

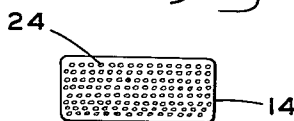
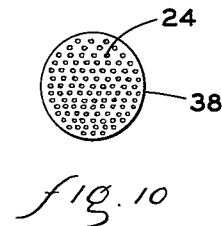
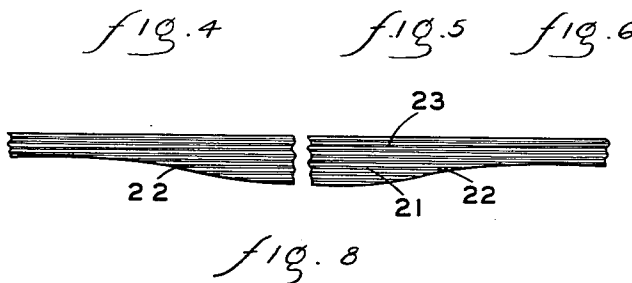
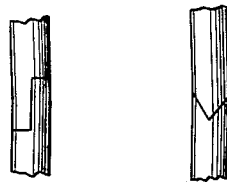
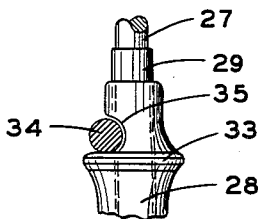
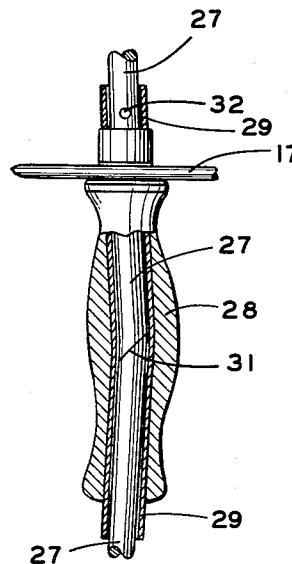
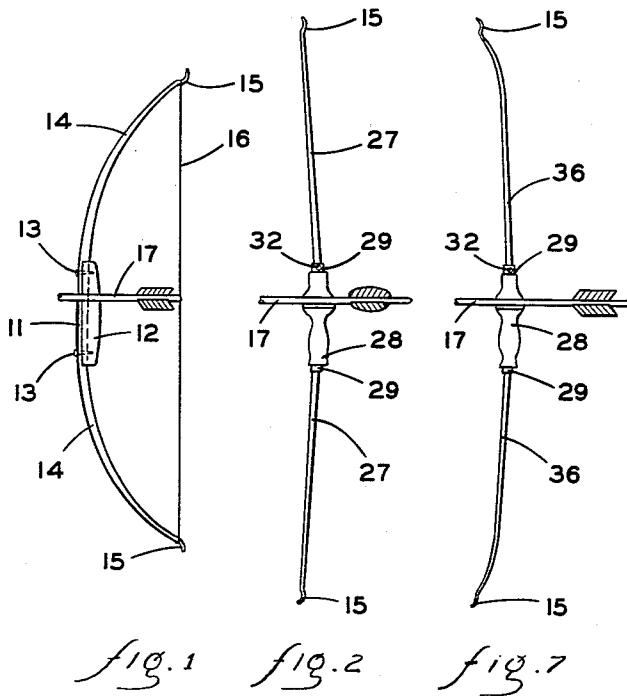
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2,713,337

ARCHERY BOWS

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ARCHERY BOWS

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6 Claims. (Cl. 124—24)

This application relates to archery bows, particularly to a non-laminated bow of resinous material reinforced with parallel longitudinal glass fiber strands. This application is a continuation in part of application Serial No. 191,553, filed October 23, 1950, and application Serial No. 228,480, filed May 26, 1951, and since abandoned.

The sport of archery is becoming more and more popular, not only among younger people but also among mature individuals of both sexes. The recognition of archery as a sport along with gunnery and angling has reached such proportions that several of the States have set aside special open seasons for the hunting of deer and other game with bow and arrow only. The increasing popularity of the sport has been accompanied by a corresponding increase in effort directed to the improvement of bows and arrows. Many variations of the traditional wood bows have been devised, both as to the type of wood employed and the actual construction and shaping of the bow. Almost every conceivable species of wood has been investigated, as have also wide variations in the actual shaping and construction of the bow itself. Reflex and recurved wood bows have been made and employed widely as have bows of laminated wood construction.

