Dec. 15, 1942. E. L. ULLRICH 2,305,285

ARCHERY BOW

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Fig.1.

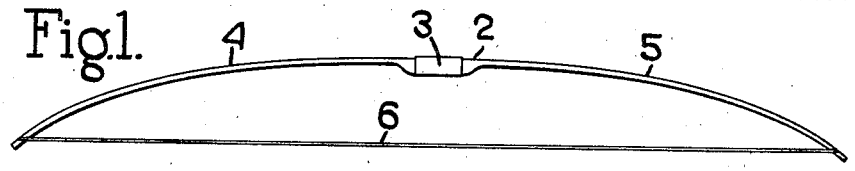


Fig.2.

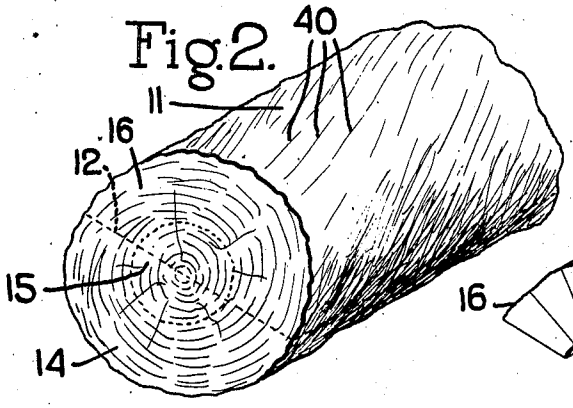


Fig.3.

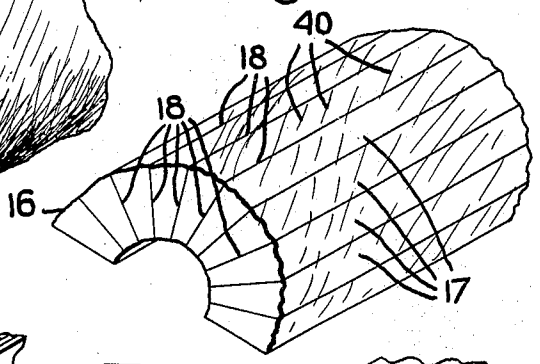


Fig.4.

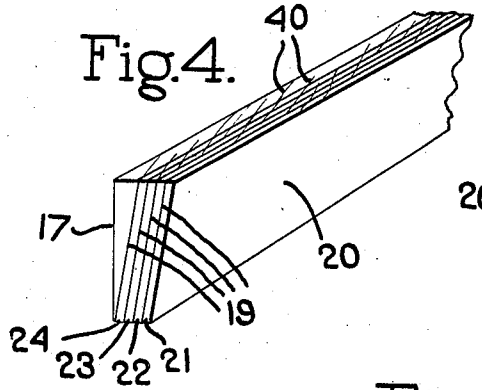


Fig.5.

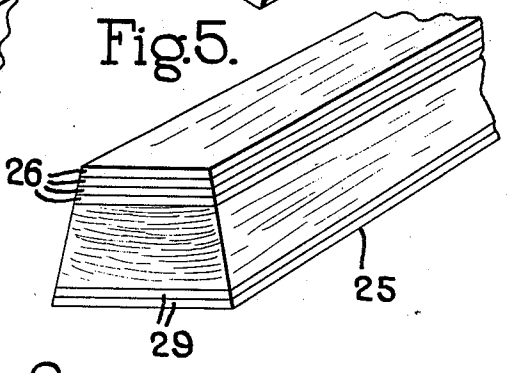
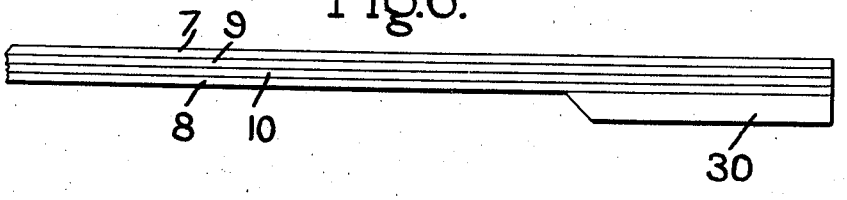


Fig.6.



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Fig. 7

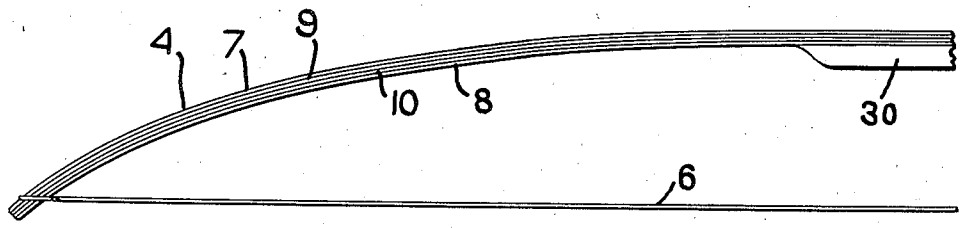


Fig. 8.

