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1,970,376

METHOD OF MAKING TENNIS STRINGS AND THE LIKE

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Fig.1.

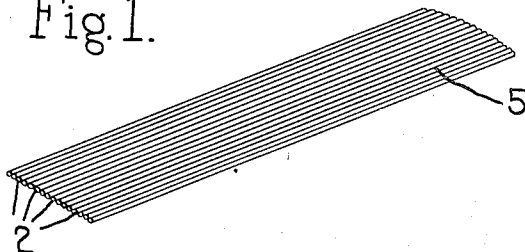


Fig.2.

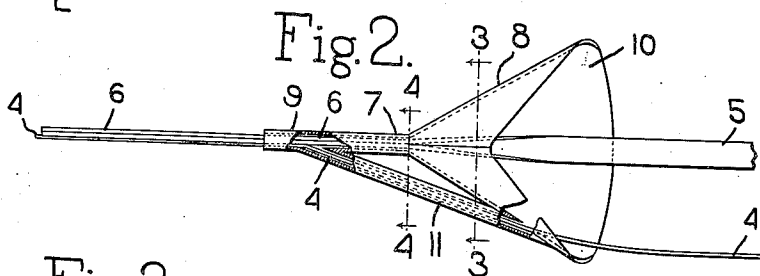


Fig.3.

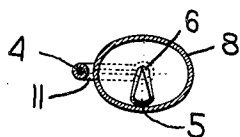


Fig.4.

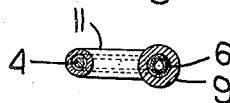


Fig.6.

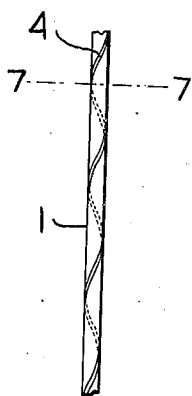


Fig.7.

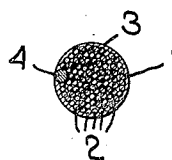
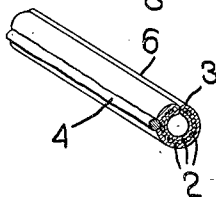


Fig.5.



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UNITED STATES PATENT OFFICE

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METHOD OF MAKING TENNIS STRINGS AND
THE LIKE

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2 Claims. (Cl. 117—53)

This invention relates to the making of strings for tennis rackets and the like and particularly to the making of strings which are formed of a plurality of strands or threads of silk or similar material which are laid in a colloidal binder and so twisted as to form the complete string.

One object of the present invention is to provide a novel method of making tennis strings of this type which has a marker or identifying strand laid on the surface of the string and spiralling about said string. This marker or identifying strand will preferably be a colored strand and the present invention provides a method of making the string by which this colored strand will be laid on the exterior surface of the string throughout the length of the latter but yet will have a spiral course about the string.

In carrying out my improved method the requisite number of strands or threads necessary to make the complete string are arranged in parallel relation in the form of a web or ribbon and are laid in glue or some other suitable colloidal binder. This ribbon-like web of parallel strands which are bound together with the colloidal binder is then folded longitudinally to produce a cord-like structure, this being done while the binder material is still tacky and before it has dried. The marker strand or identifying strand is then laid along the side of the cord-like structure so that it extends parallel to the individual strands of said structure, said marker or identifying strand adhering to the cord-like structure because of the tacky nature of the binder.

In thus assembling the identifying strand with the cord-like structure said strand is laid in position alongside of the cord-like structure under less tension than that to which the cord-like structure is subjected. The assembled cord-like structure and identifying strand are then twisted from end to end to give the final structure the required twist and because of the fact that the identifying strand is under less tension than the other strands forming the cord-like structure, said identifying strand will remain on the outside of the cord as the twisting takes place and will not become buried in the cord at any point during the twisting operation. Furthermore, during the twisting operation, the strands making up the cord-like structure are placed under increased tension and this together with the twisting operation tends to force the glue or other colloidal binder outwardly onto the exterior of the completed structure and the amount of binder which is thus forced to the exterior provides a coating or envelope of binder material on the exterior

surface substantially flush with the identifying strand. The identifying strand will thus be laid on the outside of the twisted cord throughout its length and will be visible throughout the length of the string.

In order to give an understanding of the invention I have illustrated in the drawing an apparatus for and one way of making a tennis string embodying my invention, which will now be described after which the novel features will be pointed out in the appended claims.

In the drawing, Fig. 1 illustrates the strands from which the string is made arranged in parallel relation in the form of a web and united by a suitable glue or colloidal binder;

Fig. 2 shows the manner in which the ribbon illustrated in Fig. 1 is folded into a cord-like structure and also the manner in which the marker or identifying strand is applied to the cord-like structure;

Fig. 3 is a section on the line 3—3, Fig. 2; Fig. 4 is an enlarged section on the line 4—4, Fig. 2;

Fig. 5 is a fragmentary perspective view of the web shown in Fig. 1 after it has been folded into the cord-like structure and the identifying strand has been applied thereto;

Fig. 6 is a fragmentary view of the completed tennis string;

Fig. 7 is an enlarged sectional view through the completed string on the line 7—7, Fig. 6.

A string embodying the present invention is indicated at 1 and it comprises a plurality of strands or threads 2 of silk or any other suitable material which are twisted together to form the completed string and are bound together by glue or other colloidal binder 3, together with an identifying strand or marker 4, which is laid on the surface of the completed string 1 and spirals thereabout as indicated in Fig. 6. The number of strands 2 in the string will vary according to the strength which it is desired that the finished string shall have and also in accordance with the character of the material of which the strands 2 are made. Where the tennis string is made of strands of silk it is common to use thirty, forty or fifty strands in a string.