One of the objections inherent in a wood bow arises from the fact that a given bow can be drawn only to a limited extent, depending upon the species of wood employed and the characteristics of the particular bow, without injury to the wood structure or actual breaking of the bow. The breaking of a wood bow due to excessive draw is very dangerous since the sharp jagged edges are very likely to strike the archer in the face or on the arms and shoulders. Many persons have been cut and wounded severely in this way. A wood bow is also very likely to break upon the rebound should the bow string break during the draw. It is generally conceded that the life of a conventional wood bow which is used a great deal is usually not more than about one or two years. In addition, the repeated use of a bow tends to weaken the fiber structure of the wood with a consequent alteration in the properties and, therefore, in the cast of the bow. The unavoidable change in moisture content of the wood used in the bow due to change in weather conditions also affects its properties and performance considerably.

Even though a conventional wood bow be handled and used carefully so as to avoid actual breakage there are other difficulties inherent in wood bows which it is practically impossible to overcome. Unless a great deal of care is exercised in the making of the bow and unless due regard is given to the alignment of the grain of the wood in the finished bow, the bow will have an unbalanced cast and the arrow cannot be shot accurately. Even under the best of conditions wood bows are inclined to splinter along the back after being used repeatedly. It is well known that when a piece of wood is maintained in a strained condition for a considerable period of time, and the strain then relieved, the piece does not return

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immediately to its original exact shape. Such a condition or property is generally referred to by stating that the piece is inclined to take a permanent "set" easily. This defect is very noticeable in archery bows made of wood. Such bows dare not be stored in a strung condition because the limbs of the bow will take a permanent set and the characteristics of the bow will be altered markedly and unfavorably. When using a wood bow over a period of even a few hours it is essential that it be unstrung from time to time to give the wood a chance to relax to avoid as far as possible the creation of a permanent set in the limbs of the bow.

A bow is necessarily constructed with a useful draw, i. e. the draw employed normally in using the bow, such that it is not flexed to the point where breakage, splintering or other damage is liable to occur, at least until the bow has been used for a considerable period of time. In order to secure an adequate useful draw under such conditions, the bow must be constructed with at least a minimum length which is determined by the draw desired and the permissible degree of flexing of the particular material from which the bow is made. The construction of a bow having a total length less than this indicated length is sure to lead to an unsatisfactory and easily damaged article.

On the other hand it is highly desirable for many reasons that the bow length be kept as short as possible. Unduly long bows are not only unwieldy and difficult to carry and use, e. g. in thick cover, but they have the added disadvantage of jerking the hand and arm of the archer savagely when an arrow is released. A bow having this effect to an excessive degree is said to "kick". This not only disturbs the archer's aim, but may even be painful in the case of powerful bows.

As a consequence, it is necessary to construct a bow with careful regard to its length in relation to both the useful draw required and the material from which the bow is made to insure its being long enough to be useful over an extended period of time without damage while, at the same time, avoiding any unnecessary length. Using even the best yew it has been found that a bow having a 28 inch draw must have an overall length of not less than about 64 inches. This is a minimum ratio of bow length to draw for yew of about 2.3. Although this ratio for yew may vary slightly from this value for bows having other than a 28 inch draw, the variation is small and the value of the ratio is, therefore, characteristic of yew. Materials other than yew have ratios different from that for yew but characteristic of the particular material involved. This ratio is, for convenience, herein defined as the "bow length coefficient" for the particular material concerned. For the sake of uniformity, the coefficient is generally understood to refer to a standardized draw of 28 inches. The bow length coefficient thus becomes a convenient measurement of the suitability of a material for bow construction, it being apparent that materials having small coefficients are more desirable than those having large coefficients. Woods less suitable than yew have coefficients greater than that for yew. Certain metals, backed wood bows and resins reinforced with heterogeneously distributed glass fibers generally have bow length coefficients not significantly less than that for yew. Insofar as is known, no otherwise suitable material having a bow length coefficient less than about 2.25 has heretofore been available for the construction of bows.

Because of the variation of a given piece of wood over different regions within the body of the piece, no satisfactory way has been found for producing wood bows by other than hand methods. Even under the best of conditions, and employing the best of skill, it is necessary that each bow be strung and tested for uniformity of

curvature of the limbs during the draw and that it then be tillered with great care to insure the accuracy and symmetry of curvature of the limbs. This is a time consuming and costly procedure requiring great skill.

