3 by power bands 2 causes tongue 57 to remain in the firing position, maintaining dart 64 in place on carriage 3, until carriage 3 comes to the end of its travel - by striking buffer contact point 31 of buffer 26 (see Figure 6). At that stage, the force transmitted to tongue 57 causes it to retract, thus launching dart 64.

The dart magazine illustrated in Figure 12 occupies magazine chamber 15 and includes a sliding magazine cover 62 hinged at pivot pin 75 and which may be opened with the aid of thumb press 61. Locking catch 60 secures cover 62. Compression leaf spring 63 bears upon a stack of darts 64 inside the magazine; darts 64 are maintained in the stacked formation by means of dart point guide 66 and dart flight guide 67. By means of spring 63, darts 64 are urged towards leaf spring stop 65 on slotted chamber base 68.

When cocking the slingshot, carriage 3 is drawn along guide rail 7 towards handle 12, catch 14 pushes up tongue 57 as already explained and carriage 3 adjusts its position under the force ex-

erted by power bands 2 until tongue 57 is located in slot 73 in dart body 69. In this position, dart 64 to be fired is out of alignment with the remaining darts 64 in the magazine, as shown in Figure 12. Release of catch 14 via release lever 13 then enables carriage 3 to travel forwardly until it strikes buffer 26, tongue 57 retracts until it stops against stop 74, which prevents the base of tongue 57 from protruding above carriage 3, and dart 64 is fired, as described above.

It will be appreciated that the arrow or dart which can be fired from the slingshot of the invention may be much shorter than the power stroke of the slingshot and that this represents yet a further advance over conventional bows, which require an arrow which is longer than the power stroke of the bow.

It will further be appreciated that the description of the invention in connection with the Drawings is for the purpose of illustration only and is not intended to be limiting on the scope of the invention.

For example, it will be apparent to one skilled in the art that the power draw unit 5 in the Drawings can include a pair of bow limbs. In addition, power bands 2 will be replaced by the bow and a bow string which is preferably permanently affixed to carriage 3 via arms 4. Similar adjustments may be made in order to adapt the principle of this invention to a compound style bow.

Claims

1. A slingshot for shooting projectiles, comprising a power sling (2), characterised in that the slingshot includes elongated guide means (7), a main body section (11) attached to the guide means (7) and including a handle (12), a power draw unit (5) slidably mounted on the guide means (7), a carriage (3) mounted on the guide means (7) between the power draw unit (5) and the main body section (11) and slidable on the guide means independently of the power draw unit, a projectile rest (20) located in or on the carriage (3), the power sling (2) being connected to the power draw unit (5) and to the carriage (3), a catch (14) for holding the power sling (2) in a cocked state, and trigger means (13) for releasing the catch (14).

2. A slingshot as claimed in claim 1, wherein the handle (12) is incorporated in the main body section (11) and is in the form of a pistol grip, the trigger means (13) is located adjacent the handle (12) and the power draw unit (5) has a handle (8) which depends below the guide means (7) in use, the power draw unit (5) being adapted to be drawn away from the carriage (3) by means of the handle (12) of the main body section (11), thus tensioning the slingshot for firing when the carriage (3) is in the cocked position.

3. A slingshot as claimed in claim 1 or 2, wherein the power-sling is formed by a pair of power bands each connected at one end thereof to the carriage and at the other end to the power draw unit.

4. A slingshot as claimed in claim 1, wherein the power draw unit includes a pair of bow limbs and the power sling comprises the bow limbs and a bow string.

5. A slingshot as claimed in any one of claims 1 to 4, wherein an adjustable stop is mounted on the guide means and capable of being locked into different positions thereon, for limiting draw of the power draw unit.

6. A slingshot as claimed in any one of claims 1 to 5, wherein a buffer is interposed between the power draw unit and the carriage.

7. A slingshot as claimed in any one of claims 1 to 6, wherein the projectile is substantially spherical and the projectile rest has an arcuate recess to receive the projectile.

8. A slingshot as claimed in claim 7, wherein the catch holds the power sling in the cocked position only when a projectile is in the arcuate recess.

9. A slingshot as claimed in claim 7 or 8, which further includes a projectile magazine and means for delivering a projectile from the magazine to the projectile rest.

