

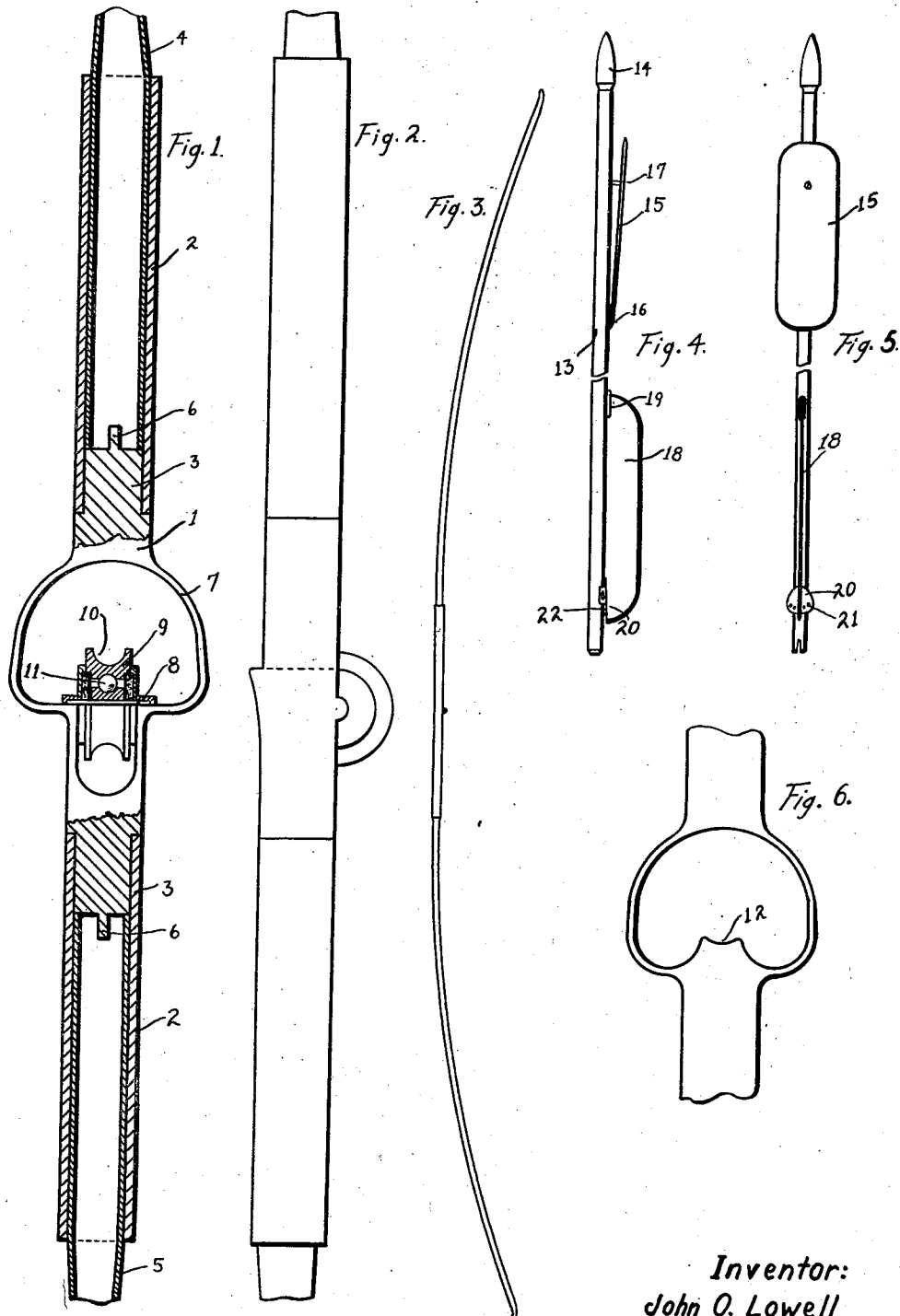
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ARCHERY SET

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ARCHERY SET

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3 Claims. (Cl. 124-24)

This invention pertains to archery sets including a bow and one or more arrows.

The modern archery set may be used either as a weapon in hunting or as an implement of sport as in archery contests. In either use the success depends as much upon the characteristics of the set as upon the skill of the archer. Although, since the dawn of history a great deal of skill has been expended upon the development of the archery set, even today modern bows and arrows are subject to many faults. It is a primary object of this invention therefore, to improve the construction and characteristics generally of both bows and arrows.

A more particular object is to provide an arrow having a greater range of flight and increased accuracy.

Another object is to provide a bow having improved qualities of resiliency and greater accuracy in launching the arrow upon a straight line of flight.