Many attempts have been made to overcome the difficulties inherent in wood bows. Bows have been constructed of thin strips of wood in the form of laminations secured together in an attempt to produce a bow less subject to breaking or splintering. In some instances, one or more of the laminates has been made of a substance other than wood, such as horn, "celluloid" or other non-woody flexible material. It has also become a more or less conventional practice to secure a backing strip along the back of a wood bow, i. e. along the face of the bow opposite the archer when the bow is held in a shooting position. Strips have been employed consisting of rawhide, synthetic resins, fabrics, and resins or rubber reinforced with fabrics or with parallel strands or threads of silk, glass fibers and the like imbedded therein. Such reinforcing strands are generally arranged so that they lie parallel to the longitudinal axis of the bow. Although such backing strips, and many of the other devices employed, are of some utility, especially in preventing splintering along the back of the bow, they contribute little or nothing to the casting power of the bow, they add to its total mass and, in addition, they are prone to interfere with the smooth flexing of the bow. The undesirableness of laminated and backed bows is apparent when it is considered that in every case the end result is a bow which is not of uniform composition throughout and which, therefore, varies in its flexing properties from region to region.

In a further attempt to produce a superior bow, use has been made of molded resins reinforced with heterogeneously distributed glass fibers. The technique of molding plastic articles reinforced in this way is well known as is also the superior strength characteristics imparted to molded resins by such reinforcements. However, it has been found that a bow made in this manner has properties leaving much to be desired. This can be appreciated readily when it is realized that the effectiveness and utility of an archery bow depends almost entirely upon its ability to flex laterally through a considerable angle without breaking or injury to its internal structure and without serious or permanent distortion. Although resins reinforced with heterogeneously distributed glass fibers are notable for their strength insofar as their resistance to rupture by longitudinal tension is concerned, they are not altered to the same desirably high degree insofar as lack of injury under flexing is concerned. Bows constructed of suitable resins reinforced with heterogeneously distributed glass fibers are subject to breakage when drawn in much the same way as are good quality wood bows and the bow length coefficient of the material is not materially less than that of wood. The danger from the rebounding sections when such breakage occurs may be somewhat less than in the case of a wood bow, due to the less likelihood of complete severance of the pieces at the point of breaking, but the bow is, nevertheless ruined easily unless made of sufficient length and used carefully. Such bows also vary in flexibility from region to region because of the difficulty of securing true heterogeneity of distribution of the fibers and even reinforcement in all directions. In addition, it has been found that bows made in this way are sluggish in action and are lacking in qualities which are usually referred to as giving "life" to the bow. Metal bows have been made and used, but are generally considered unsatisfactory, both because of their excessive mass and because of the extreme danger to the archer resulting from the fatiguing and breaking of metal limbs.

It is apparent from the foregoing and from the great amount of effort which is currently being expended in the perfection of more suitable archery bows that the state of the art leaves much to be desired. It is equally apparent that any improvement in archery bows which

would tend to make them more effective or more enjoyable to use, or even more economical to produce, would be of great value.

It has now been found, and is herein first disclosed, that an archery bow having characteristics superior to those of bows heretofore produced can be obtained by fabricating the bow in such a way that the limbs consist of a bundle of parallel reinforcing strands of glass fibers, each under substantially the same longitudinal tension as every other strand and with the entire group of strands being imbedded in a suitable hardened resin. In a preferred modification, the strands lying in and adjacent the back surface of the bow limb extend continuously the entire length of the limb while the strands lying along the face of the limb are, because of the tapering of the limb, shorter than the total length of the limb. The reinforcing strands are distributed substantially evenly laterally throughout the body of the limb.

