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B. PEARSON

2,813,818

METHOD OF MAKING A DEMOUNTABLE BOW

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FIG. 1.

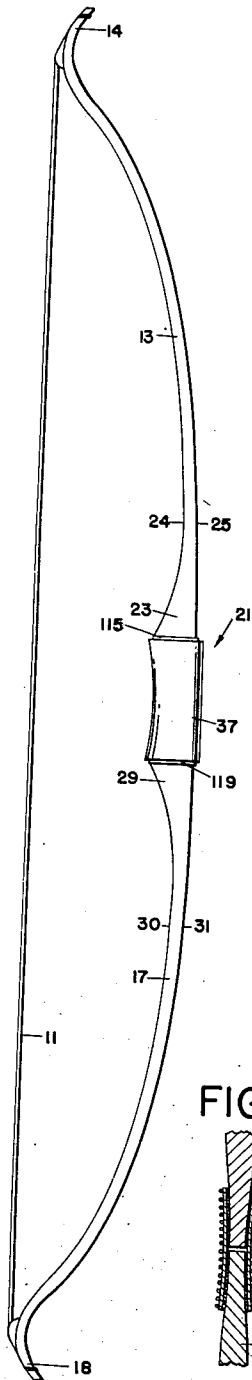


FIG. 2.

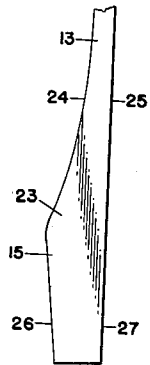


FIG. 3.

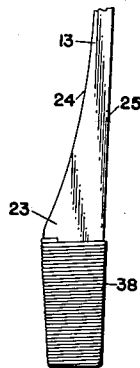


FIG. 4.

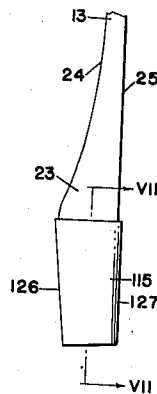


FIG. 5.

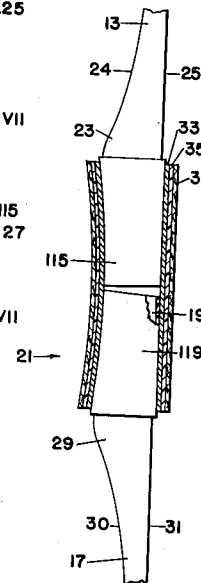


FIG. 6.

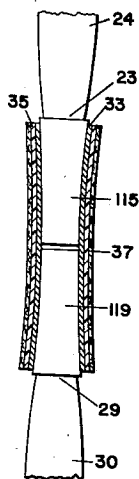


FIG. 7.

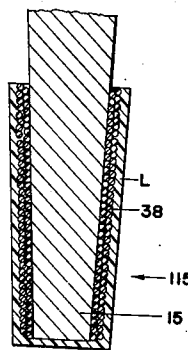


FIG. 8.

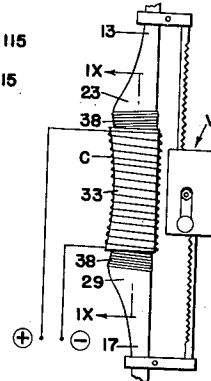


FIG. 9.

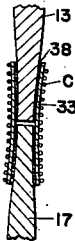
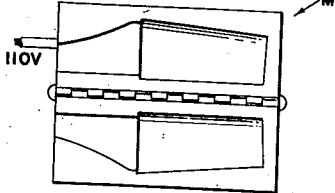


FIG. 10.



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## METHOD OF MAKING A DEMOUNTABLE BOW

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5 Claims. (Cl. 154—110)

This invention relates to certain new and useful improvements in demountable bows and methods of making same, and in particular relates to a method of forming demountable bows to adapt same for removable fitting into standardized sockets of bow handles.