Another object is to provide an arrow with adjustable means to regulate its flight and to compensate for the effect of wind and the like.

Further objects will appear from the following description taken in connection with the accompanying drawing, in which:

Figure 1 is a partial sectional view of a bow constructed in accordance with this invention.

Figure 2 is a side view of Figure 1.

Figure 3 is a view, to a reduced scale, of the complete bow.

Figure 4 is a side view of an arrow embodying features of this invention.

Figure 5 is a front view of the arrow of Figure 4, and

Figure 6 is a fragmentary view, similar to Figure 1, illustrating another embodiment of this invention.

In the early days of archery bows were invariably made of wood. Accordingly, their characteristics as to strength and resiliency were limited by the characteristics of the material of which they were constructed. In more modern times bows of metal such as steel have been used. In accordance with this invention the bow is not only constructed of metal such as steel having a high degree of resiliency, but the arms thereof which provide the resilient force which propels the arrow are made hollow. These arms are preferably constructed of tubular steel of a high quality and are preferably tapered from the middle portion of the bow to the tips of the arms, although tubular arms of constant cross section are also provided in accordance with this inven-

tion and furnish a bow possessing improved characteristics.

As every archer knows the "pulling" characteristics of a bow are extremely important in archery. These pulling characteristics involve such features as the amount of force required to bend the bow, the rate at which this force increases as the deflection is increased, the vigor or life with which the bow returns to its unbent condition when the bow string is released, the manner in which the resilient force of the bow is imparted to the arrow, the initial tension on the bow string and many others. By constructing the arms of the bow of resilient tubular metal such as steel practically all these qualities or characteristics are improved.

It appears that in a bow of solid material, whether wood or metal, the bending of the bow places the various portions of its cross section under stress to varying extent. The fibers on the front or outer surface of the bow are placed under heavy tension, while these fibers on the rear or inner surface thereof are placed under corresponding compression. The intermediate fibers are placed under varying stress which may have any value from the maximum tension of the outer fibers to the maximum compression of the inner fibers. When the bow is bent there is naturally relative movement of one fiber upon another in order to accommodate the deformation. When the bow springs back in launching the arrow a return movement of the separate fibers takes place. Accordingly, during the bending and release of the bow there is apparently a to and fro shift of the fibers upon each other and this seems to have some retarding effect upon the resilient return of the bow when released. This is in the nature of a friction drag upon the power of the bow.

In a tubular bow on the other hand these intermediate fibers are absent and the drag effect thereof is also absent. Accordingly, a tubular bow will show a livelier return than a solid bow or, as the archer usually expresses it, there is more life in the tubular bow.

Another characteristic of such a tubular steel bow is that it may be bent further than a solid bow and still retain its life or lively comeback. Consequently the bow may be so proportioned as to have the required pounds pull at a greater deflection than the ordinary bow. This has a twofold advantage in that, first, the maximum pull comes at a greater deflection at which the position of the archer's arm is such as to give him increased power, and second, the stroke of

the bow string in launching the arrow is greater with the same pull so that more energy is delivered to the arrow for its flight.

Referring to the drawing the bow illustrated in Figure 1 is provided with a middle handle portion which may have a main support 1 and two ferrules 2 extending in opposite directions therefrom. The support 1 may be formed by casting or forging or otherwise out of any suitable metal such as steel or aluminum and may be provided with reduced portions 3 upon which the ferrules 2 are mounted as shown in Figure 1. These ferrules may be secured to the support by brazing or in any other suitable manner. Upper and lower arms 4 and 5 respectively are fitted into the ferrules 2. These arms may be notched at their inner ends so as to engage key extensions 6 on the support 1 in order properly to orient the arms with respect to the handle portion. The arms 4 and 5 are constructed of tubular metal such as steel and are preferably formed cylindrical at those portions which fit into the ferrules 2, and tapering beyond those portions to the tips of the bow. These arms may be permanently secured in the ferrules but it is preferably that one of them, usually the upper arm 4, be left unsecured so that it may be dismounted in order to reduce the length of the bow for the sake of portability.

The middle of the support 1 is formed to provide an open frame portion or window 7 through which the arrow may be launched. Mounted within this window in any suitable manner upon an axis 8 is an aiming support in the form of a roller 9. This roller is grooved as indicated at 10 so as to receive and support the arrow while aiming and to provide a substantially frictionless support therefor when launched. The roller 10 may be mounted upon any suitable type of anti-friction bearing such as the ball-bearing 11. In the cheaper types of bows where the roller construction would be too expensive a fixed aiming support 12 as shown in Figure 6 may be provided.