Bows constructed in this manner are free of most of the defects of bows constructed of wood and of other hitherto used materials. Since they are of substantially uniform and easily controlled composition, and thus do not vary in composition from region to region, they have a smoothness of action and a "liveliness" not obtained with any other material used heretofore. They can be formed from stock on machines accurately, e. g. by grinding, and require a minimum of tillering to provide limbs having equal and desired degrees of curvature when the bow is drawn. They do not acquire a permanent set during long usage and may even be stored in a strung condition over a period of months without any tendency to become permanently distorted or to take a set. Due to their superior flexibility as compared to both the best wood or metal bows and to bows made of resins reinforced with heterogeneously distributed glass fibers, they can be flexed repeatedly through a much greater arc than can either of these types of bows without the slightest injury to the bow. Bows of the invention can be constructed for a 28 inch draw which have an overall length which need not be greater than about 54 inches, thus providing a bow with a ratio of bow length to draw of about 2.0 or less, as compared with the minimum ratio of about 2.25 to 2.3 referred to previously for the heretofore used materials. Generally speaking, the bows of the invention are constructed with a ratio of bow length to useful draw of from about 1.6 to about 2.15, a preferred ratio being from about 1.8 to about 2.0. Thus the preferred length for a bow having a 28 inch draw is from about 44.8 inches to about 56 inches as compared to a minimum suitable length of at least 63 inches for materials used previously.

Although the new bow can, if desired, be constructed with a ratio of length to useful draw greater than those given, such bows are, of course, as awkward and unwieldy to transport and use in thick cover as are wood bows of equal length. They do, however, make target bows of superior quality because they are free of defects due to non-uniformity of the material of construction.

As a result, the new bow can be overdrawn regularly without damage. Bows intended for normal use at a 28 inch draw can, for example, be drawn to 30 or 32 inches repeatedly without damage. The resistance of the new bow to breakage is also apparent from the fact that it is not injured in any way whatsoever by breakage of the string even at full draw.

An additional advantage of the new bow is the reduction in mass of the bow which is effected. It is known that, for a given draw weight, a bow having a small mass, especially of the limbs, will cast an arrow farther than will a bow having a greater mass. The new bow can be constructed having a limb mass one half or less of the limb mass of the best wood bows having the same draw weight. This is reflected directly in their superior cast. As a comparison, a bow of the invention having a forty

75 pound draw weight has been found to have a cast as great

or greater than the cast of a conventional yew bow having a fifty pound draw weight.

The invention can be understood readily by reference to the accompanying drawing wherein, in the interest of clarity, certain features are shown on a somewhat exaggerated scale and wherein:

Figure 1 is an elevation of a strung bow of conventional configuration embodying features of the invention,

Figure 2 is an elevation of a bow of hitherto undisclosed configuration with separable bow limbs and embodying additional features of the invention,

Figure 3 is an enlarged fragmentary elevation, partially in section, of the handle and adjacent members of the bow of Figure 2,

Figure 4 is a fragmentary elevation of a portion of the handle and arrow rest of the bow of Figure 3 rotated 90 degrees,

Figures 5 and 6 are fragmentary elevations of a pair of separable bow limbs illustrating means for preventing relative rotation of one limb with respect to the other,

Figure 7 is an elevation of a reflex bow of hitherto undisclosed configuration embodying additional features of the invention,

Figure 8 is a fragmentary longitudinal section of a limb of the bow of the invention showing the disposition of glass fiber strands therein,

Figure 9 is a cross section of a rectangular bow limb of the invention showing the lateral distribution of glass fiber strands therethrough, and

Figure 10 is a cross section of a circular bow limb of the invention showing the lateral distribution of glass fiber strands therein.

Referring now to Figure 1, there is illustrated a strung bow of more or less conventional design consisting of a central portion 11, to the belly side or face of which is affixed a handle 12, e. g. of wood secured by means of small screws or pegs 13. The limbs of the bow 14 are suitably tapered toward their ends and each terminates in a bow nock 15 over which the bow string 16 is looped. The handle 12 may be fitted at one side with a conventional arrow rest, not shown in Figure 1, for an arrow 17.

In the embodiment shown in Figure 1, the central portion 11 in the body of the bow and the limbs 14 form one continuous body extending from one tip of the bow to the other, the handle 12 being separate from and affixed to the body of the bow as just mentioned. The body of the bow of Figure 1, including the central portion 11 and the limbs 14, is generally formed so that it possesses little or no curvature toward its face when it is unstrung. Such a bow is often referred to as a "straight" bow.

