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Johns

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[54] **CONTINUOUS FIBER TENNIS RACQUET**

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[52] **U.S. Cl.** ..... **273/73 F,** 273/DIG. 7

[51] **Int. Cl.** **A63b 49/10**

[58] **Field of Search** .. 273/67 R, 73, DIG. 7; 124/23

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Assistant Examiner—Richard J. Apley
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[57] **ABSTRACT**

A tennis racquet composed entirely, except for the strings and a leather handle cover, of resin impregnated glass fibres approximately 25 percent of which extend unbrokenly up one handle, around the bow including the throat, around the head and down the other handle, approximately 50 percent of which extend up one handle around the head and then down the other handle, and approximately 25 percent of which extend up one handle member, across the throat and then down the other handle member. Short fibres are positioned across the throat to make the throat contain a number of fibres equal to that of any other portion of the racquet.

3 Claims, 8 Drawing Figures

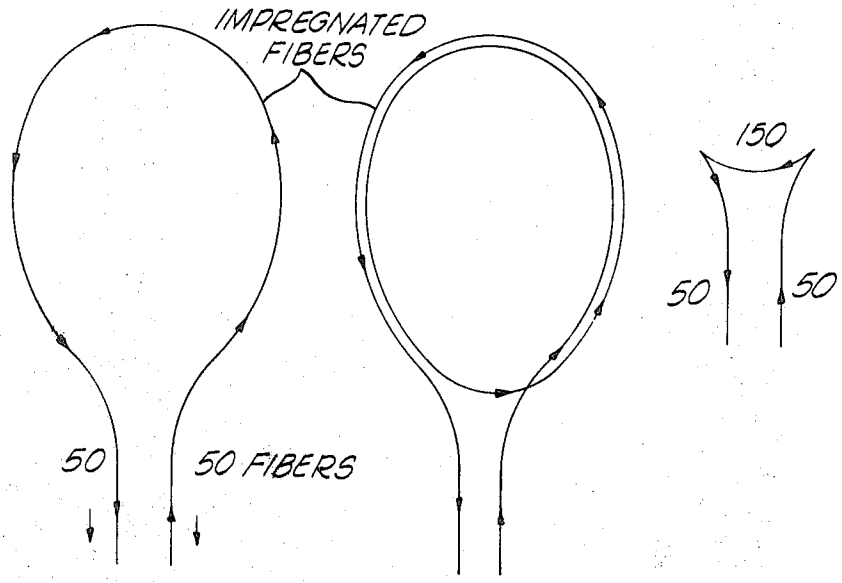


FIG. 1.

