July 19, 1960 C. V. CRAVOTTA ET AL 2,945,488

COMPOSITE BOW FOR ARCHERS

Filed Sept. 4, 1956

Fig. 1.

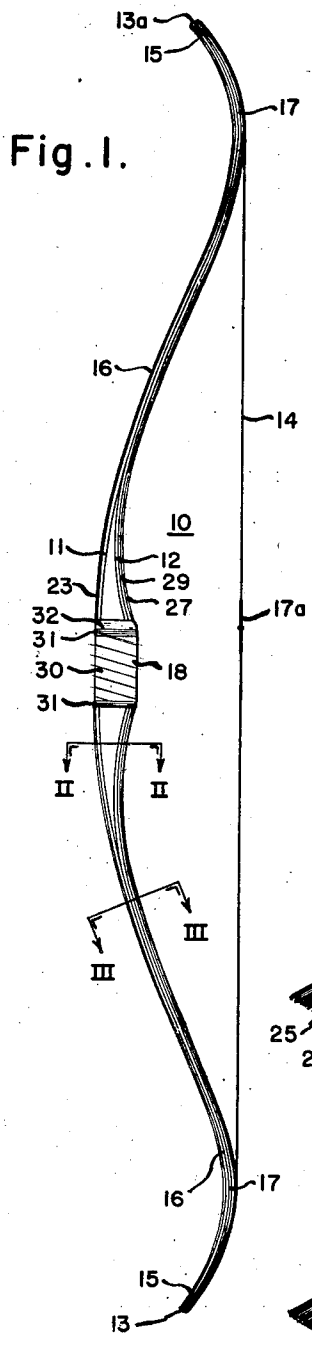


Fig. 2.

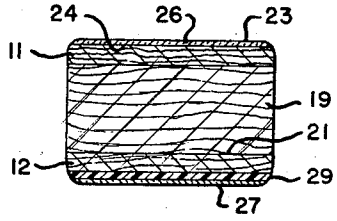


Fig. 3.

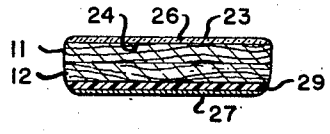


Fig. 4.

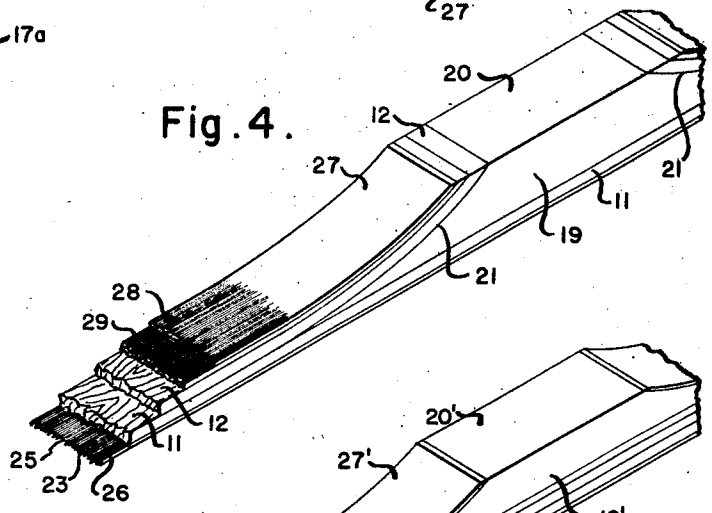
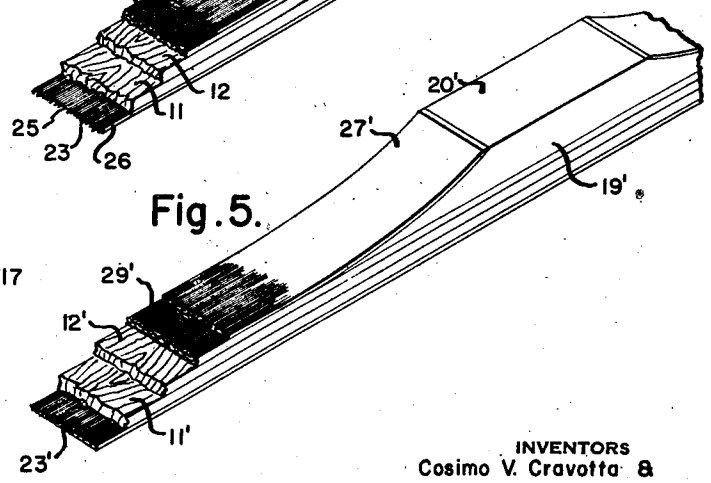


Fig. 5.



