

April 12, 1932.

G. E. BARNHART

1,853,294

ARCHER'S BOW

Filed Jan. 30, 1928

2 Sheets-Sheet 1

Fig. 1. Fig. 2. Fig. 3.

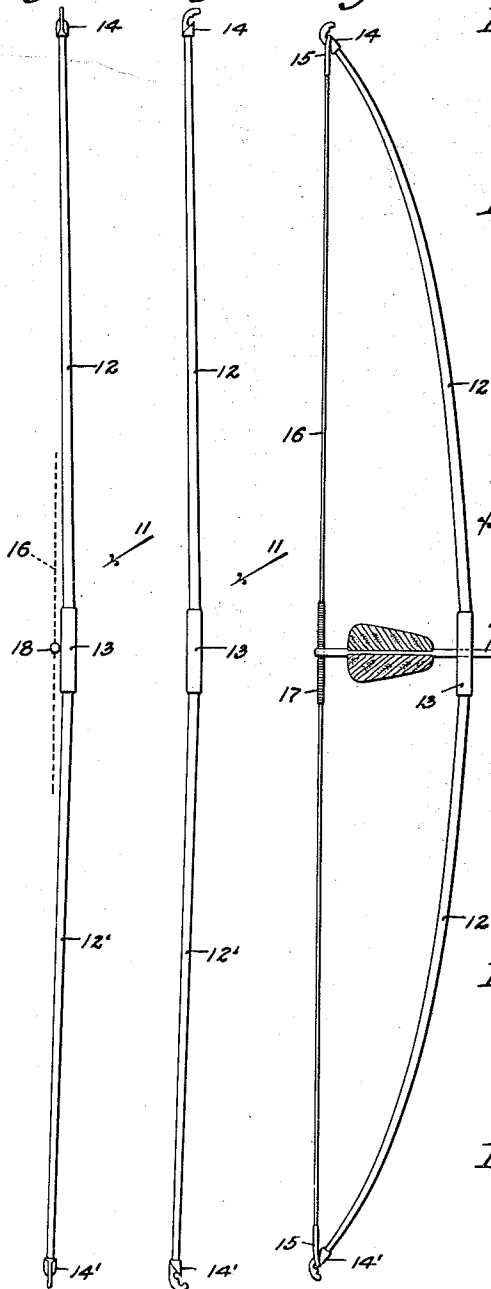


Fig. 5.



Fig. 6.



Fig. 7.

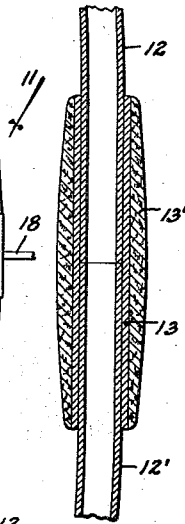


Fig. 9.



Fig. 10.

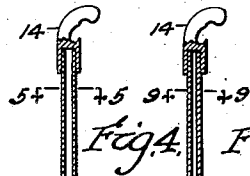
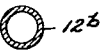
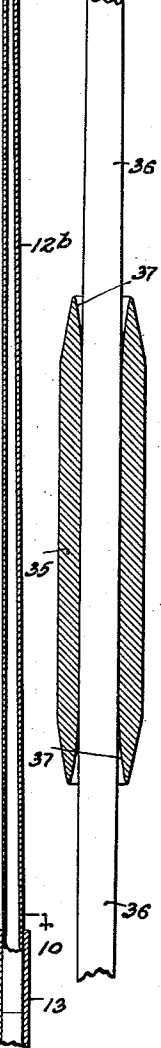


Fig. 4. Fig. 8.

Fig. 19.



INVENTOR
By GEORGE E. BARNHART

Manickam

ATTORNEY

April 12, 1932.