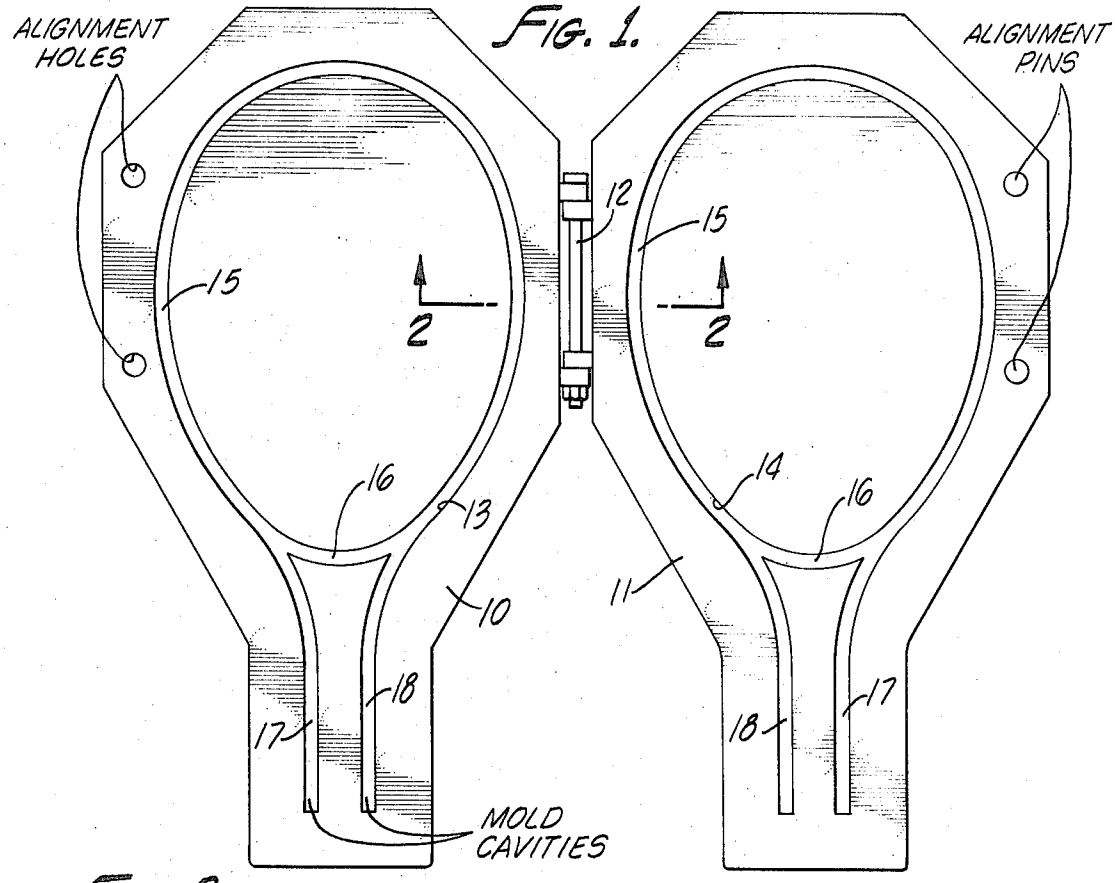


FIG. 2.

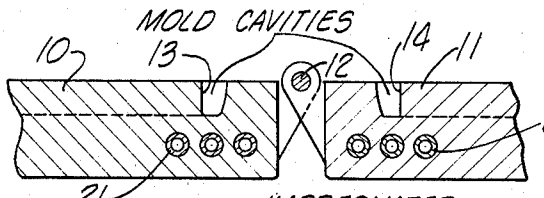
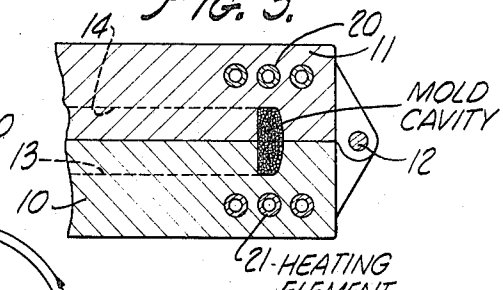


FIG. 3.



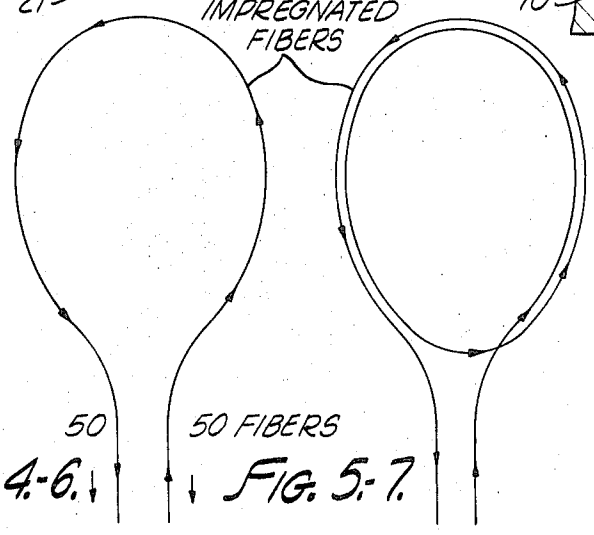


FIG. 4-6. FIG. 5-7.

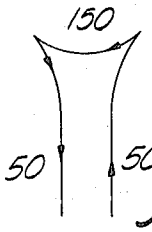


FIG. 8.

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CONTINUOUS FIBER TENNIS RACQUET

INTRODUCTION

This invention relates to a tennis racquet and more particularly to such a racquet the body of which is composed entirely of glass fibres impregnated with a thermosetting resin. For improved strength it is desirable to form the racquet, so far as it is possible, of continuous unbroken fibres. However, due to the peculiar shape of a tennis racquet it is not possible to achieve this ideal. Hence this invention is in essence an attempt to use in the structure of a racquet as many continuous unbroken fibres as possible and yet still make a balanced racquet having a uniform cross-section in all parts of the bow, even including the throat.

