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Cummings

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(54) **TOY BOW AND ARROW SYSTEM WITH UV LIGHT SHIELDING**

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Related U.S. Application Data

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(51) **Int. Cl.**

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F41B 5/00	(2006.01)
A63F 9/02	(2006.01)
F41B 5/12	(2006.01)
F41B 7/08	(2006.01)
F41B 5/14	(2006.01)

(52) **U.S. Cl.**

CPC ***F41B 5/0094*** (2013.01); ***A63F 9/0252*** (2013.01); ***F41B 5/12*** (2013.01); ***F41B 5/1484*** (2013.01); ***F41B 7/08*** (2013.01)

(58) **Field of Classification Search**

CPC F41B 5/0097; F41B 3/00; A63F 9/0252
USPC 124/20.1, 22, 17, 23.1
See application file for complete search history.

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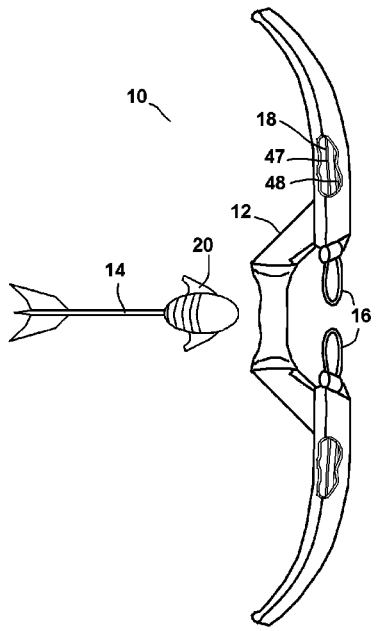
(57) **ABSTRACT**

A toy bow assembly that is used to launch toy projectiles. The toy bow assembly includes a bow structure having a first arm section and a second arm section. Both the first arm section and the second arm section have sheathed areas that are protected from ambient light. A central area is disposed between the first arm section and the second arm section. A first elastic element extends through the first sheathed area into the central area, wherein the first sheathed area shields the first elastic element from exposure to ambient light. Likewise, a second elastic element extends through the second sheathed area and into the central area, wherein the second sheathed area shields the second elastic element from exposure to ambient light.