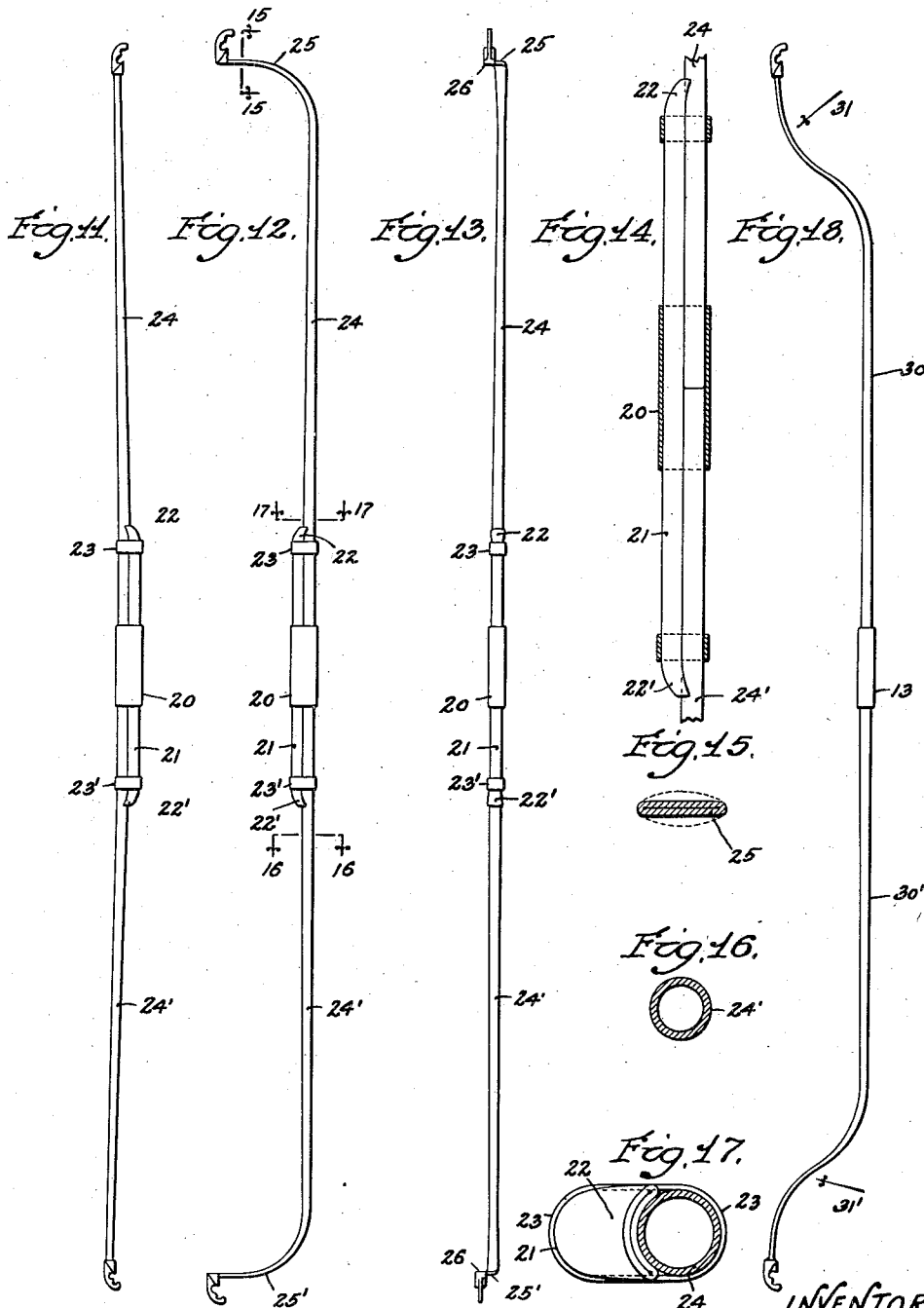
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ARCHER'S BOW

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2 Sheets-Sheet 2



INVENTOR
GEORGE E. BARNHART
George E. Barnhart
ATTORNEY

UNITED STATES PATENT OFFICE

GEORGE E. BARNHART, OF PASADENA, CALIFORNIA

ARCHER'S BOW

Application filed January 30, 1928. Serial No. 250,548.

My invention relates to bows, such as are used by archers, being more particularly an all metal bow designed for that purpose. Bows of the class described, as usually made and used, consist of wood shaped to the desired form, the string ordinarily used being of gut, rawhide or fibre. Bows of this type are subject to the action of moisture in the atmosphere and accordingly do not have a constant tension, and the above mentioned types of bow strings tend to stretch and deteriorate with use. Then again, bows made of wood are subject to deterioration. Wooden bows are, furthermore, subject to a certain hysteresis or local loss in elasticity, which prevents the arrow from receiving a driving thrust from the bow string which is equal to the force necessary to "draw" the bow. Such losses are not present in metal bows, and it is, therefore, an object of my invention to produce a bow which will give a maximum thrust to the arrow for the force required to draw the bow.

It is one of the principal objects of my invention to produce an all metal bow of simple form and construction, in which the bow sections are made of drawn tubular steel, a grip of similar metal being provided at the joint of the bow sections, and a steel wire string used extending between the ends of the bow sections.

By using a method of producing tapered steel tubes, such as described in my co-pending application for patent, Serial No. 101,651, filed April 13, 1926, I am enabled to produce ideal bow members which bend uniformly to the tension exerted on drawing the string, this tension being subject to distribution as occasion may require, or to individual need or taste, by making such bow sections of metal tubes having walls of increasing or decreasing thickness, or of uniform thickness throughout.