10. A slingshot as claimed in claim 9, which includes means for ensuring that no projectile is delivered from the magazine unless the projectile rest is in a suitable position relative to the magazine.

11. A slingshot as claimed in claim 10, wherein the means include a sliding breech block.

12. A slingshot as claimed in any one of claims 1 to 6, wherein the projectile is a dart.

13. A slingshot as claimed in claim 12, wherein the dart has a dart body having a slot therethrough or a cavity therein and the projectile rest has a pivoting tongue adapted to be located in the slot or cavity until the dart is fired.

14. A slingshot as claimed in claim 12 or 13, which further includes a projectile magazine and means for delivering a projectile from the magazine to the projectile rest.

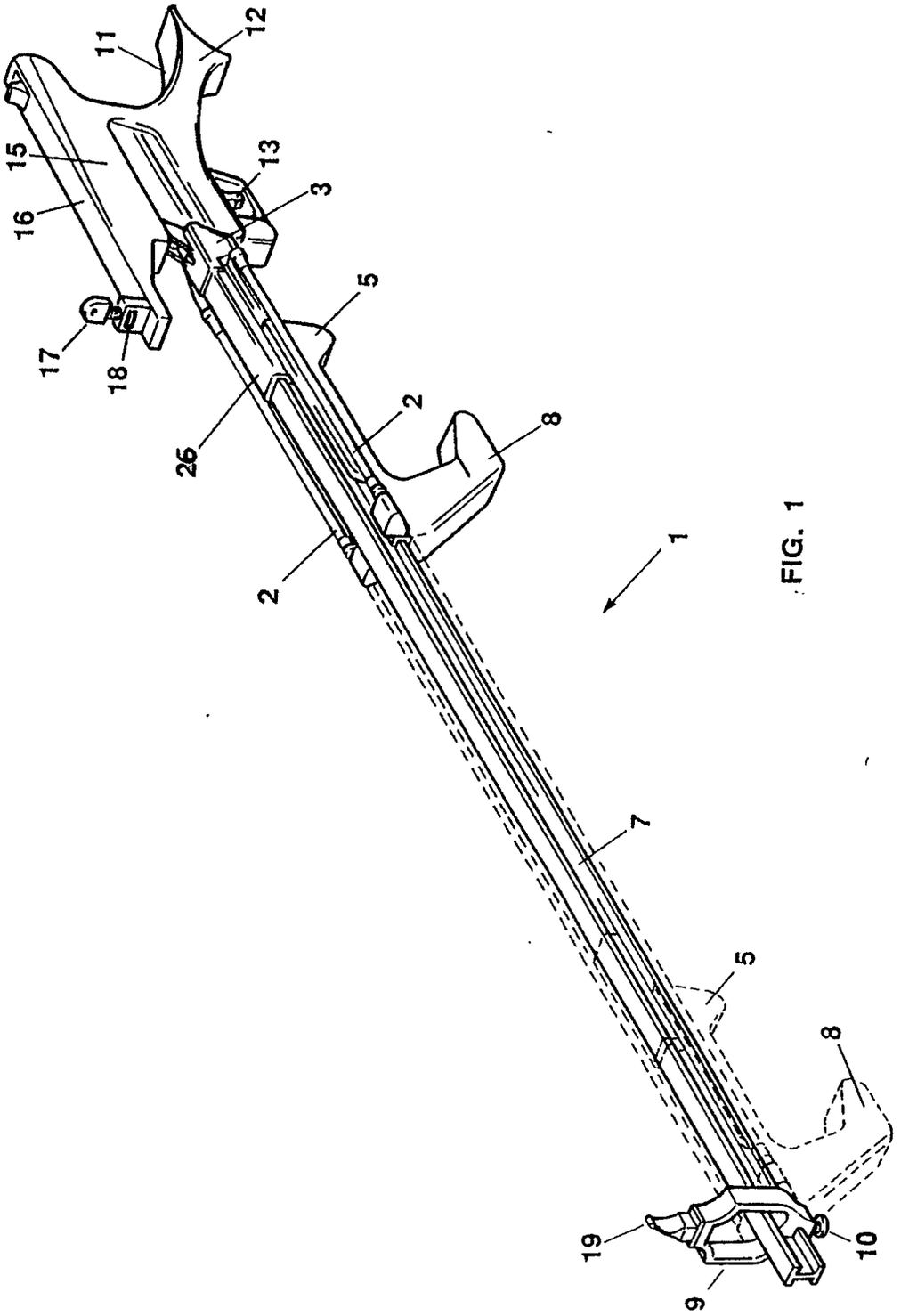

FIG. 1

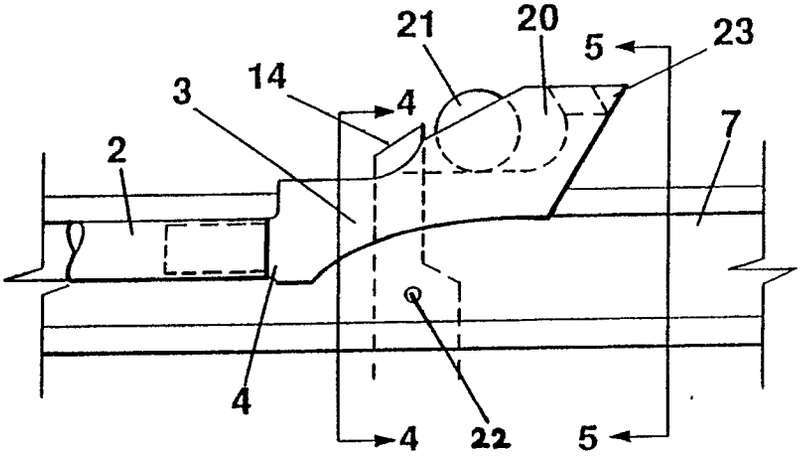

