PATENT SPECIFICATION

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COMPLETE SPECIFICATION

Improvements in Sports Rackets

We, SLAZENGERS LIMITED, of Laurence Pountney Hill, Cannon Street, London, E.C.4., a British Company, do hereby declare the invention for which we pray that a Patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to sports rackets. e.g., badminton and tennis rackets, all of which are hereafter generally included in the term "rackets".

In their conventional form rackets are furnished with a wooden shaft extending between the head frame and the handle or hand-grip but metallic tubular shafts of round or oval section have also been employed. In constructing rackets one of the most important details is to obtain correct balance but it is also important to obtain "whip" in the shaft whilst retaining strength. Whilst tubular metal shafts have strength, wooden shafts, particularly small-section badminton racket shafts, may be relatively weak and it is necessary to have very careful selection of the timber employed to obtain the best results.

According to the present invention there is provided a sports racket having a reinforced shaft of laminated construction comprising one or more layers of resin-bonded glass fibre material lying intermediate wooden laminae and bonded thereto.

The invention may include a method of manufacturing a badminton or other sports racket shaft, consisting in employing a strip of resin-bonded glass fibre material and two wooden bars, bonding the three parts together by an adhesive into a laminated shaft member with a central glass fibre reinforcement, shaping each end of the member to a wedge formation, applying two throat wedge blocks at one shaped end, applying a handle or gripping means at the other end, and submitting the structure to further usual racket manufacturing processes. The method may include forming the laminated shaft member of a thickness which allows it to be cut longitudinally to form two or more shaft members.

Referring now to the accompanying drawings in which embodiments of the invention are shown:—

Fig. 1. is an elevation of a laminated member from which a badminton racket shaft is formed;

Fig. 2. is a front view of an unfinished badminton racket frame with a reinforced laminated shaft exposed:—

Fig. 3. is a similar front view of a finished racket frame ready for stringing;

Fig. 4. is a cross-sectional elevation on line A—A of Fig. 2;

Fig. 5. is a cross-sectional elevation of a modified shaft;

Fig. 6. is a cross-sectional elevation of a further modified shaft with a horizontal reinforcing layer.

In a particular embodiment of this invention in the formation of a badminton racket shaft, a strip 2 is cut from a sheet of resin-bonded glass fibre material and two wooden bars 3 are formed. The bars and strip are all treated with an adhesive on the required faces, assembled together and then submitted to pressure to bond the parts firmly together as shown in Fig. 1. The strip 2 may be of single thickness or of laminated form. Thus a laminated shaft member is formed of rectangular cross section and of a thickness to form a single shaft 4 or alternatively it may be of a thickness that will enable it to be cut longitudinally into two or more shaft members. Each shaft member thus formed is shaped off at each end into wedge formation and at one end 5 is applied a pair of the usual wedge blocks 6 which are bonded thereto according to normal practice and at the other wedge-shaped end 7 a handle 8 or other gripping means is applied again according to known practice. The rough shaft member

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is now ready for further usual manufacturing processes to provide a racket shaft on to which a head frame 9 is secured at the most convenient time. The completion of the racket is carried out in known manner including the application of a grip 10. Also, a resin-bonded glass fibre overlay 11 may be applied, as shown in Fig. 2, to each face of the head frame 9 at the lower part thereof to reinforce it.

The shaft may be modified by the provision of an additional reinforcing lamination 2 (or laminations). In Fig. 5, two side-by-side glass fibre laminations 2 are shown spaced apart by a central wood or other strip 12. In Fig. 6 a further modified construction is shown wherein a reinforcing central lamination 2*a* is arranged transversely of the handle and parallel with the faces of the racket head frame. Here also more than one lamination may be used.

A badminton racket constructed with the above laminated handle provides the necessary " whip " but also adds additional strength to the usual form of wooden handle. It will be appreciated that the edge of the glass fibre lamination may be left exposed as shown on the finished handle or may be covered if this is desirable. Moreover, it may be desirable to allow the glass fibre lamination to extend into, or through, the throat wedge part and/or the handle or gripping means.

Although the invention is intended primarily to be applied to badminton racket shafts it may be convenient to apply it to other racket shafts, say tennis rackets, in which case a single central reinforcement may be employed or two or more reinforcing strips included in the shaft.

What we claim is:—

1. A sports racket, including a reinforced shaft or laminated construction comprising one or more layers of resin-bonded glass fibre material lying intermediate wooden laminae and bonded thereto.

2. Method of manufacturing a badminton or other sports racket shaft, consisting in employing a strip of resin-bonded glass fibre material and two wooden bars, bonding the three parts together by an adhesive into a laminated shaft member with ~~the~~ central glass fibre reinforcement, shaping each end of the member to a wedge formation, applying two throat wedge blocks at one shaped end, applying a handle or gripping means at the other end, and submitting the structure to further usual racket manufacturing processes.