11 Claims, 4 Drawing Sheets



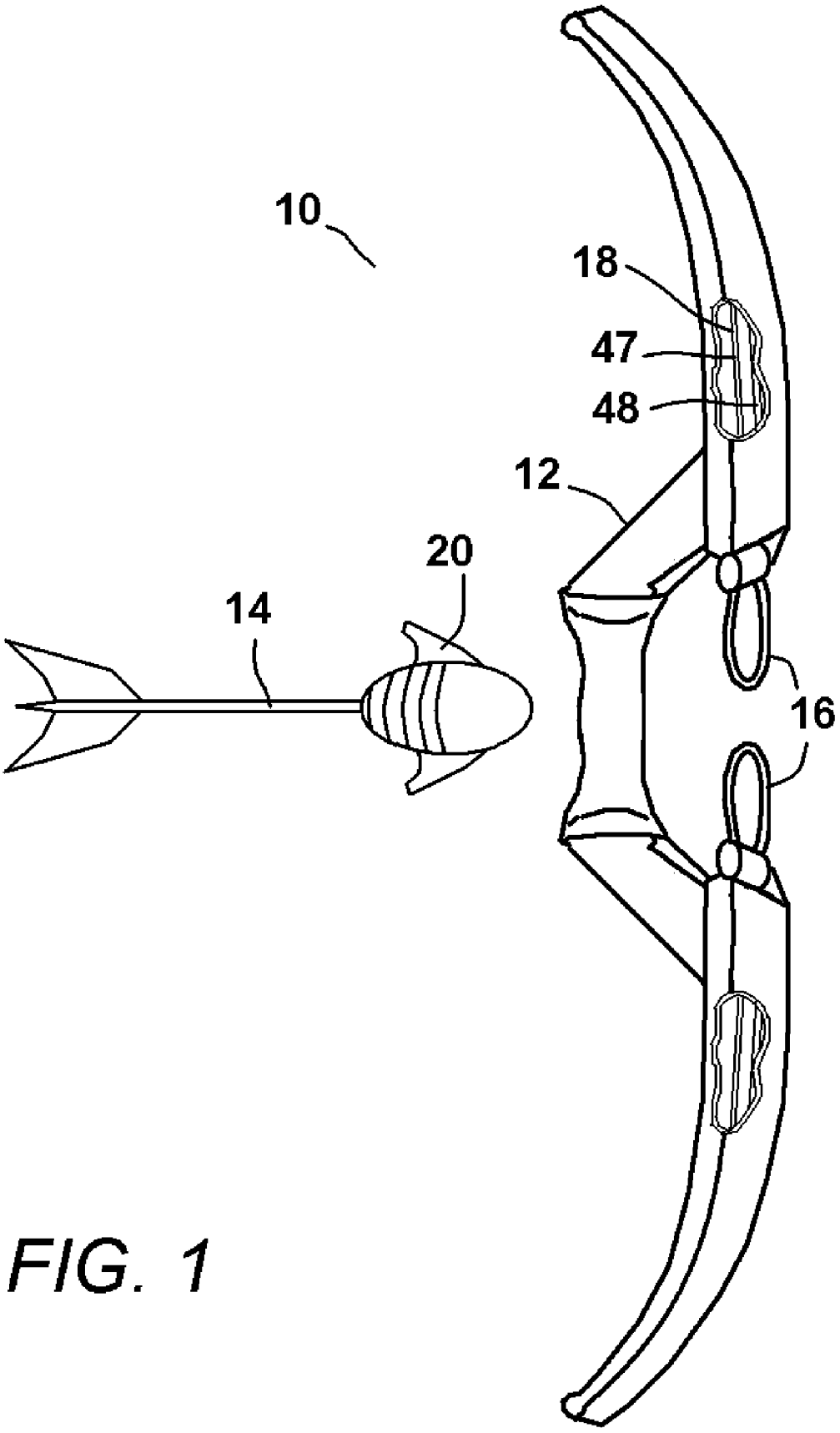


FIG. 1

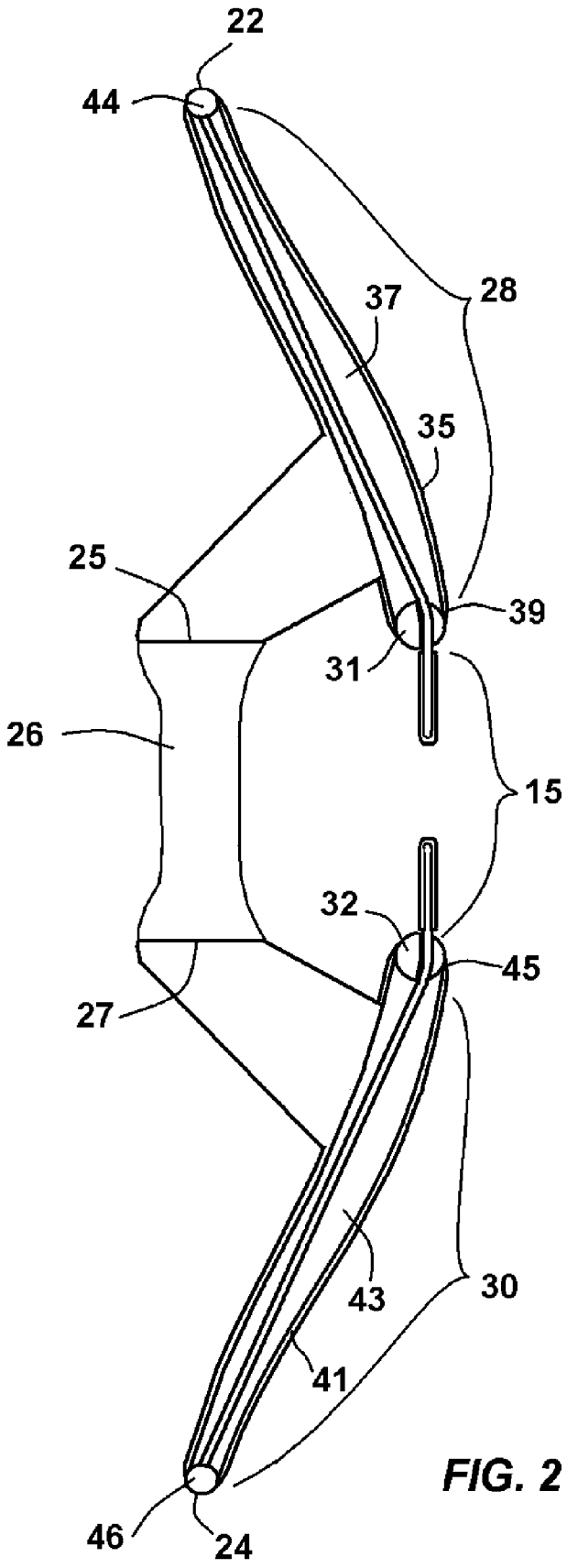


FIG. 2

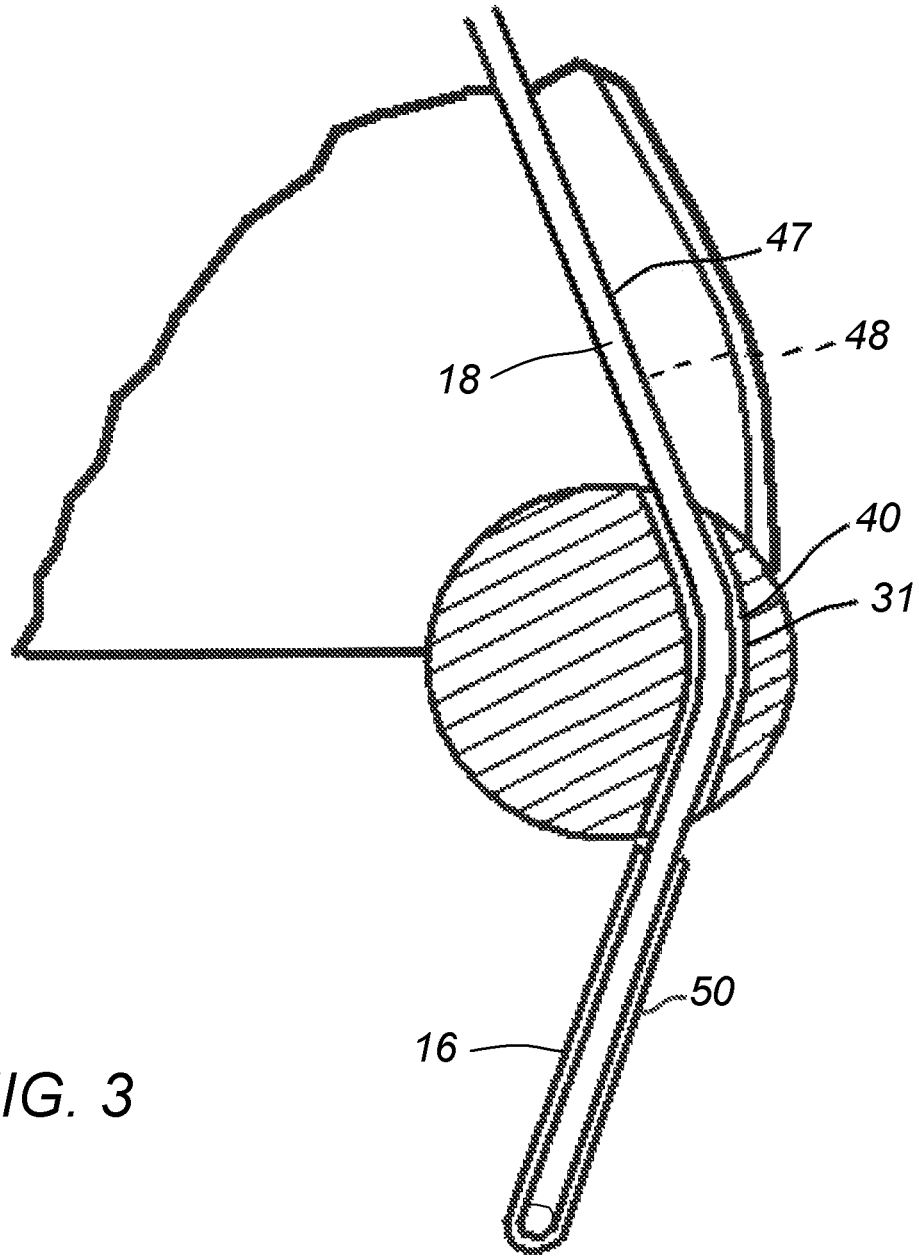


FIG. 3

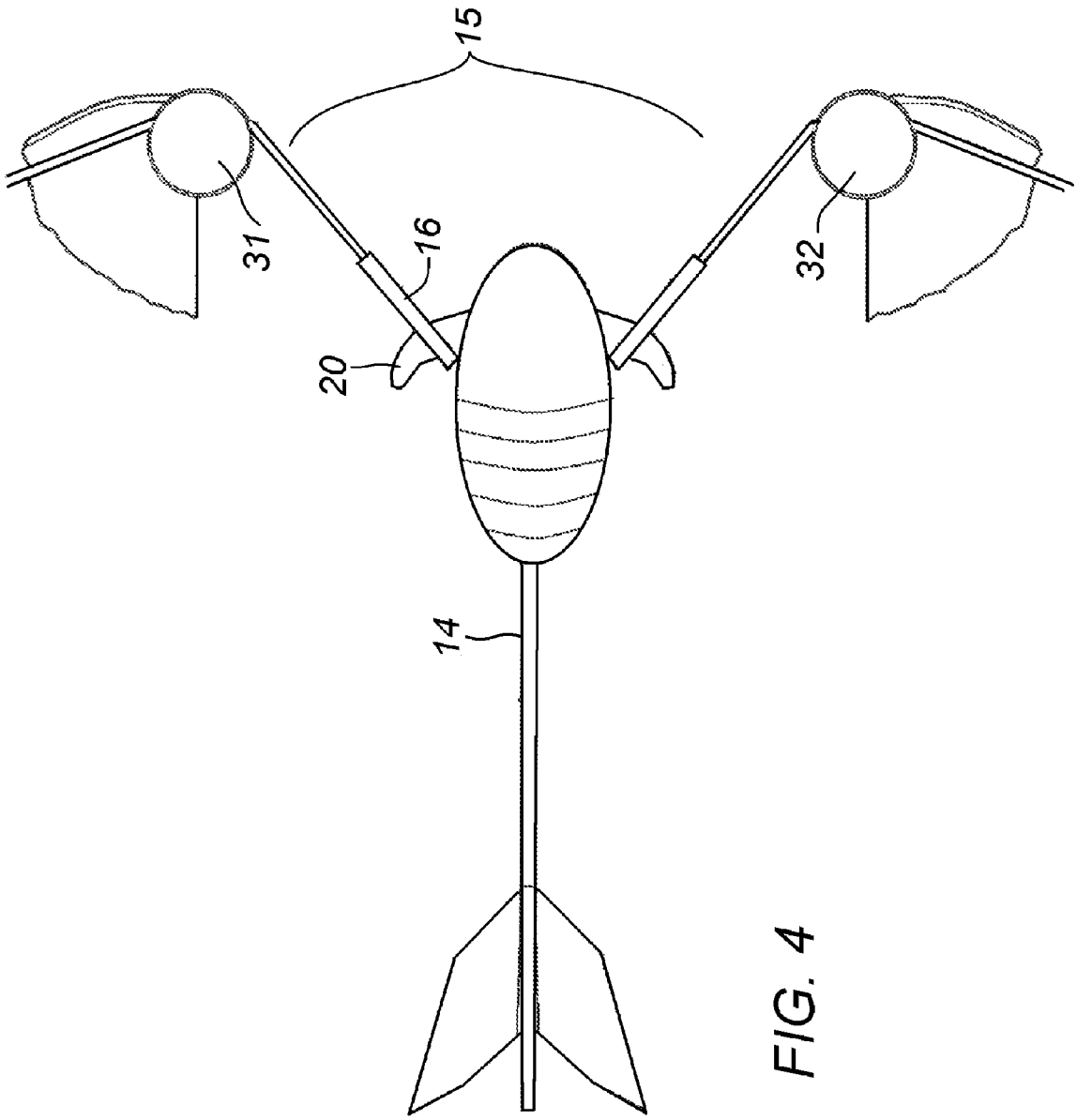


FIG. 4

TOY BOW AND ARROW SYSTEM WITH UV LIGHT SHIELDING

RELATED APPLICATIONS

This application is a continuation-in-part of co-pending U.S. patent application Ser. No. 12/878,985, filed Sep. 9, 2010.

BACKGROUND OF THE INVENTION

1. Field of the Invention

In general, the present invention relates to toy bow and arrow systems, where a toy bow is used to launch a toy arrow projectile into flight.

2. Prior Art Description

Bow and arrow sets that are designed for children's play have existed throughout recorded history. In the modern era, toy bow and arrow sets typically have a plastic molded bow, a string and safety-tipped arrows. To ensure safety, the functional design of a toy bow is also commonly altered. In a real bow, the string has a fixed length. The spring force used to launch an arrow comes from the flexing of the arms of the bow. The problem with