FIG. 2

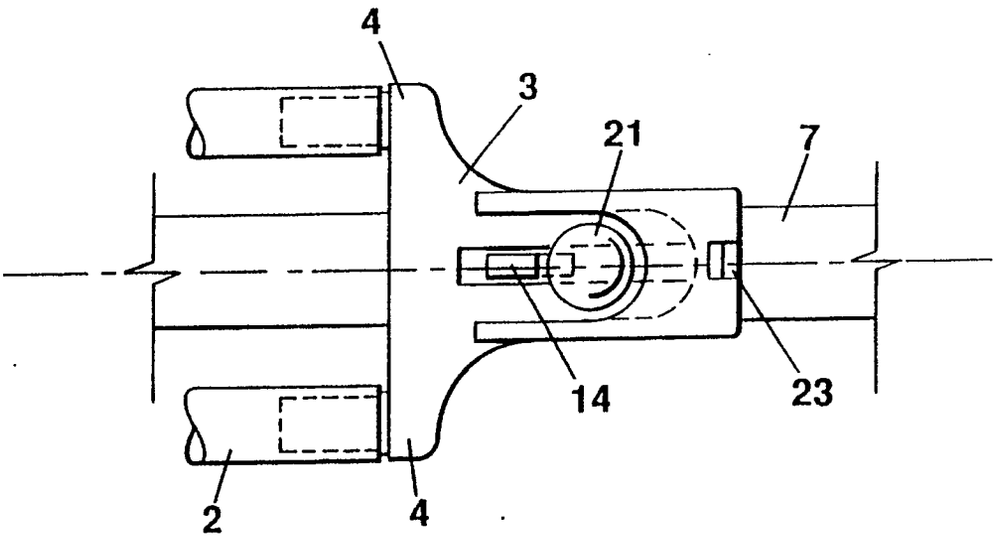

FIG.3

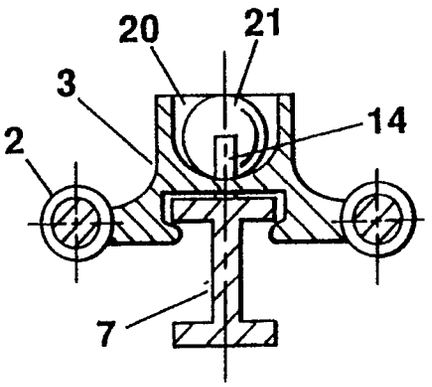

FIG. 4

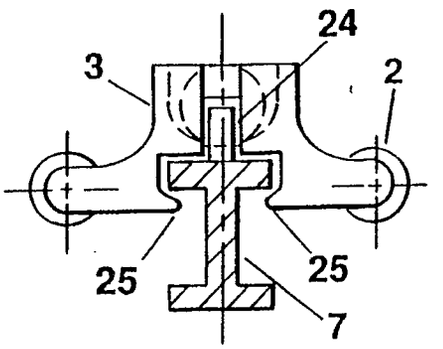

FIG. 5

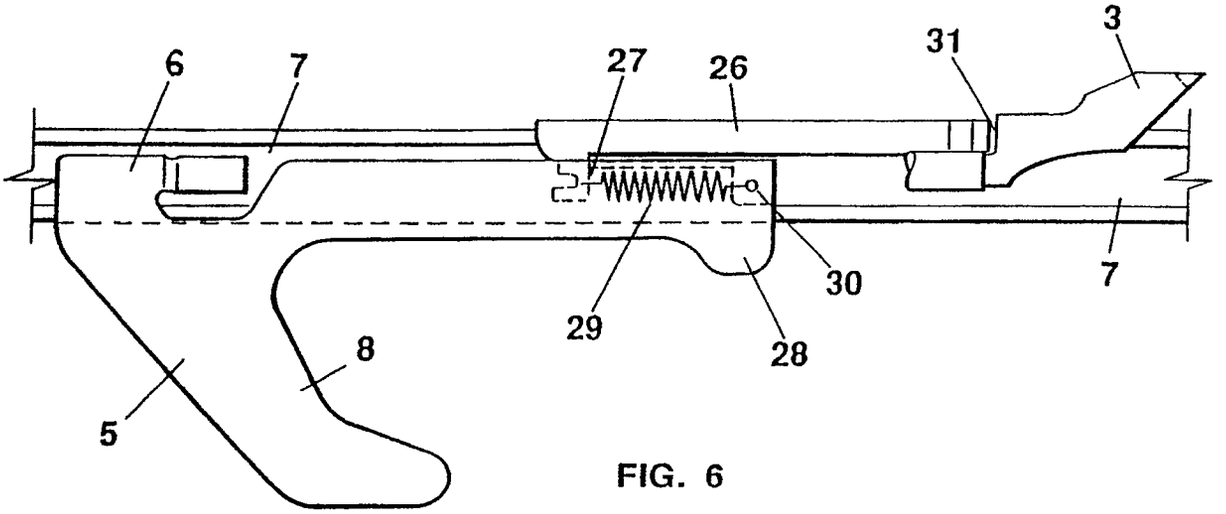

FIG. 6

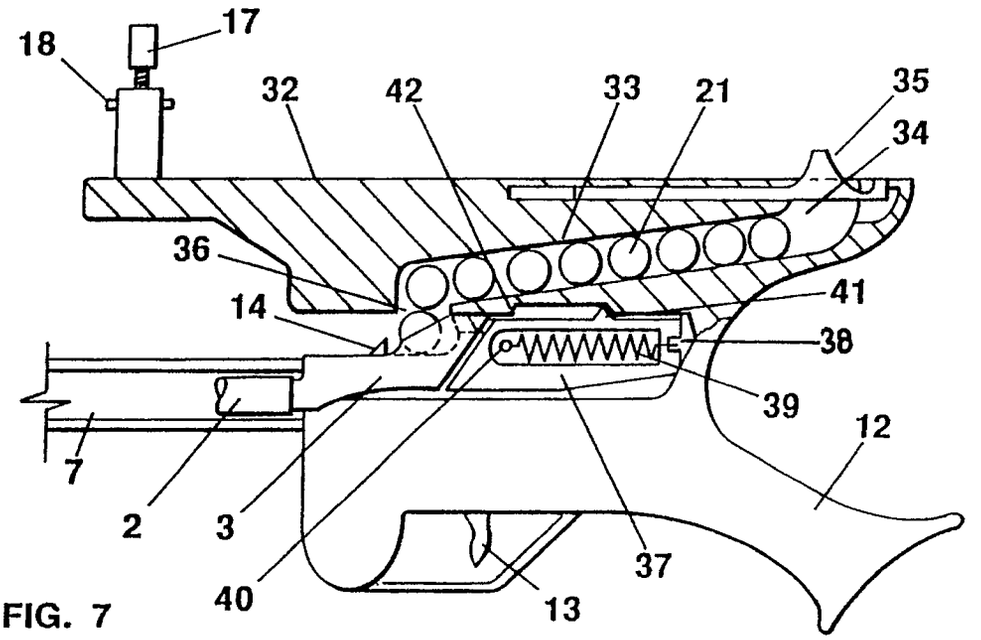

FIG. 7