By using the all metal bow constructed as hereinafter described, these advantages just pointed out are acquired, with the result that an all metal bow is produced of uniform tension, regardless of weather conditions and which is evenly balanced, so that straight

and accurate shooting of arrows depends entirely on the skill of the archer.

Referring to the drawings, which are for illustrative purposes only,

Fig. 1 is a rear view of a bow embodying a form of my invention.

Fig. 2 is a side elevation of the bow shown in Fig. 1.

Fig. 3 is a view similar to Fig. 2, showing the bow, with string attached.

Fig. 4 is an enlarged sectional view of approximately one half of the bow shown in the preceding figures, drawn to a larger scale.

Fig. 5 is an enlarged cross sectional view on line 5—5 of Fig. 4.

Fig. 6 is an enlarged cross sectional view on line 6—6 of Fig. 4.

Fig. 7 is an enlarged sectional view of the grip portion of the bow shown in Figs. 1 to 6, inclusive.

Fig. 8 is a view similar to Fig. 4, showing a modified form of bow section, in which the thickness of the metal walls of the bow section increase toward the tip.

Fig. 9 is an enlarged cross sectional view on line 9—9 of Fig. 8.

Fig. 10 is an enlarged cross sectional view on line 10—10 of Fig. 8.

Fig. 11 is a side elevation of a modified form of bow, showing a bracing member at the middle or grip portion of the bow.

Fig. 12 is a view similar to Fig. 11, showing a modified form of tip construction.

Fig. 13 is a rear view of the bow shown in Fig. 12.

Fig. 14 is an enlarged view, partly in section, of the grip portion of the bow, shown in Figs. 11 to 13.

Fig. 15 is an enlarged cross sectional view on line 15—15 of Fig. 12.

Fig. 16 is an enlarged cross sectional view on line 16—16 of Fig. 12.

Fig. 17 is an enlarged cross sectional view on line 17—17 of Fig. 12.

Fig. 18 is a side elevation of a bow, showing a modified form of construction, in which the bow ends are curved rearwardly, terminating in tips extended in planes substantially parallel with the mid-section of the bow, and

Fig. 19 is an enlarged cross sectional view of a modified form of grip member used in my invention.

Describing more particularly my invention as illustrated in Figs. 1 to 10 of the drawings, the bow 11 consists of two bow sections 12—12' of like form, having their inner ends abutting against each other and secured together by welding if so desired. The inner ends of the bow sections are enclosed in a hand grip 13, consisting of a metal tube, the ends of which are soft soldered, welded or hard soldered to the bow sections 12—12'. The grip 13 may optionally be covered with fabric, cork or other similar substance, as indicated at 13'.

The outer ends of the bow sections 12—12' are provided with any suitable type of hook or tips 14—14', which are adapted to receive the outer looped ends 15 of a bow string 16. This bow string 16 may be of any flexible material, but is preferably made from a comparatively fine wire cable, and may be wrapped with fibre in the central or arrow engaging portion 17.

In order that the string, when engaged with an arrow 18, may maintain a straight line between the two tips 14—14', I have found it essential to offset the tips from the central or grip portion of the bow, as illustrated in Fig. 1, that is, looking from the rear of the bow. By so doing, the arrow may lie against the side of the grip and be engaged by the string without distorting or pulling the string sideways, the positions of the string and arrow being shown in dotted lines in Fig. 1.

For the purpose of giving the initial bend in the right direction when the string is attached to the bow, the bow sections are bent slightly rearwardly, as indicated in Fig. 2. This bend of the bow sections just referred to, and the bend of the bow section sideways, as shown in Fig. 1, constitute a bend of the tip ends of the bow sections in two directions, that is, sideways and rearwardly.

It will be understood that different archers have individual tastes as to the bending characteristics of the bow, and for the purpose of accommodating different requirements in this respect, that is, the production of a bow more or less flexible at the tip ends or central portion of the bow, I propose to make the bow sections of tubular drawn material of varying cross sectional diameter and thickness of metal, as, for instance, in Fig. 4, the bow section 12a, while diminishing in diameter from the grip to the tip, also diminishes in thickness of metal, as illustrated in the sections shown in Figs. 5 and 6, while in the form shown in Fig. 8, the bow section 12b, while of decreasing diameter, the metal is of increasing thickness toward the smaller or tip end of the section, as illustrated in Figs. 9 and 10. If desired, it is to be understood

that a slightly different bending effect of the bow may be produced by making the bow sections of diminishing diameter from the grip to the tip, but of uniform thickness of metal (such form not being illustrated).