this design is its failure mode. If a bow is drawn beyond its limit, then the arms or the string of the bow may break. Depending upon where the breakage occurs, the broken string and/or bow may fly toward the person holding the bow as the stored energy is accidentally released.

To reduce the likelihood of this hazard from occurring, many toy bows are manufactured as static structures. An elastic string is used to create the arrow launching force. If such a bow is overdrawn, there is no significant chance of the bow breaking. Rather, the elastic string will break and will most likely move in a direction away from the person drawing the bow. The failure mode of a string breaking is far less dangerous than the failure mode of the bow breaking. However, the failure mode of a broken string does present some danger depending upon where the elastic string breaks and how much energy is stored in the elastic string at the time it breaks.

Toy bows that use a static bow and an elastic string are exemplified by U.S. Pat. No. 5,247,920 to Harbin, entitled Toy Bow; and U.S. Pat. No. 7,748,369 to Chee, entitled Launching Apparatus and Assembly.

Many toy bows that have elastic strings use elastic strings that are made from a synthetic polymer, such as silicon, TPR or some other synthetic rubber. On the toy, such elastic strings are constantly under tension. As such, if the material of the string creeps or degrades, the elastic string will break. This stops the toy bow from being functional.

Most all plastic degrades in some fashion over time. However, it has been found that one of the fastest ways to degrade the preferred polymers used for the bowstring is to expose the bowstring to UV light. A bowstring that can last for months inside a home may only last for a few days if taken outside and left in sunlight. A toy that lasts for months is acceptable. A toy that last for days is not. Damage caused by exposure to light has therefore caused products to be returned and/or consumer's dissatisfaction with the toy manufacturer.

A need therefore exists for a toy bow and arrow design that inhibits degradation in the elastic string caused by exposure to light. This need is met by the present invention as described and claimed below.

SUMMARY OF THE INVENTION

The present invention is a toy bow assembly that is used to launch toy projectiles. The toy bow assembly includes a bow

structure having a first arm section and a second arm section. Both the first arm section and the second arm section have sheathed areas that are protected from ambient light. A central area is disposed between the first arm section and the second arm section.

A first elastic element is anchored to the first arm section. The first elastic element extends through the first sheathed area into the central area, wherein the first sheathed area shields the first elastic element from exposure to ambient light. Likewise, a second elastic element is anchored to the second arm section. The second elastic element extends through the second sheathed area and into the central area, wherein the second sheathed area shields the second elastic element from exposure to ambient light. This prevents the elastic elements from degrading due to exposure of UV light contained in ambient light.