In making the string the requisite number of strands 2 are arranged in parallel relation in the form of a web or ribbon 5 as shown in Fig. 1 and a suitable binder is applied to the web 5 to bind the strands together in this form. This binder can be thus applied by passing the web 5 through a bath of binder material or by spraying the binder material on the web or in any other suitable

way. The binder material which is used may be glue or any suitable colloidal binder. Where the binding solution is applied by passing the web through a bath of the binding solution it will be preferable to feed the web between squeeze rollers after it issues from the bath to squeeze out surplus binding material.

Before the binding material dries the web 5 is folded longitudinally to form a general cord-like structure 6 and this may conveniently be done by passing the web through a trumpet-like forming device 7. This device has the generally conical portion 8 open at its larger end and the tubular portion 9 which extends from the smaller end of the conical portion. The web 5 is led into the larger open end 10 of the conical portion 8 and into the tubular portion 9 and as it passes into the smaller end of the conical portion 8 it is folded longitudinally into a cord-like structure 6 which passes into and through the tubular portion 9 so that said web will merge from the tubular portion 9 with the cord-like structure but with the strands 2 all extending parallel to each other.

As the web 2 is thus formed into the cord-like structure a marker or identifying strand 4 is laid along the side of the cord-like structure 6 on the exterior thereof, said identifying strand adhering to the cord-like structure because of the fact that the binder material 3 is still in a tacky condition. This marker or identifying strand will preferably have a characteristic different from the strands 2 so that it will be easily identified from said strands. This different characteristic may be of color, or of size, or of material, but preferably I will employ a marker or identifying strand having a different color characteristic from that of the strands 2 so that it can be easily identified by color.

This identifying strand 4 may be assembled with the cord-like structure 6 by various means and as shown in Fig. 2 the trumpet member 7 is provided with a tubular guiding portion 11 which leads into the tubular portion 9 and through which the marker or identifying strand 4 may be fed. As herein shown this tubular guide 11 opens at its entrance end into the cone-shaped member 8 near the open end thereof so that the identifying strand 4 as well as the web 5 may be fed into the open end 10 of the cone 8. The web 5, however, passes directly into the tubular portion 9 while the identifying strand 4 passes into the tubular guide 11 and from the latter into the tubular member 9 at a point intermediate of its ends. As a result this strand 4 is brought into this assembled relation with the strand 2 of the web 5 after said strands have been rolled or folded into the cord-like structure 6 and hence the identifying strand will be laid along the cord-like structure on its exterior and because of the tacky nature of the binder 3 at this time it will adhere to said cord-like structure. As a result the cord-like structure 6 and the identifying strand 4 are delivered from the tubular member 9 in their assembled relation.

In thus assembling this identifying strand with the cord-like structure 6 said strand is laid along the cord-like structure under tension which is somewhat less than that to which the strands 2 of the cord-like structure are subjected so that when the identifying strand is placed in position it will be in a less stretched condition than the strands 2 of the cord-like structure 6.

Fig. 5 shows the tennis string after the cord-

like structure 6 and the marker 4 have been assembled but while the strands are in a straight untwisted condition.

After the cord-like structure 6 and identifying strand 4 have thus been assembled the string is twisted from one end to the other and at the same time subjected to tension. This twisting operation twists the strands 2 together to form a twisted string and during this twisting operation the binder material 3 will not only be caused to fill all the interstices between the strands 2 but because of the increased tension to which the strands are placed during the twisting operation a certain portion of this binder material will be forced to the exterior surface of the string and this will form an exterior coating or layer around the string.

Because of the fact that the marker or identifying strand 4 is laid loosely along the cord-like structure 6 and is normally under less tension than the strands 2 it will follow that during the twisting operation said looser strands 4 will remain on the exterior of the twisted strand and in the completed structure it will spiral about the string as shown in Fig. 6 but will not be drawn into the interior of the string at any point along its length and thereby covered up with other strands 2.

As the identifying strand 4 is laid in position along the cord-like structure 6 as shown in Figs. 2 and 5 it will be partially embedded in the cord-like structure as best seen in Fig. 5. When binding material 3 is forced to the exterior of the twisted string 1 during the twisting operation the amount of binding material which comes to the surface will be sufficient to form sufficient coating on the completed string to bring the surface of the string flush with the marker 4 as shown in Fig. 7.

I claim:

1. The method of making a tennis string or the like which consists in forming a web of parallel strands laid in a colloidal binder, folding said web longitudinally into the general shape of a cord, laying along one side of said folded web an identifying strand which has characteristics sufficiently different from those of the strands in the web to enable the identifying strand to be readily identified, said identifying strand being laid under a lesser tension than the strands of the web, and then twisting the folded web to twist the strands of the web together and thereby form the tennis string, the identifying strand, because of its lesser tension, remaining on the surface of the string throughout its length.

2. The method of making a tennis string or the like which consists in forming a web of parallel strands laid in a colloidal binder, folding said web longitudinally into the general shape of a cord, laying an identifying strand along one side of said folded web under less tension than that to which the strands of the web are subjected, said identifying strand being laid while the binder material is still tacky so that said identifying strand adheres to the folded web, and then twisting the folded web and identifying strand to make the completed string, said identifying strand, because of its lesser tension, remaining on the peripheral surface of the twisted string but spiraling thereabout and being visible throughout the length of the string.

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