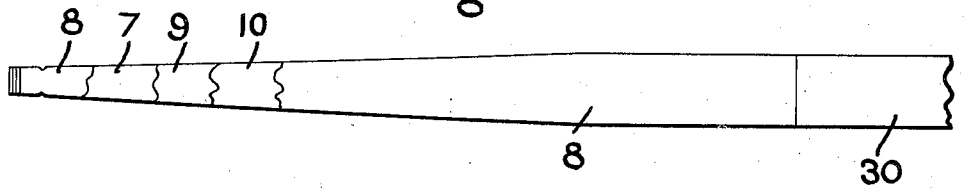


Fig. 9.

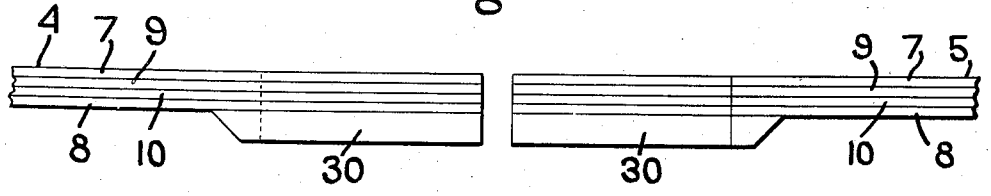
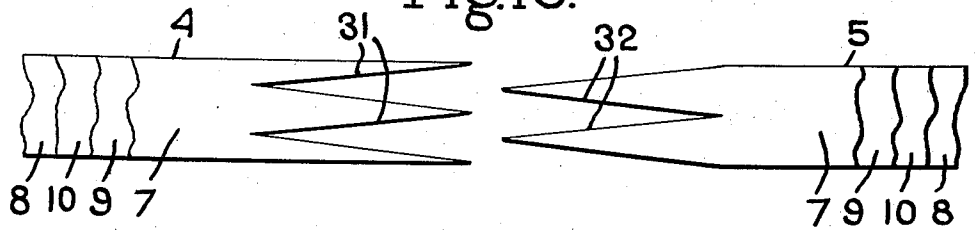


Fig. 10.



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ARCHERY BOW

Earl L. Ullrich, Roseburg, Oreg.

Application January 29, 1941, Serial No. 376,449

1 Claim. (Cl. 124—23)

This invention relates to laminated archery bows and especially to laminated bows made of yew wood.

In making bows of yew wood, it is common practice to use two billets for making each bow, each billet being of a length to make one limb of the bow and being cut from the yew log so as to contain some sap wood as well as the heart wood. The process of fashioning a bow from two billets consists in trimming each billet down to the general shape of the bow limb with the sap wood on the back of the limb and the heart wood on the belly side, and then splicing the two partially shaped billets together end to end, after which the spliced structure is further worked down to form a bow of the desired length and weight.

The reason the yew bow is made with the sap wood on the back and the heart wood on the belly is because the sap wood of the yew is best adapted to withstand the stretching strains to which the fibres on the back of the bow are subjected when it is drawn, while the heart wood of the yew is best adapted to withstand the compression strains to which the belly of the bow is subjected when said bow is fully drawn.

In reducing the limbs of the yew bow to their proper size and taper, it is important to follow the grain of the sap wood on the back of the bow, for if in shaping the limbs of the bow the sap wood is cut across the grain, the bow may be thereby weakened to the extent that the back will not be able to withstand the stretching strains to which it is subjected when the bow is drawn and the result will be a broken bow. This makes it important to use for making bows only billets having a straight grain, for if a billet has a twisted grain, it is impossible to produce a satisfactory bow by following the twisted grain.

In searching through the timberland for suitable yew wood, it is found that a considerable portion of the yew timber has a twisted grain or has bear scratches or other imperfections which have heretofore been regarded as making the logs cut from such timber unfit for use as bow wood, and consequently it is sometimes rather difficult to find good straight-grained yew logs.

One of the objects of the invention is to provide a laminated yew bow which embodies in its structure laminations of twisted grain yew wood and which, notwithstanding this fact, is no more liable to breakage than a bow made of straight-grained yew wood.

In the drawings, which illustrate a yew bow embodying my invention and also the steps taken in carrying out my improved method of making a yew bow:

Fig. 1 is a view of a bow made in accordance with this invention.

Fig. 2 is a fragmentary perspective view of a twisted grain yew log which normally is considered unfit for bow making but which can be used for this purpose according to my invention.

Fig. 3 shows the manner in which the usable part of the twisted-grain log is cut into billets.