The arrow illustrated in Figures 4 and 5 comprises a shaft 13 and a head 14. The shaft 13 may be constructed of any suitable material such as straight grained wood, but it is preferably constructed of tubular metal such as steel. The head 14 will vary in type and construction in accordance with the use to which the arrow is to be put, whether for hunting or target shooting.

Mounted on the shaft 13 is an airfoil 15 in the form of a substantially plane sheet of any suitable material such as cardboard, Celluloid, sheet-metal or the like. The airfoil 15 is arranged to extend horizontally during the flight of the arrow and may have any desired shape, except that it must be proportioned with respect to the construction of the bow so that it will readily pass through the window 7. This portion of the bow upon the other hand may also be proportioned to suit the arrow. That is the open frame portion 7 may be made any desired size so as to accommodate an airfoil 15 of any desired design. The airfoil 15 is preferably secured to the shaft 13 in such a manner that it may be adjusted in an angular relation to said shaft. For this purpose it may be secured to the shaft in any suitable manner at its rear as indicated at 16 and in such a position as normally to extend forwardly at an angle away from the shaft 13, as indicated in Figure 4. When so mounted a holding down device such as screw 17 threaded into the shaft 13 is arranged to bear upon the airfoil 15 so as to force it down against the shaft. By loosening

or tightening this screw 17 the air foil may then be adjusted to any desired angle with respect to the shaft. By this adjustment of the angle of the airfoil the flight of the arrow may be controlled as to distance as this airfoil functions to support the arrow when in flight in a manner similar to the action of an aeroplane wing, and its angular adjustment will determine the amount of vertical lifting action which the airfoil exerts upon the arrow.

Mounted at the rear of the shaft 13 is a second airfoil 18 providing a rudder. This rudder is mounted to stand vertically above the shaft 13 and it is preferably secured at its foremost point as indicated at 19 to the shaft. This rudder is also proportioned so that it will pass freely through the window 7 on the bow. Means for adjusting the rudder 18 laterally as to its angle with respect to the shaft 13 may also be provided. For this purpose a plate 20 may be mounted on the shaft 13 to extend horizontally and provided with a series of perforations 21 located in a laterally extending arc and the rear end of the rudder may then be provided with a downwardly extending pin 22 which may be set in any selected one of the perforations 21 in order to fix the angular position of the rudder. This angular adjustment of the rudder provides for controlling the flight of the arrow in a horizontal direction. For instance by adjusting the rudder to an angle the effect of a cross wind acting upon the arrow during its flight may be compensated for.

It will be seen that this invention provides an archery set of novel construction, capable of greatly improved performance. The provision of the window 7 permits the arrow to travel in the plane of movement of the bow string so that there is no tendency for the bow string to deviate the arrow at the moment of launching. The aiming support is located in this same plane. The airfoil mounted on the arrow provides for a control of the flight of the arrow which has been impossible heretofore. The construction of the bow of tubular spring metal such as steel greatly improves the lively action or life of the bow and increases its power.

While, in the above description, a certain theory of action of the tubular steel bow has been indicated, it is to be understood that this is for the sake of clarity in explanation, and that applicant is not bound by any particular theory of action used in explaining the invention.

While this invention has been described as embodied in a unitary set it will be understood that individual features or sub-combinations thereof may be useful without other features or the entire combination. It is understood, therefore that the employment of such individual features or sub-combinations is contemplated by this invention and within the scope of the appended claims.

It is obvious that various changes may be made, within the scope of the appended claims, in the details of construction without departing from the spirit of this invention; it is understood, therefore, that the invention is not limited to the specific details shown or described.

Having thus described the invention what is claimed is:

1. In an archery set of the character described; in combination with an arrow having a shaft provided with a bow-string notch at its rear end, a weight-sustaining airfoil of sufficient horizontal extent to exert a lifting moment on the forward part of the arrow in flight secured to

the forward portion of said shaft substantially at right angles to said notch and a vertically positioned guiding vane on the rear portion of said shaft, a long-bow having a central window through which said arrow may be discharged, and a low-friction aiming support in said window, said window having a lateral width above said support and a vertical height above said support to freely clear said airfoil and said vane.

10 2. In an archery set of the character described; in combination with an arrow having a shaft provided with a bow-string notch at its rear end, a weight-sustaining airfoil of sufficient hori-

zontal extent to exert a lifting moment on the forward part of the arrow in flight secured to the forward portion of said shaft substantially at right angles to said notch; a long-bow having a central window through which said arrow may be discharged, and a low-friction aiming support in said window, said window having a lateral width above said support sufficient to freely clear said airfoil.

3. The combination as claimed in claim 1 having means for adjusting the angle of inclination of said airfoil to said shaft.

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