A toy projectile is provided that has extending hooks. The hooks on the projectile engage the elastic elements. When the projectile is drawn back, the elastic elements stretch and provide the spring energy needed to launch the projectile into flight when it is released.

BRIEF DESCRIPTION OF THE DRAWINGS

For a better understanding of the present invention, reference is made to the following description of an exemplary embodiment thereof, considered in conjunction with the accompanying drawings, in which:

FIG. **1** is a perspective view of an exemplary embodiment of a toy bow and toy projectile in combination;

FIG. **2** is a side cross-sectional view of the toy bow shown in FIG. **1**;

FIG. **3** is a cross-sectional view of a pivot post shown in section **3** of FIG. **2**; and

FIG. **4** shows a toy projectile engaging the loading loops within the central region of the toy bow.

DETAILED DESCRIPTION OF THE DRAWINGS

Although the present invention toy bow and arrow system can be embodied in many ways, only one exemplary embodiment of the present invention system is illustrated. This embodiment is selected in order to set forth the best mode contemplated for the invention. The illustrated embodiment, however, is merely exemplary and should not be considered a limitation when interpreting the scope of the appended claims.

Referring to FIG. **1**, a bow and arrow system **10** is shown. The bow and arrow system **10** includes a bow structure **12** and at least one arrow projectile **14**. The bow structure **12** is rigid. The force used to propel the arrow projectile **14** is provided by two separate and distinct loading loops **16**. The arrow projectile **14** has hook projections **20** that engage both of the loading loops **16**. Elastic elements **18** extend through the loading loops **16**. As a person engages an arrow projectile **14** with the loading loops **16** and pulls on the arrow projectile **14**, the elastic elements **18** in the loading loops **16** stretch. Since there are two loading loops **16**, the elastic element **18** in each of the loading loops **16** need only provide half the force needed to propel the arrow projectile **14** into flight. The elastic elements **18** are therefore difficult to overstretch in the proper operation of the toy. Furthermore, should either of the elastic elements **18** or loading loops **16** suddenly break, the orientation of the broken elastic elements **18** prevents the elastic elements **18** or the loading loops **16** from whipping toward the user. This dynamic is explained later in greater detail. Lastly, since the arrow projectile **14** engages two separate and distinct loading

loops **16**, the chances of the elastic elements **18** in both loading loops **16** breaking simultaneously are highly improbable. Accordingly, if one elastic element **18** breaks, the arrow projectile **14** will still be engaged by the other loading loop **16** and the person pulling the arrow projectile **14** back will not pull the arrow projectile **14** into himself upon the breakage of the one loading loop **16**.

Referring to FIG. **2** in conjunction with FIG. **1**, it can be seen that the bow structure **12** is a rigid molding. The bow structure **12** has a first end **22**, a second end **24** and a handle **26** in its central region. The handle **26** has a top end **25** and a bottom end **27**. A first arm section **28** is supported above the top end **25** of the handle **26**. Likewise, a second arm section **30** is supported below the bottom end **27** of the handle **26**. The first arm section **28** and the second arm section **30** are oriented in a common vertical plane. The handle **26** is offset from the common vertical plane so as not to interfere with the path of the arrow projectile **14**. This creates an open central region **15** between the first and second arm sections **28**, **30**.

The first arm section **28** contains a sheath structure **35** that defines a first internal compartment **37**. The first internal compartment **37** has a bottom end **39** that faces toward the open central region **15**. Likewise, the second arm section **30** contains a sheath structure **41** that defines a second internal compartment **43**. The second internal compartment **43** is has a top end **45** that faces toward the open central region **15**. Both sheath structures **35**, **41** are opaque.