The body of the bow is composed of a suitable hardened resin reinforced with parallel glass fiber strands extending longitudinally within the resinous body of the bow, as shown in Figure 8, and distributed substantially evenly laterally through the body, as shown in Figures 9 and 10. It is apparent that, since the glass fiber strands are parallel with one another and, since the limbs of the bow taper towards their tips, not all of the glass fiber strands present in the thicker section of the bow body extend completely to the tips of the limbs. The condition is illustrated in somewhat exaggerated detail in Figure 8 wherein the strands 21 lying near the face of the bow at its thicker portions terminate at points 22 removed only a short distance from the thickest section of the body. Other glass fiber strands 23 lying adjacent the back of the bow are parallel with its back surface and extend the complete length of the bow body. Certain glass fiber strands lying intermediate the short strands 21 and the longer strands 23 may terminate in the face of the bow at points intermediate the limb tips and the terminal points 22 of the shorter strands 21, depending on the configuration of the limbs. When the glass fiber strands are disposed within the resinous bow body in the

manner just described, it is apparent that the longer strands 23 lying near or in the back surface of the bow will receive most of the tensile strain when the bow is drawn and that the shorter strands 21 lying near the face surface of the bow will be subjected to no longitudinal tension because these regions of the bow body are subjected only to compressive strains. It has been found that such a disposition of glass fiber strands within a resinous bow body produces a bow of very superior characteristics insofar as freedom from breakage, smoothness and uniformity of action, "liveliness," a high ratio of cast to weight or drawing force and other desirable qualities are concerned.

It should be noted, however, that bows suitable for many purposes, and possessing advantages over bows produced heretofore, can be made wherein the reinforcing glass fiber strands adjacent the back surface of the bow do not extend the entire length of the bow limbs. Thus, a circular limb can be formed from a cylindrical blank by simply grinding the blank to give it the desired decreasing taper in the direction of the tip with only the strands in the center of the blank extending the entire length of the tapered limb.

It has been mentioned previously that the glass fiber strands are distributed substantially evenly laterally throughout the body of the bow. This is illustrated schematically in Figure 9 wherein the bow limb 14 is of rectangular cross section and wherein the glass fiber strands 24 are distributed substantially evenly laterally through the limb. Similarly, the glass fiber strands 24 of Figure 10 are distributed substantially evenly laterally throughout the circular limb section 38. The substantially even distribution of the glass fiber strands laterally through the body of the bow results in a bow free from many of the defects mentioned previously which are inherent in wood bows, in laminated wood or metal bows and in molded resinous bows reinforced with heterogeneously distributed glass fibers. Many of these defects are due to the variation in character and property of such bow bodies from region to region within the body.

The bow of the present invention, such as that just described and illustrated in Figure 1, can be made conveniently by forming an elongated bundle of glass fiber strands saturated with a hardenable resin, preferably maintained under longitudinal tension in such a manner that the tension on each strand is substantially equal and parallel to the tension on each of the other strands, and then hardening the resin. Under such conditions the strands maintain their relative positions within the hardened elongated article as well as any tension under which they are held during the hardening operation. The article can then be ground using conventional procedures to give it the desired cross sectional configuration. This operation can be carried out mechanically and automatically and bows produced in quantity with substantially no variation from bow to bow and with the utilization of a minimum of hand labor. Such slight tillering as may be required after grinding can be done quickly and economically using powered tools. When manufactured in this way bows having substantially identical characteristics can be obtained in quantity with a minimum of rejects.

The glass fiber strands employed are generally composed of a plurality of continuous glass monofilaments of very small diameter twisted loosely together so as to maintain them in the form of a loose strand. Inasmuch as it is desirable to form the bow in such a manner that the strands, and also the monofilaments, are as nearly parallel as possible in the finished bow, it is apparent that it is desirable to maintain the strands under longitudinal tension during the hardening step. The desirable degree of tension has not been determined but it should, of course, not be great enough to break the strands. Due to the very high tensile strength of glass fibers, the attainment of too high a tension on the bundle of strands is not likely to be attained. On the other hand, the tension

should be sufficient, whether the resin in the impregnated bundle is hardened with the bundle traveling or stationary, to maintain the strands substantially parallel and to prevent the impregnated bundle from sagging appreciably during the hardening operation. The terms "under tension" and "under longitudinal tension" as applied herein to the condition of the glass fiber strands defines the range between these two extremes.