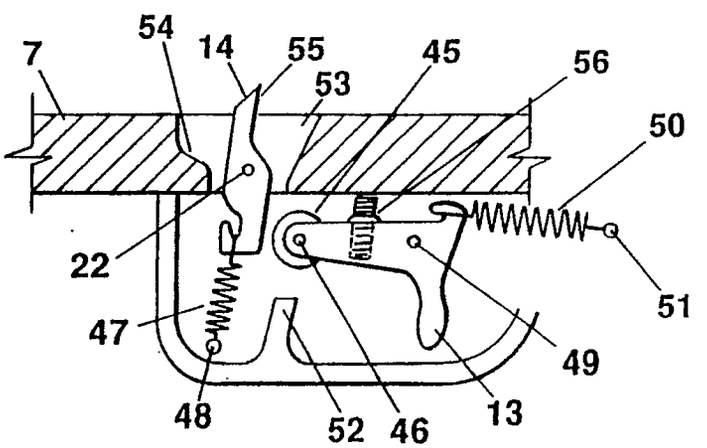

FIG. 8

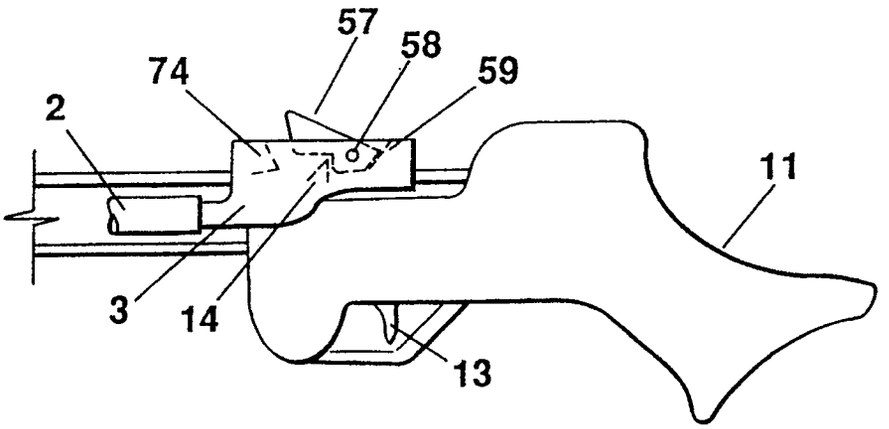

FIG. 10

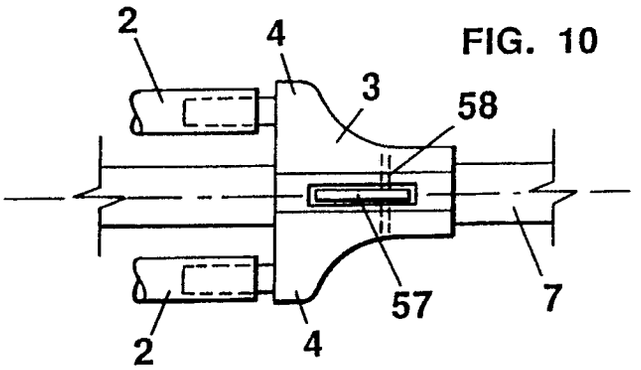

FIG. 11

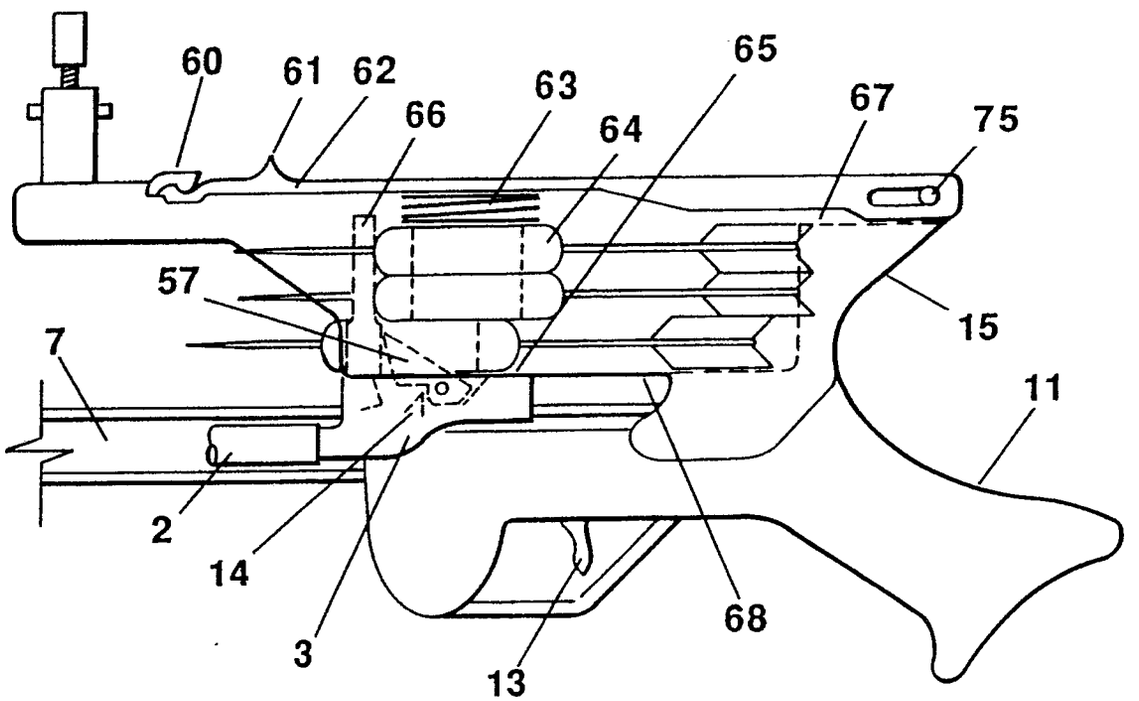

FIG. 12

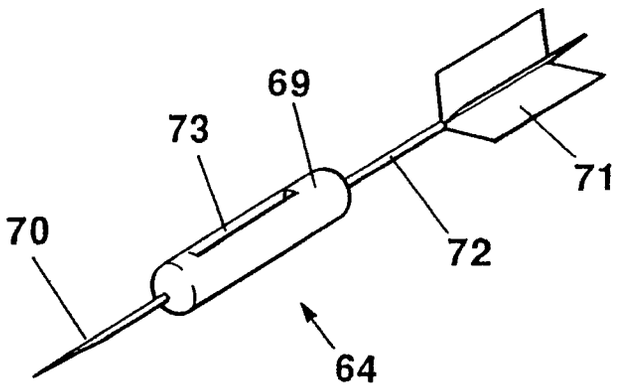

FIG. 13

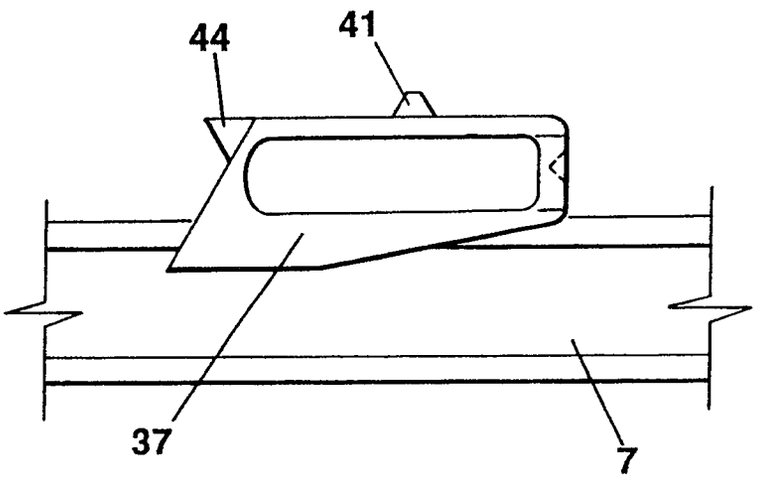

FIG. 9