It is herein contemplated that demountable bows be formed by detachably joining the opposite limbs of the bows, preferably through the medium of a handle. In fabricating the present bow, due to a wide variety in handles, as well as in the structure of the bow limbs, careful shaping of the butt ends of the bow limbs so as to fit within a desired handle, has impeded the manufacture of the demountable bows on a commercial basis and has involved considerable time and labor-consuming efforts as well as frequent waste from spoilage, as for example in the case of reducing the butt end of the bow limb to such a size as to fail properly to fit snugly the desired handle.

The present invention relates to a demountable bow comprising a pair of independent bow limbs, each limb having a somewhat tapered distal butt end, the said tapered butt ends being removably inserted in complementarily tapered sockets formed in a handle structure and being retained therein for use under the tension influence of the bow string when the assembled bow has been strung or braced.

The present invention further relates to the formation of bow limbs of any suitable or desired material or a combination of materials, including a tapering distal butt end, subsequently applying to such tapered butt end glass fiber wet with a suitable thermo-setting plastic such as one of the polyesters or one of the phenolic plastics, with a sufficient quantity of glass fiber and thermo-setting plastic being applied to the limb butt to substantially fill a suitable mold, subsequently molding the glass fiber and plastic to the limb butt end in an enlarged tapered shape of standard size and adapted accurately and closely to fit a tapered socket of a bow handle.

The principal object of the present invention is to provide a new and novel method of processing bow limbs to adapt same for use in demountable bows.

A further object of the invention is to provide such a method in which glass fiber and thermo-setting plastic are applied to the butt end of the bow limb and are molded together to form an enlarged handle butt for insertion in a socket of a bow handle.

A further object is to generally improve the efficiency and utility of methods for producing demountable bow structures.

The means by which the foregoing and other objects of the present invention are accomplished and the manner of their accomplishment will readily be understood from the following specification upon reference to the accompanying drawings, in which:

Fig. 1 is a side elevational view of a braced demountable bow embodying the present invention.

Fig. 2 is an enlarged fragmentary elevational view of the handle or butt end of a limb.

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Fig. 3 is a view similar to Fig. 2 illustrating one form of applying fiber glass and thermo-setting plastic to the limb butt.

Fig. 4 is a view similar to Fig. 2 of the limb butt shown in Fig. 3 after processing.

Fig. 5 is a fragmentary side elevational view with parts broken away for purposes of illustration.

Fig. 6 is a fragmentary front elevational view with parts broken away for purposes of illustration.

Fig. 7 is a fragmentary sectional view taken as on the line VII—VII of Fig. 4.

Fig. 8 is a somewhat diagrammatic view illustrating a preferred method employed in making the demountable bow of the present invention, at a preliminary stage.

Fig. 9 is a sectional view as on the line IX—IX of Fig. 8, showing the limb butt position during molding.

Fig. 10 is a view of a typical mold adapted for alternative use in the process of the present method.

Referring now to the drawings in which the various parts are indicated by numerals, the bow assembly of the present invention includes a substantially conventional bow string 11 which may be provided with usual end loops for engaging with the bow upon bracing. An upper bow limb 13 having a notched tip 14 adapted for engagement by one of the loops of the bow string includes a butt 15, terminating in a distal or free end, remote from tip 14. A similar lower bow limb 17 likewise includes a string-engagable notched tip 18 and a butt 19 terminating in a free end. In general the device is assembled by inserting the butt ends 15, 19 into the opposite open ends of a handle 21.

Adjacent but outwardly of butt 15 upper bow limb 13 is provided with a riser section 23 in which the belly 24 of the upper limb diverges away from the back 25 of the limb, the riser section 23 reaching its maximum divergence substantially at the junction of the limb 13 with butt 15. It will be seen that in riser section 23 the opposite sides of the riser section converge toward the butt end 16. The front or belly portion 26 of the butt section converges from the maximum dimension at the point of junction of the butt 15 with limb 13 toward the back 27 of the butt section and the sides of butt 15 also converge toward the free or distal end of the butt along lines substantially parallel with the sides of riser section 23. It will be observed that butt back 27 is substantially co-planar with limb back 25, and it will be observed that butt section 15 is a tapered section having its smaller dimension at its distal or free end.