Although the proportion of glass to resin in the finished bow body can be varied to a considerable extent it has been found that excellent bows are obtained when the bow body contains from about 40 to 60 percent by weight of glass, the balance being hardened resin. Glass fiber strands are readily available and their properties and methods for handling them are well known. The preferred resins are those generally referred to as "Polyester" resins and as such are well known in the art. In their partially polymerized state they are thick, viscous liquids and it is in this form that they are generally used for impregnating the bundle of glass fiber strands. Further polymerization of the thickened resin is generally effected with the aid of catalysts either with or without heating according to known procedures. Care should be exercised in impregnating the bundle of strands to avoid as far as possible the retention of air bubbles within the bundle. Such bubbles, if present, do not escape readily due to the viscous nature of the partially polymerized resin. The presence of a bubble within the bundle during the hardening step generally results in the formation of a void within the hardened body which is highly undesirable.

In practice, the impregnating and hardening steps can be carried out in known manner by forwarding the glass strands individually through a body of partially polymerized resin containing a polymerization catalyst and, while the strands are still beneath the surface of the resin, gathering them together laterally into a bundle by passing them successively through a series of orifices of progressively decreasing area and eventually drawing the impregnated bundle from the impregnating vessel through a final sizing and shaping orifice located in the wall of the vessel below the surface of the liquid resin. The withdrawn impregnated bundle is then forwarded through a hardening zone while still under tension wherein it can be heated by externally applied heat, e. g. by radiation, to cause the resin to harden. In some instances, depending upon the particular resin and the kind and amount of catalyst employed, heating is unnecessary. The tension necessary to forward the strands through the impregnating bath and to forward the impregnated bundle through the hardening zone can be applied to a hardened portion of the body following the hardening operation. Using this procedure, tension is applied longitudinally to each strand in an amount substantially equal to and in a direction substantially parallel to the tension applied to each of the other strands in the bundle and this tension is maintained until the hardening operation is substantially completed. Such procedures are well known in the resin art and need not be described in more detail here. The hardened article thus formed is subsequently cut into suitable lengths and ground to give it the desired configuration. The bow nocks and handle are subsequently affixed and the bow is then ready for stringing.

Although the polyester resins are preferred in making the bow of the invention, other suitable hardenable viscous liquid resins can be employed for saturating the bundle of strands and the resin then hardened provided the hardened resin is tough and flexible. Such resins include the polyamids, certain modified polystyrene types and many others well known in the art.

Although an archery bow, the body of which consists of a polyester resin reinforced with longitudinal parallel glass fiber strands, can be constructed having the form shown in Figure 1, the nature of this material permits the formation of bows having configurations more desirable for many purposes than that illustrated in Figure 1.

Thus, because of the tough, non-splintering character of the reinforced resin it is possible and practical to construct a bow with separate limbs which can be mounted in a handle or other device forming the central section of the bow. Such a bow is illustrated in Figure 2 wherein the tapered limbs 27 fitted with bow nocks 15 at their tips are mounted in the handle portion 28 of the bow. In one preferred modification, shown in detail in Figure 3, the handle 28, which is usually of wood or of a molded resin having a central longitudinal bore, encircles a tube 29 which is in the nature of a liner for the handle and which is usually of metal to provide additional strength and rigidity for the handle. The tube 29 is of a size and shape to accommodate the ends of the limbs 27. The latter may contact one another within the tube 29 as illustrated at 31 of Figure 3. It is generally convenient and often desirable, especially in the case of circular limbs, to form the contacting ends of the limbs 27 in such a manner that they interlock with one another in such a way as to prevent their rotation within the tube 29 and also relative rotation of one of the limbs with respect to the other. Such a locking arrangement may consist of merely forming the adjoining ends of the limbs so that they meet in a plane which is not normal to the longitudinal axis of either limb. Alternatively, the adjoining ends of the limbs can be formed with interlocking steps as shown in Figure 5 or with a dove tail arrangement similar to that shown in Figure 6. Other means for interlocking the adjoining ends of the bow limbs will be apparent.

It should be pointed out that it is frequently advantageous to form the bow limbs with a rectangular cross section in which case the reinforcing tube 29 within the handle can have a corresponding rectangular bore. In such instances the interlocking of the ends of the bow limbs is not generally necessary and they may even be separated from one another within the body of the handle by suitable arrangement of the component parts. In practice it is generally the custom to secure one of the bow limbs in the reinforcing tube 29, as by a pin 32, so that the limb and handle can be manipulated as a unit. To assemble the bow, the other limb can then merely be seated in the other end of the handle or reinforcing tube 29 and the bow then strung ready for use. The tension of the string tending to force the two limbs together maintains the non-secured limb securely in position and there is no tendency for it to become unseated under any condition of normal use.