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United States Patent Office 2,945,488 Patented July 19, 1960

2,945,488

COMPOSITE BOW FOR ARCHERS

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Filed Sept. 4, 1956, Ser. No. 607,876

1 Claim. (Cl. 124—23)

This invention relates to a composite bow for archers. More particularly, it pertains to a reinforced wooden bow which is stabilized so that deterioration or twisting out of shape is inhibited.

Past years have seen the development of numerous practices for the reinforcing of wooden bows by the employment of facing members, or backing members, or both, to counteract tensile and compressive stresses which occur in a wooden bow, as illustrated, for example, in United States Patents Nos. 2,285,031, 2,316,880, 2,613,660 and 2,665,678. In the case of the use of plastic for such members unreinforced by strengthening material like fibrous glass, it happens on occasion that either the bow will sag toward the string in the course of time and become let-down or that the plastic itself does not fully or adequately take care of the stresses encountered particularly along the back and face areas of the bow. And, even when longitudinal fibers of glass have been used to reinforce such members, we have discovered that despite that the bow is not always stable, particularly in the case of greater weights. Instead, trouble would arise in that such bows would sometimes warp or twist so that a plane through the bowstring of such a bow when braced would not pass squarely through the bow itself including the reinforcing members, thereby rendering the bow unsuitable at least for accurate usage.

Bows made in accordance with our invention disclosed herein retain the desirable properties of wooden bows, are susceptible of being reinforced as desired on the back and/or face and, in addition, include a novel stabilizing member of strong fabric or cloth, such as glass cloth, impregnated or contained in a stiff but bendable plastic and together forming a solid strengthening member or lamination having sufficient fabric and thickness to inhibit such warping.

Other objects and advantages will be apparent from the following description and the accompanying drawings, which are illustrative only, in which

Figure 1 is a side view of a right-handed bow made in accordance with this invention, in braced but undrawn condition;

Figure 2 is a view in section taken along line II—II of Figure 1;

Figure 3 is a view in section taken along line III—III of Figure 1;

Figure 4 is a view in perspective of the center of the bow shown in Figure 1 before final shaping and wrapping of the hand grip; and

Figure 5 is a perspective view, similar to the view shown in Figure 4, of a bow constituting a modified embodiment of our invention.

Referring to Figures 1 to 4 of the drawings, a bow **10** is shown constituting one embodiment of this invention. Therein, a wooden stave, which may be of clear straight-grained hardwood such as maple or hickory, is provided in the form of laminations **11** and **12** suitably bonded together. Lamination **11** preferably extends throughout the entire length of the bow from end **13** to end **13***a* where nocks **15** are provided for a bowstring **14** which may be served with small stuff at nocking point **17***a*. As shown, the outer portions of the limbs **16** are reflex curved as shown at **17** even bow **10** is braced but undrawn as illustrated in Figure 1, although this invention is applicable to composite archery bows of other shapes and kinds which employ a wood stave.

In the bow **10**, the hand grip **18** at the center of the bow may be formed in material part from a block of wood **19** having a front surface **20** and sloping end surfaces **21** making a gradual merger into the front plane of lamination **12** as shown in Figure 4. The respective laminations **12** at their inner or central ends are bonded by a suitable adhesive to the respective sloping surfaces **21**, the rear surface of the portion of the laminations **12** beyond the end of block **19** being bonded to the front surface of the stave lamination **11** again by a suitable adhesive of which there are many known to those in the art to whom this invention may be disclosed.

The back of bow **10** is strengthened by a backing strip **23** bonded to the rear surface **24** of stave lamination **11** again by a suitable adhesive. As shown, backing strip **23** comprises longitudinally extending glass fibers **25** encased and held in a relatively bendable plastic matrix **26** of a suitable material including polyester resin preformed into strip form prior to being coated with an adhesive and positioned relative to stave lamination **11** as shown in Figure 4.

A like facing strip **27**, similar to the backing strip **23** is provided for the face of bow **10** toward bowstring **14**, longitudinally extending glass fibers or other suitable fibers **28** being encased and locked in the plastic resin matrix of strip **27** which extends from the adjacent corner of surface **20** to the corresponding end of bow **10**.