In some instances, particularly in bows of large size or very heavy pull, I have determined that it is desirable to strengthen or reinforce the central portion of the bow, such construction being shown in Figs. 11 to 14, inclusive. In this form of construction, the grip indicated at 20 extends around and encloses a reinforcing member 21 formed of tubular metal which extends outwardly a short distance along the front of the bow members, the ends 22—22' of such reinforcing member being bent inwardly and around the bow sections, as indicated in Fig. 17. The outer ends of the reinforcing member 21 are securely attached to the respective bow members by means of bands 23—23', which are welded, or soft soldered or hard soldered, or otherwise secured to the bow members and to such reinforcing members. In some cases the bow sections 24—24' may be free to slide in bands 23—23', the bands being rigidly attached to the reinforcing member 21.

In the form shown in Fig. 12, the bow sections 24—24' are formed with their tips 25—25' bent rearwardly, such tips being optionally flattened, as shown in Figs. 12 and 15. It will be understood that such bow sections are of tubular construction, as heretofore described, with the exception that the tip ends of the bow sections are flattened and rearwardly extended as just described, although bows of this shape may be circular in cross section throughout. In addition to this rearward extension, it will be noted, as shown in Fig. 13, that such rearward extensions 25—25' are slightly offset as indicated at 26, so that when the bow is strung, the string will extend slightly to one side of the grip 20. In the form shown in Fig. 18, the bow sections 30—30' are of tubular drawn metal, the tip ends terminating in a double curve, as shown at 31—31', such tip ends being flattened in the same manner as heretofore described with respect to Figs. 12 and 13.

In Fig. 19, I show a modified form of grip or grip reinforcing member 35, which may be used in connection with my invention. The grip is shown as mounted upon a bow 36 formed of a single section of tubing, which is tapered in two directions from the center. In this form of grip the outer ends 37 are internally tapered away from the bow. This tends to give added resilience to the bow by giving a more uniform distribution of forces between the bow section and the grip.

Although seamless drawn metal tubing such as is produced by the method described in my co-pending application, Serial No. 101,651, filed April 13, 1926, is of marked superiority in the making of bows such as here-

in described, it will be understood that my invention is not necessarily limited to this method of construction, and, further, that ordinary seamed or welded tubes, may be drawn in any preferred manner to form very satisfactory bows.

While I have described this bow construction as being made of steel, it will, of course, be understood that various steel alloys and other metals, such as aluminum, etc., if suitably treated to have high resilient properties, may be very satisfactorily employed in this construction.

It will be further understood that in preferred cases the bow may be drawn in any suitable manner, such as the above mentioned method to form a single section tapered in two directions, instead of the two separate sections 12-12'. Such a form of bow is indicated in the sectional view shown in Fig. 19.

While I have shown and described several modified forms of my invention, it is to be understood that the essential characteristic dominating all forms described is the combination of tubular drawn bow sections united and securely fastened at their inner adjacent ends by a hand grip, such bow sections being offset in two directions for the purposes described.

I have found that by making a bow as hereinabove described, the bending element is evenly distributed on both sides of the central or grip portion of the bow, this, I believe, being due to the use of the tubular drawn sections of diminishing diameter outwardly and the fact that in utilizing drawn metal for this purpose the fibers of the metal are not broken, but are elongated and concentrated at the smaller diameter of the bow sections, thereby tending to distribute the resiliency of the bow properly throughout its entire length.

I claim as my invention:

1. An archer's bow construction comprising: two tapered metal tubular sections having their inner ends retained in a central grip, said grip comprising a tubular section having an inner diameter substantially equal to the outer diameter of the inner ends of said sections; and means for rigidly attaching said grip section to said end sections, said tubular members being bent in such a manner that the center line of the bow tips is offset in two directions from the center line of the grip member.

2. An archer's bow construction comprising: two tapered metal tubular sections having their inner ends retained in a central grip, said grip comprising a tubular section having an inner diameter substantially equal to the outer diameter of the inner ends of said sections and internally provided with end surface flared outwardly from said bow

section; and means for rigidly attaching said grip section to said bow sections.

3. An archer's bow construction comprising: two tapered metal tubular sections having their inner ends retained in a central metal grip and their outer ends bent to substantially parallel relationship with each other; and a metal "bow string" interposed between said outer ends, the tips of said outer ends being laterally offset from the plane of said bow sections.

4. In an archer's bow having tapered metallic sections: a grip for connecting said sections, said grip having means for receiving the inner ends of said sections and being flared at its outer ends to permit flexure of said sections.

In testimony whereof, I have hereunto set my hand at Pasadena, California, this 21st day of January, 1928.

GEORGE E. BARNHART.