In the modification shown in Figure 3, and as illustrated in more detail in Figure 4, the handle 28 can be formed near its upper end with an arrow rest 33 on which the shaft 34 of an arrow can be rested during its draw and release. Due to the unique construction of the handle illustrated, and due also to the fact that the bow body need not be continuous through the handle, the reinforcing tube and, if desired, the adjacent section of the bow limb can be notched on the side, as illustrated at 35, to provide for placing the arrow shaft more nearly in the plane of the bow tips and draw string. If desired, the handle can be formed with an enlarged central opening for the arrow and with a socket in each end to receive a bow limb and a true center shot bow thus constructed.

In still a further modification illustrated in Figure 7, the bow limbs 36 are recurved so that they curve at their outer ends away from the face of the bow. Such recurved bows made of wood are known in the art and have certain advantages not possessed by straight bows. Using a suitable resin reinforced with parallel glass fiber strands and by properly forming and tapering the limb over the recurved region, a limb with a true working recurve can be made easily wherein full advantage of the recurved configuration is realized. This is difficult, if not impossible, to accomplish with bows made of wood and other conventional materials. In the forming of such recurved bows, the recurved limb sections are, of course, maintained in a curved posi-

tion, preferably with the strands under tension, during the hardening of the resin.

Another preferred modification comprises a reflex bow with separable straight limbs, as in Figure 2, or with separable recurved limbs, as in Figure 7. In such a bow, the limbs are inclined toward the tips away from the face of the bow. Such bows can be formed readily by employing a reinforcing tube 29 and handle 28 shaped in such a manner that the longitudinal axes of the two limb receiving sockets are inclined at a suitable angle. A suitable angle will cause the limb tips to be displaced so that a line connecting them will pass from approximately one fourth to one half inch from the backs of the limbs at their juncture at the center of the bow. The advantages of reflex bows made of conventional materials are well known. These same advantages accrue to bows formed according to the present invention.

I claim:

1. An archery bow having an elongated limb substantially greater in width than in thickness throughout a major portion of its length and provided with a substantially straight back side having a substantially flat surface, the limb being thicker at its base than at its tip and having a belly side opposed to said back side sloping generally from the base to the tip of said limb, comprising: a body of solid flexible resin having dispersed throughout a plurality of closely packed strands of glass monofilaments extending longitudinally of the limb and substantially parallel with one another and with the back side of the limb, said strands lying adjacent the flat surface of the back side of the limb extending continuously for substantially the entire length of the limb and said strands removed from the back side by a distance greater than the thickness of the tip of the limb extending from the thicker end and terminating at points on the surface of the belly side of the limb intermediate the base and tip thereof, whereby maximum reinforcement of the limb is obtained in the region of greatest tension when the bow is drawn.

2. An archery bow as claimed in claim 1 wherein the resin is a heat-hardened polyester resin.

3. An archery bow as claimed in claim 1 wherein each strand is under longitudinal tension substantially equal to that of every other strand.

4. An archery bow as claimed in claim 1 comprising from about 40 to about 60 percent by weight of glass, the balance being resin.

5. An archery bow as claimed in claim 1 wherein the ratio of the length of the bow to its useful draw is between about 1.6 and about 2.15.

6. An archery bow as claimed in claim 1 wherein the ratio of the length of the bow to its useful draw is between about 1.8 and about 2.0.

References Cited in the file of this patent

UNITED STATES PATENTS

1,709,630	Rounsevelle	Apr. 16, 1929
1,926,845	Folberth et al.	Sept. 12, 1933
2,073,418	Gille et al.	Mar. 9, 1937
2,100,317	Hickman	Nov. 30, 1937
2,285,031	Hickman	June 2, 1942
2,571,692	Dubois	Oct. 16, 1951
2,571,717	Howald et al.	Oct. 16, 1951
2,575,346	Julian	Nov. 20, 1951
2,602,766	Francis	July 8, 1952
2,613,660	Bear	Oct. 14, 1952
2,625,498	Koch	Jan. 13, 1953

OTHER REFERENCES

Article on page 8 of the American Bowman-Review of February 1946.