Two pivot post structures **31**, **32** are mounted to the bow structure **12** outside the bottom opening **39** of the first sheath structure **35** and the top opening **45** of the bottom sheath structure **41**. Referring now to FIG. **2** in conjunction with FIG. **3**, it will be understood that although FIG. **3** shows only one of the pivot post structures **31**, the description offered stands for both pivot post structures **31**, **32** equally. Each pivot post structure **31**, **32** defines two narrow channels **40**. In FIG. **3**, only one channel **40** is shown. It will be understood that a second channel lay below the shown channel **40** in a parallel configuration.

Each of the loading loops **16** is a loop structure of an elastic element **18** that creates two runs **47**, **48**. The runs **47**, **48** of each elastic element **18** extend through the sheath structures **35**, **41** and through the two pivot posts **31**, **32**. Each elastic element **18** has two ends. Both ends of each elastic loop **18** are affixed to anchored posts **44**, **46** within the sheath structure **35**, **41**. Since the runs **47**, **48** of each elastic element **18** extend through the sheath structures **35**, **41**, it will be understood that the material of the elastic elements **18** is shielded from any external light exposure until the elastic elements **18** are stretched out of the channels **40** in the pivot post structures **31**, **32**.

The length of the elastic element **18** has a cross section that is smaller than the diameter of the channels **40** in the pivot post structures **31**, **32**. In this manner, a separate run **47**, **48** of the elastomeric element **18** can pass through each of the openings **40**, therein keeping the two runs **47**, **48** of the loop apart.

As the runs **47**, **48** of the elastic element **18** pass out of the pivot post structures **31**, **32**, the elastic element **18** immediately passes into reinforcement tubes **50** to form the loading loops **16**. The diameters of the reinforcement tubes **50** are larger than the channels **40** in the pivot post structures **31**, **32**. Consequently, the reinforcement tubes **50** cannot pass through the pivot post structures **31**, **32**. As a result, each length of the elastic element **18** is divided into two runs **47**, **48**. The first run **47** extends between an anchor post and the reinforcement tube **50** on the far side of the pivot post structure. The second run **48** extends from the reinforcement tube **50** back to the anchor post. The looping of the elastic element **18** between the two runs **47**, **48** curves the reinforcement tubes **50** and creates the two loading loops **16**.

Additionally, the presence of the reinforcement tubes **50** protects the elastic element **18** inside the loading loops **16** from exposure to light. Consequently, when the elastic elements **18** are at rest, the entire length of each of the elastic elements **18** is shielded from ambient light.

Due to the offset of the handle **26**, an open central region **15** exists between the two pivot post structures **31**, **32**. The loading loops **16** each extend into the open central region **15** from opposite sides.

Referring to FIG. **4** in conjunction with FIG. **1**, it can be seen that the arrow projectile **14** has two hook elements **20** extending from opposite sides. The hook elements **20** are sized and shaped to engage the two loading loops **16** as the hook elements **20** are pulled through the open central region **15**. To load the arrow projectile **14**, the arrow projectile **14** is positioned within the open central region **15** so that the hook elements **20** engage the loading loops **16**. Once engaged with the loading loops **16**, the arrow projectile **14** is pulled in the manner of a traditional bow and arrow. As the arrow projectile **14** is pulled away from the open central region **15**, the elastic elements **18** stretch. The elastic elements **18** bend around the pivot post structures **31**, **32**, therein enabling the loading loops **16** to move with the arrow projectile **14**. This is the only time that parts of the elastic elements **18** are exposed to ambient light. This exposure lasts only for as long as the elastic elements **18** are stretched. Thus, the exposure to ambient light only lasts for a few seconds during each shot cycle.

As the elastic elements **18** stretch, they store energy. When the arrow projectile **14** is released, the elastic elements **18** retract and the arrow projectile **14** is accelerated toward the open central region **15**. At the open central region **15**, the loading loops **16** retract against the pivot post structures **31**, **32**. The momentum of the arrow projectile **14** causes the arrow projectile **14** to continue its forward movement beyond the open central region **15**. This launches the arrow projectile **14** into flight as the hook elements **20** disengage the loading loops **16**.