Preferably between such a facing strip **27** and the front of the stave member **12**, we provide a stabilizing member **29** having a fabric core (indicated by cross-hatching in Figure 4) and a plastic matrix of sufficient thickness from front to back to inhibit warping, such stabilizing member being bonded to the wooden stave by a suitable adhesive such as an urea glue and to the facing strip on the front side of member **29** by an epoxy-type adhesive which will adhere to glass-containing strips, although other adhesives may be equally suitable. Such members **29** extends from the center of bow **10** or other bow incorporating the teaching of this invention, substantially to the ends or tips of such bow.

In a preferred practice, the fabric in member **29** is made of glass cloth or several layers of glass cloth to occupy a substantial portion such as about 50% as desired of the whole volume of the flat stabilizing member **29**. We have found that a bendable stabilizing member may be made of a material such as that termed "Formica CN 41" or "FF 91," of approximately $\frac{3}{32}$ of an inch in thickness, and will normally provide satisfactory stabilizing to inhibit warping. As a consequence, bows made as taught herein resist warping or twisting so that a plane through the bowstring **14** will be normal to the transverse plane of the bow substantially from one end to the other, and, at the same time, the bow will not "let-down" and will fully meet the respective tensile and compressive stresses placed upon it, particularly along the back and face thereof.

After the laminations are laid up, as shown in Figure 4, with suitable adhesive on the engaging surfaces of the respective laminations and block **19**, the "make-up" is clamped and baked for a suitable period by thermal or dielectric heating means to cure the adhesive and join the components into a unitary mass. Following such treatment, the bow is usually shaped by "sanding" or

shaping operations, including the shaping of the hand grip of which block **19** is the central item, and the limbs and ends of the bow are tillered and nocked. A leather or other pad may be placed on one side of block **19** for conformation of the hand grip which may then be wrapped with leather strip **30** and ferrules **31** of smaller leather strips or cords applied and the whole made to adhere by a suitable adhesive. In the shaping of center **18**, an arrow rest may be provided or not as a bowyer desires as shown at **32** in the case of the right-hand bow **10**.

A modified embodiment of our invention is illustrated in Figure 5 in a manner similar to the showing in Figure 4. In such Figure 5, parts corresponding generally in structure and functioning to parts in the embodiment shown in Figures 1 to 4, inclusive, are provided with the same reference numerals with the addition of a prime factor thereto. It will be noted that in such modification, the stave lamination **12'** and the stabilizing member lamination **29'** are continuous substantially from one end of the bow to the other, the hand grip block **19'** having its rear surface bonded to the front face of the center of the stabilizing member **29'**. Other lamination arrangements may be made within the purview of this invention and the form of the stabilizing member may be varied. Thus, a facing strip such as facing strip **27** and a stabilizing member such as member **29** may be made as a single lamination at one and the same time, or the stabilizing member **29** may be used to serve both as a stabilizing member and as a facing strip, particularly when glass cloth fabric is utilized as the core member therein with sufficient strands in the warp to withstand the longitudinal stresses and sufficient strands in the weft or woof to withstand and resist bending or twisting stresses as a part of the structure of such stabilizing member.

Various other modifications may be made without departing from the spirit of our invention or the scope of the appended claim.

We claim:

A composite bow for archers, comprising, in combination, a transversely laminated wooden stave, said laminations being bonded to each other, a backing strip extending from end to end of said bow bonded to the adjoining lamination, a center block bonded to the center of said stave, the ends of said block having a graduated slope toward respective ends of said stave, a stabilizing member in strip form bonded to the front of said stave and extending substantially along the length of said bow and from side to side thereof, said stabilizing member comprising glass cloth embodied in a bendable plastic, said glass cloth having relatively longitudinal and transverse fibers in interengaging relation, said stabilizing member further having appreciable thickness sufficient to resist deformation due to twisting tendencies in other components of said bow, and a facing strip bonded to said stabilizing member and extending from end to end of said bow, said backing and facing strips comprising longitudinally extending glass fibers encased in bendable plastic, whereby said bow is protected against stress and deterioration including warping.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 2,945,488

July 19, 1960

Cosimo V. Cravotta et al.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 2, line 5, before "bow" insert -- when --; line 46, for "extends" read -- extend --.

Signed and sealed this 20th day of December 1960.

(SEAL)
Attest:

KARL H. AXLINE
Attesting Officer

ROBERT C. WATSON
Commissioner of Patents