3. Method according to claim 2, including forming the laminated shaft member of a thickness which allows it to be cut longitudinally to form two or more shaft members.

4. Method according to claim 2 or 3, including the modification of inserting at least one additional glass fibre strip and a spacing lamination during the assembly operation.

5. Sports racket according to claim 1, wherein the glass fibre layer or layers is or are located at a right angle to the faces of the head frame.

6. Sports racket according to claim 1, wherein the glass fibre layer or layers is or are located parallel with the faces of the head frame.

7. Sports racket according to claim 1, 5 or 6, wherein the glass fibre layer or layers is or are of laminated formation.

8. Sports racket according to claim 1, 5, 6 or 7 wherein the glass fibre layer or layers is or are arranged to extend into the adjacent racket structure.

9. Method of forming a reinforced sports racket shaft substantially as described.

10. Sports racket having a reinforced shaft substantially as described with reference to the accompanying drawings.

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According to the present invention there is provided a racket having a shaft of laminated construction comprising one or more layers

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is now ready for further usual manufacturing processes to provide a racket shaft on to which a head frame 9 is secured at the most convenient time. The completion of the racket is carried out in known manner including the application of a grip 10. Also, a resin-bonded glass fibre overlay 11 may be applied, as shown in Fig. 2, to each face of the head frame 9 at the lower part thereof to reinforce it.

The shaft may be modified by the provision of an additional reinforcing lamination 2 (or laminations). In Fig. 5, two side-by-side glass fibre laminations 2 are shown spaced apart by a central wood or other strip 12. In Fig. 6 a further modified construction is shown wherein a reinforcing central lamination 2*a* is arranged transversely of the handle and parallel with the faces of the racket head frame. Here also more than one lamination may be used.

A badminton racket constructed with the above laminated handle provides the necessary "whip" but also adds additional strength to the usual form of wooden handle. It will be appreciated that the edge of the glass fibre lamination may be left exposed as shown on the finished handle or may be covered if this is desirable. Moreover, it may be desirable to allow the glass fibre lamination to extend into, or through, the throat wedge part and/or the handle or gripping means.

Although the invention is intended primarily to be applied to badminton racket shafts it may be convenient to apply it to other racket shafts, say tennis rackets, in which case a single central reinforcement may be employed or two or more reinforcing strips included in the shaft.

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1. A sports racket, including a reinforced shaft or laminated construction comprising one or more layers of resin-bonded glass fibre material lying intermediate wooden laminae and bonded thereto.

2. Method of manufacturing a badminton or other sports racket shaft, consisting in employing a strip of resin-bonded glass fibre material and two wooden bars, bonding the three parts together by an adhesive into a laminated shaft member with ~~the~~ central glass fibre reinforcement, shaping each end of the member to a wedge formation, applying two throat wedge blocks at one shaped end, applying a handle or gripping means at the other end, and submitting the structure to further usual racket manufacturing processes.

3. Method according to claim 2, including forming the laminated shaft member of a thickness which allows it to be cut longitudinally to form two or more shaft members.

4. Method according to claim 2 or 3, including the modification of inserting at least one additional glass fibre strip and a spacing lamination during the assembly operation.

5. Sports racket according to claim 1, wherein the glass fibre layer or layers is or are located at a right angle to the faces of the head frame.

6. Sports racket according to claim 1, wherein the glass fibre layer or layers is or are located parallel with the faces of the head frame.

7. Sports racket according to claim 1, 5 or 6, wherein the glass fibre layer or layers is or are of laminated formation.

8. Sports racket according to claim 1, 5, 6 or 7 wherein the glass fibre layer or layers is or are arranged to extend into the adjacent racket structure.

9. Method of forming a reinforced sports racket shaft substantially as described.

10. Sports racket having a reinforced shaft substantially as described with reference to the accompanying drawings.

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In a particular embodiment of this invention in the formation of a badminton racket shaft, a strip is cut from a sheet of resin-bonded glass fibre material and two wooden bars are formed. The bars and strip may all be treated with an adhesive on the required faces, assembled together and then submitted to pressure to bond the parts firmly together. Thus a laminated shaft member is formed and this may be of a section to form a single shaft or alternatively it may be of a section that will enable it to be cut longitudinally into two or more shaft members. Each shaft member thus formed can be shaped off at each end into wedge formation and at one end is applied a pair of the usual wedge blocks which are bonded thereto according to normal practice and at the other wedge-shaped end a handle or other gripping means is applied again according to known practice. The rough shaft member is now ready for further usual manufacturing processes to provide a racket shaft on to which a head frame is secured at the most convenient time. The completion of the racket is carried out in known manner.

A badminton racket constructed with the above laminated handle provides the necessary "whip" but also had additional strength to the usual form of wooden handle. It will be appreciated that the edge of the glass fibre lamination may be left exposed on the finished handle or may be covered if this is desirable. Moreover, it may be desirable to allow the glass fibre lamination to extend into, or through, the throat wedge part and/or the handle or gripping means.

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