When the elastic elements **18** are stretched, they are most vulnerable to breakage. If one of the runs **47**, **48** of an elastic element **18** breaks before passing through a pivot post structure **31**, **32**, then the speed of the contracting broken elastic element **18** is slowed by its passage through the pivot post structure **31**, **32**. This prevents a broken run from whipping toward a user. Furthermore, if the elastic element **18** were to break after it passes the pivot post structure **31**, **32**, most of the potential energy serves to move the broken elastic element **18** back toward the pivot post structure **31**, **32** and away from the user.

It will be understood that the embodiment of the present invention that is illustrated and described is merely exemplary and that a person skilled in the art can make many variations to that embodiment. For instance, the bow structure can have many different ornamental shapes. The bow structure can also take the form of a crossbow. Likewise, the arrow projectiles can be configured as airplanes, rocket ships or any other flying projectile. All such embodiments are intended to be included within the scope of the present invention as defined by the claims.

What is claimed is:

1. A toy bow assembly used to launch toy projectiles, said toy bow assembly comprising:

a bow structure having a first arm section with a first sheathed area, a second arm section with a second

sheathed area, and a central area disposed between said first arm section and said second arm section;

a first reinforcement tube;

a first elastic element that extends through said first reinforcement tube, said first elastic element having two opposite ends that are anchored to said first arm section, said first elastic element extending through said first sheathed area and forming a first loading loop that extends out of said first sheathed area into said central area, wherein said first sheathed area shields said first elastic element extending therethrough from exposure to ambient light, and wherein said first reinforcement tube shields said first loading loop in said central area from exposure to ambient light;

a second reinforcement tube;

a second elastic element that extends through said second reinforcement tube, said second elastic element having two opposite ends that are anchored to said second arm section, said second elastic element extending through said second sheathed area and forming a second loading loop that extends out of said second sheathed area into said central area, wherein said second sheathed area shields said second elastic element extending therethrough from exposure to ambient light, and wherein said first reinforcement tube shields said second loading loop in said central area from exposure to ambient light;

wherein said first loading loop and said second loading loop are separate and distinct elements that are spaced apart within said central area.

2. The assembly according to claim **1**, further including a first pivot structure and a second pivot structure located proximate said central region on opposite sides of said central region.

3. The assembly according to claim **2**, wherein said first elastic element contacts said first pivot structure proximate said first loading loop.

4. The assembly according to claim **3**, further including first channels at said first pivot structure through which said first elastic element passes, wherein said first loading loop is sized to be too large to pass through said first channels at said first pivot structure.

5. The assembly according to claim **4**, wherein said second elastic element contacts said second pivot structure between proximate said second loading loop.

6. The assembly according to claim **5**, further including second channels at said second pivot structure through which said second elastic element passes, wherein said second loading loop is sized to be too large to pass through said second channel at said second pivot structure.

7. The assembly according to claim **1**, further including a handle that is offset from said central area and is coupled to both said first arm section and said second arm section, wherein said handle, said first arm section and said second arm section form a rigid bow structure.

8. A toy launching assembly used to launch toy projectiles, said assembly comprising:

a first arm section and a second arm section that are joined together by an offset handle, wherein an open central region is disposed adjacent said handle between said first arm section and said second arm section;

a first sheath coupled to said first arm section that defines a first protected area along said first arm section;

a second sheath coupled to said second arm section that defines a second protected area along said second arm section;

a first elastic element that is anchored to said first arm section, wherein said first elastic element extends through said first protected area and forms a first loop that extends into said open central region from said first arm section;

a first reinforcement tube that protects said first loop from light in said open central region;

a second elastic element that is anchored to said second arm section, wherein said second elastic element extends through said second protected area and forms a second loop that extends into said open central region from said second arm section, wherein said first elastic element and said second elastic element are separated by a gap within said open central region; and

a second reinforcement tube that protects said second loop from light in said open central region.

9. The assembly according to claim **8**, further including a first pivot structure and a second pivot structure located proximate said open central region on opposite sides of said open central region.

10. The assembly according to claim **9**, wherein said first elastic element bends about said first pivot structure.

11. The assembly according to claim **10**, wherein said second elastic element bends about said second pivot structure.

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