This object and others will be apparent from the following description in which:

FIG. 1 is a plan view of a pair of molds suitable for making the racquet of this invention, the molds being shown in their open position.

FIG. 2 is a fragmentary cross-section taken along line 2—2 of FIG. 1.

FIG. 3 is a view similar to FIG. 2, but showing the mold filled and closed.

FIGS. 4–6 is a diagram of the position in which approximately 50 percent of the glass fibres are laid in the mold.

FIGS. 5–7 is a diagram of the position in which approximately 25 percent of the glass fibres are laid in the mold.

FIG. 8 is a diagram of the position in which approximately 25 percent of the glass fibres are laid in the mold.

Referring now more particularly to the drawings, FIG. 1 illustrates a mold formed in two halves **10** and **11** hinged together by a hinge **12.** Each half **10** and **11** is provided with a groove **13** or **14** which grooves trace the outline of a tennis racquet frame. That is to say, each groove has a head portion **15,** a throat portion **16** and two handle portions **17** and **18.**

As known in the art, glass fibers are arranged with about 204 unidirectionally extending filaments in a unit known as a sliver. The term E glass designates the composition and stands for "electrical" versus "chemical". The term K represents a filament diameter of about 0.00055 inch. (See Handbook of Reinforced plastics of the SPI, Oleesky and Mohr, pub. 1964 by Reinhold Pub. Corp., pp 117–166).

Glass fibres impregnated with a flexible epoxy resin of the amine type and B staged to a semi-cured state are laid in the grooves **13** and **14** in the following manner:

Bundles of E glass fibres of the K fibre diameter are used with approximately 60 slivers to the bundle. The first step comprises laying 50 bundles into the molds in the pattern shown in FIGS. **4–6,** that is to say, up one handle, around the head and down the other handle. The second step comprises laying 25 bundles into the molds in the pattern shown in FIGS. **5–7,** that is to say, up one handle, completely around the bow, around the head and then down the other handle. The third step comprises laying into the molds 50 bundles in the pattern shown in FIG. **8,** that is to say, up one handle, across the throat and down the other handle. Concurrently 100 short bundles are laid across the throat only. The fourth step comprises a repeat of the second step; i.e., an additional 25 fibres are laid in the pattern of FIGS. **5–7.** The fifth step is a repeat of the first step; i.e., another 50 bundles are laid in the pattern of FIGS. **4–6.** This process is continued until both molds **13** and **14** are filled. The molds are then closed and the material in the molds is cured, preferably by energizing the heating elements **20** and **21** and curing the racquet for 30 minutes at 200°–225° F.

After curing the racquet is removed from the molds and is complete except for fitting a handle to the two handle portions formed in portions **17** and **18** of the mold, boring the holes in the head of the racquet and stringing.

The term "glass" as used herein is defined as fibre glass, or alternately any of the commercially available materials generally described as carbon - graphite - Boron - high modulus glass, or any mixture of the former with the latter.

While there has been disclosed what at present is considered a preferred embodiment of the present invention it will be appreciated that various changes and modifications may be made therein without departing from the essence of the invention.

What is claimed is:

1. In a tennis racquet frame composed entirely of resin impregnated continuous unidirectional reinforcing fibers and having spaced handle portions joined to a head bow and a throat portion extending between said handle portions to complete, with said head bow, a closed head loop, the improvement comprising:

a first plurality of continuous unbroken fibers extending along one handle portion, around said head bow, along said throat portion, around said head bow again, and then along said other handle portion; and

a second plurality of unbroken continuous fibers extending along one handle portion, along said throat portion, and along the other handle portion.

2. A tennis racquet as defined in claim **1** including a third plurality of continuous unbroken fibers extending along one handle portion, around said head bow, and then along the other handle portion.

3. A tennis racquet as defined in claim **2** including a fourth plurality of unbroken glass fibers extending along only said throat portion, there being substantially the same number of glass fibers extending along each handle portion, around said head bow, and along said throat portion.

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