Fig. 4 illustrates the manner in which the twisted-grain billet is cut quarter grain to form laminations for use in making my improved bow.

Fig. 5 is a fragmentary perspective view of a straight-grained billet showing the manner in which it is cut into laminations to make the back and belly portion of the bow.

Fig. 6 is a fragmentary view showing a plurality of laminations assembled to form a laminated structure from which one limb of the bow is made.

Fig. 7 is a side view of one limb of a bow embodying my invention.

Fig. 8 is a bottom view of Fig. 7.

Fig. 9 is a side view showing the two ends of the two laminated structures from which the two limbs of the bow are formed.

Fig. 10 shows the manner of splicing the two laminated structures shown in Fig. 9.

In Fig. 1, 2 indicates an archery bow embodying my invention which comprises the usual handle 3, the two limbs 4 and 5, and the bow string 6. Each limb 4 and 5 is made of at least four laminations, a back lamination 7, a belly lamination 8 and two intermediate laminations 9 and 10. The belly lamination 8 is preferably cut from a straight-grained yew billet, the cut being taken substantially flatwise of the grain, and parallel thereto. The back lamination 7 may be of any suitable material, such as rawhide, silk or wood of some kind, such as yew wood or hickory. If the back lamination is of yew wood, I will preferably use yew sap wood cut flatwise of the grain from a straight-grained billet.

The intermediate laminations 9 and 10 are cut quarter grain from a yew billet which may have a twisted grain or which may have other imperfections normally making it unsuitable for use as bow wood, said laminations being produced by cutting the twisted grain billet lengthwise and from the outer or sap-wood face to the inner or heart-wood face. These intermediate quarter grain cut laminations 9 and 10 are lo-

cated centrally of the bow body and thus near the neutral line and hence are not subjected either to the severe tension strain to which the lamination 7 at the back of the bow is subjected when the bow is drawn or to the severe compression strain to which the belly lamination 8 is subjected as the bow is being used, and thus are not liable to be broken. Laminations of twisted-grain yew wood cut quarter grain, however, have just as much resiliency as laminations of straight-grained yew wood cut flatwise of the grain, and, when released after having been bent, such quarter-grain cut laminations will recover with as much force and snap as laminations of straight-grained wood cut parallel to the grain.

Such twisted grain quarter-cut laminations, however, are not suitable for the back or belly of the bow as they will not withstand the stretching and compression strains to which the back and belly of the bow is subjected when it is used.

However, by placing such quarter-cut twisted grain laminations in the center of the bow body between the back lamination and the belly lamination, where they are subjected principally to the bending strains and are subjected in a very small degree, if at all, to the stretching and compression strains, and by employing laminations for the belly and back of the bow which are especially adapted to withstand the strains peculiar to these parts of the bow, a bow can be made which has a cast equal to, and which is no more liable to breakage than, a bow made entirely of straight-grained yew wood.

In Fig. 2, I have shown a portion of a yew log 11 which has twisted grain as indicated by the lines 40 and which normally would be considered unfit for use as bow wood. Usually only one side of a yew log is suitable for use as bow wood, the other or "timber bound" side being useless for this purpose. In accordance with my method, the yew log 11 is cut in half, as indicated by the dotted line 12 (Fig. 2), and the timber bound portion 14 is discarded. The core portion 15 of the usable half 16 of the log is also discarded as this core portion is of no use as bow wood. The remaining part of the usable section of the log is then cut longitudinally along radial planes into a plurality of billets 17, and my preference is to cut these billets so that they are about an inch wide. In Fig. 3, the radial planes on which the billet is cut are indicated at 18, and as stated above, these cuts are so made as to produce billets 17 about an inch wide. If the log 11 has a twisted grain, as shown, the cuts 18, which extend longitudinally of the log, will be made more or less across the grain.

Each billet 17, which is of a length slightly longer than one half the length of the bow to be made, is then cut quarter grain to form at least four laminations, each approximately one-eighth of an inch thick, although this particular dimension is not critical. This quarter grain cutting of the billet 17 is illustrated in Fig. 4 wherein the billet is cut longitudinally along the radial planes 19, extending parallel to one side face 20 of the billet, each cut extending from the outer or sap-wood face of the billet to the inner or heart-wood face thereof. There will, thereby, be formed four laminations 21, 22, 23, and 24, each approximately one-eighth of an inch thick and each containing sap wood along the outer side edge. These are the laminations which are used to form the intermediate laminations 9 and 10 of the laminated structure for each limb of the bow.

As stated above, the belly lamination 8 of the bow is cut from a straight grain billet of yew wood, such as illustrated at 25 in Fig. 5. This billet is sawed flatwise of the grain to make a plurality of laminations 26, and as the billet is straight-grained, the planes along which the billet is sawed to produce the laminations extend substantially parallel to the grain.