Similarly lower limb 17 includes a riser section 29 in which the belly 30 diverges away from the back 31 of the lower limb, reaching maximum divergence substantially at the junction of butt 19 with lower limb 17, and like butt section 15, butt 19 is a tapered section in which the opposite portions converge toward the distal or free end of butt section 19. It will be observed that the back of butt section 19 is substantially coplanar with limb back 31 at their point of junction and that the belly of butt section 19 converges toward the butt back.

Handle 21 comprises an inner hollow sleeve 33, preferably formed of metal or other suitable rigid material, to which is bonded an intermediate layer 35 as of a suitable thermosetting plastic and preferably the exterior of plastic layer 35 is enclosed with an outer covering 37 which may be formed of leather, fabric or other suitable material. Preferably handle 21 is relatively compressed intermediate its length and enlarges outwardly toward its opposite ends providing a convenient hand grip for use in handling the bow in shooting.

Internally hollow sleeve 33 similarly flares outwardly from its central section toward its opposite ends providing opposite tapered sockets which are shaped comple-

mentarily to the tapered butts 15, 19 and are respectively adapted to receive the said butts when inserted during assembly of the bow. When so inserted butts 15, 19 respectively snugly fit within the tapered sockets of the handle 21 with the distal or free ends of the respective butts in slightly spaced relation. Preferably handle 21 is of a length to substantially completely cover the respective butts so that when the bow is assembled the opposite ends of the handle 21 are positioned substantially at the junctions of limb 13 with butt 15 and of limb 17 with butt 19. When so positioned and the bow is braced by engaging the opposite loops of bow string 11 with notched tips 14, 18 the tension of the bow string is such as to retain the respective bow limb butts engaged with the handle against accidental or undesired separation. It will be seen that the distal ends of the butts are spaced apart within the handle, minimizing the possibility of undue shock during shooting of the bow. It will further be seen that the tapered snug fit of the limb butts in the handle sockets affords a snug engagement, minimizing and substantially preventing looseness, creaking or rattling as the bow string is drawn and released during shooting of the bow.

It has further been found that the manufacture of demountable bow assemblies of the type just described is greatly facilitated from a commercial point of view when standardized parts can be employed. This has proven particularly difficult, especially in the case of bows formed of wood or of wood combinations in which the wooden material is shaped as by cutting, planing or similar operations to desired size and shape. Owing to variations in the size and shape of bow limbs, particularly with respect to variations in the weight or draw of the bow; various sizes of handles have been used and at times it is necessary to specially construct a handle to accommodate the limb butt dimensions after fabrication of the limbs.

The present invention, therefore, further contemplates utilizing standardized handles 21 which may be prefabricated and stored in substantial quantities awaiting use in commercial production of bow limbs, and in order to permit the use of such stored and prefabricated handles, preferably butts 15, 19 are additionally processed after shaping to substantially final form. In this processing elongated glass or other suitable fibers or material 38 are wet or covered with a suitable thermo-setting plastic such as one of the polyesters or a phenolic plastic and the fibers as thus wet are applied to the butt section of the respective bow limbs, which application preferably is accomplished as by spirally wrapping the butt therewith in manner indicated in Fig. 3, the wrapping being continued until the butt section has been built up to a desired size so as to substantially fill a socket of a hollow sleeve 33 or a similar device. Preferably the built-up butt section is to be molded and set under heat and pressure so as to fit the socket of the handle sleeve 33 with which it is to be used. In one embodiment of the invention the built-up butt sections are directly inserted in the sleeve 33 with which it is to be used. Induction coil means C is wound about the exterior of the metal sleeve and the opposite limbs 13, 17 are maintained in proper and exact alinement with the handle sleeve under an appropriate pressure which may be applied by the travelling vise means V, as schematically shown in Fig. 8. Heat is applied to the metal sleeve 33 by means of induction coil C, thermally setting the plastic of the built-up layer, bonding the glass fiber and plastic to the limb butt, thus building up the butt with a layer L of applied glass fiber and plastic to form an enlarged butt 115 having an exact molded size to fit a tapered socket of a sleeve 33 of a handle 21. Similarly butt 19 and the fiber and plastic applied thereto is processed to produce an enlarged handle-socket-fitting butt 119 having a fiber and plastic layer L. When the setting of the built-up butt sections has been completed induction means C may be removed

from the sleeve 33 and the sleeve and processed limbs removed for completion as by the application of layer 25 and cover 37 to sleeve 33 in order to complete the handle 21.

In the alternative a sleeve 33, or a device substantially duplicating sleeve 33, may be permanently mounted in conjunction with coil C and travelling vise V or other suitable pressure and alinement means and upon completion of the processing of the limb butts the formed butts may be removed from the sockets of the sleeve and are adapted for insertion and mounting in a substantially identical sleeve member, accomplishing the same result. If desired the molding of the butt sections may be accomplished through the employment of a conventional-type mold M which is preferably a divided mold having suitable complementary sockets formed in the respective halves of the mold, which, upon closure of the mold, form a chamber dimensioned and shaped substantially identically with the interior dimensions and shape of a tapered socket of a sleeve 33 of a handle 21.

It will be observed that butt 115 is tapered toward its free or distal end and away from limb riser section 23 similar to the taper heretofore described for butt 15, in that butt belly 126 converges toward butt back 127 and the sides of butt 115 also converge. Butt 119 is a similarly tapered section. Enlarged butts 115, 119 are inserted in the sockets of a handle and snugly fit therewithin, the plastic and fiber layers engaging the interior of the sockets. As previously described, the distal ends of the butts are spaced apart longitudinally within the handle, minimizing shooting shock.

It will be understood that while bow limbs 13, 17 have been here shown as integral, such is illustrative only and that the present invention may be applied to bow limbs regardless of the material of which the limbs are formed.

I claim:

1. A method of fabricating limbs for use with handle means to provide demountable bows which comprises shaping bow material to form a bow limb having a butt section at one end, wetting glass fibers with a thermo-setting plastic, applying said glass fibers after wetting to said butt section only and heat molding said butt section and applied fiber and plastic into the shape and size of the interior of the handle means to be used therewith to provide said butt section only with an exterior superposed, handle-fitting layer of plastic and glass fiber.
2. A method in accordance with claim 1 in which said wet glass fiber is applied to said butt section by spirally winding said fibers on said section.
3. A method in accordance with claim 1 in which said butt section is shaped to taper toward its free distal end.
4. The method of fabricating demountable bows which comprises the steps of shaping bow material to form a pair of independent bow limbs, each having a tip at one end and a butt section at the other end, shaping said butt sections to taper away from said tips to the free ends of said butt sections remote from said tips, wetting glass fibers with thermo-setting plastic, applying said glass fibers after wetting to each said butt section to substantially uniformly build up an exterior layer of glass fiber and plastic surrounding said butt section only, forming a handle having oppositely open hollow sockets, molding said butt sections and layers to snugly fit said sockets, and subsequently inserting said butt sections and layers to seat in said sockets.
5. A method of fabricating limbs for use with handle means to provide demountable bows which comprises the steps of shaping bow material to form a bow limb and a butt section of minor length relative to said limb integrally connected to said limb, wetting fibers with a thermo-setting plastic, surrounding said butt section with a layer of substantially uniform thickness formed of said fibers wet with said plastic, confining said layer to said butt section to prevent application of said fiber and plastic

layer to said limb, shaping said layer to the size and shape of the interior of said handle means and applying plastic-setting heat to said butt section and said surrounding layer while maintaining uniformity of layer thickness to bond to said butt section only an exterior, substantially uniform, superposed layer of thermally set plastic and fiber of a size and shape to fit said handle means.

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