Having thus provided the straight grain laminations 26 and the quarter-cut laminations 21, 22, 23 and 24 sawed from the twisted grain yew wood, then the laminations are assembled to produce two laminated structures, one for each limb of the bow. In thus assembling the laminations, a lamination 26 cut from the straight-grained billet 25 is used as the belly lamination 8, and then two of the quarter cut laminations cut from the twisted grain billet 17 are used as the intermediate laminations 9 and 10 of the bow, a lamination 7 of some suitable wood or other material being used for the back lamination of the laminated structure. A suitable material for this purpose would be a lamination 29 of sap wood cut from the straight-grained billet 25, although a lamination of hickory or some other wood suitable for backing for a bow, or a lamination of rawhide or silk, might be used without departing from the invention.

In assembling the laminations cut from the twisted grain billet 17, I propose to select the first and third laminations, i. e., laminations 21 and 23 of Fig. 4, for the intermediate laminations 9 and 10 in one limb of the bow, and the other laminations 22, 24, cut from the same twisted grain billet as the intermediate laminations 9 and 10 in the laminated structure for the other limb of the bow. This selection of the alternate quarter grain cut laminations for each limb of the bow is made in order to produce a more balanced bow, that is, one in which the two limbs of the bow are in better balance.

This same balanced structure might be produced, however, if the first and fourth laminations (laminations 21 and 24) were placed in the laminated structure for one limb of the bow and the second and third laminations (laminations 22 and 23) were used in the laminated structure for the other limb of the bow.

After the four laminations for each laminated structure have thus been selected, they are assembled and adhesively united by means of glue, and at the same time, a handle block 30 is glued to the belly lamination 8 at one end of each laminated structure.

After each laminated structure, part of one of which is shown in Fig. 6, is thoroughly dry, then the two laminated structures are spliced together at the handle ends in the manner usually adopted in splicing together two billet sections in forming a yew bow. Usually a fishtail splice is employed which involves cutting the end of one laminated structure along the lines 31 to make two V cuts, and cutting the other laminated structure along the line 32 to make two V-shaped projections adapted to fit into the V-shaped notches formed by the cuts 31. These cuts are made from the back to the belly of the bow. The two laminated structures are glued together at the spliced joint to make the completed bow structure.

The four laminations extend throughout the length of each limb 4 and 5, and after the two laminated structures have been spliced together, the bow is completed by trimming the sides of the laminated limbs to give the desired shape

thereto and to produce a bow of the desired weight.

It will be understood, of course, that any suitable finish may be given to the handle 3 of the bow.

In a yew bow made in accordance with this invention, about half of the material of the bow is taken from billets having a twisted grain and which are normally regarded as quite unfit for making bows and are thus much less expensive than straight grained billets. By using the less expensive twisted grain stock for the intermediate laminations, a bow is produced which has as good a cast as, and is no more liable to breakage than, a yew bow in which each limb is made from the more expensive straight grain billet, but which can be made at a lower cost than yew bows as now manufactured.

Many archers prefer to make their own yew bows from yew billets which are purchased in the open market, but unless the two billets used in making any bow are properly balanced, the two limbs of the bow may function somewhat differently, thus producing an unbalanced structure.

With my invention, it is possible to make up pairs of laminated structures and to sell these to archers who desire to make their own bows. The laminated structures for this purpose may be made with or without the backing lamination. If made without the backing lamination, then the archer who purchases a pair of three-ply structures for making his bow will supply his own backing lamination and may equip each three-ply structure with a backing of any material which he chooses.

On the other hand, the laminated structure which is sold may be made with four plies, as shown in the drawings. In either case, the pairs of laminated structures which are sold would contain two balanced structures made by using the first and third twisted grain laminations of any billet for the intermediate laminations of the laminated structure for one limb of the bow, and the second and fourth twisted grain laminations of the same billet for the intermediate structure for the other limb of the bow. The two laminated structures will thus be balanced so that the archer purchasing a pair of such laminated structures can readily make a bow by splicing the two laminated structures together and then trimming down each limb to give it the proper shape and to produce a bow of the desired weight.

In my improved laminated bow, there are no weak spots, and the two limbs of the bow will be as nearly alike as nature and man can make them.

I claim:

A laminated archery bow in which each limb is formed with a backing lamination, a belly lamination formed of the heart-wood portion of a straight-grained yew wood billet cut therefrom parallel to the grain, and two intermediate laminations, said intermediate laminations of the two limbs being cut quarter-grained from the same twisted-grain yew wood billet by cuts extending from the outer or sap-wood side of the billet to the inner or heart-wood side thereof, the first and third laminations cut from said twisted-grain billet being in one limb of the bow and the second and fourth of such laminations being in the other limb of the bow.

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