MAGNESIUM TENNIS RACKET WITH WEIGHTED THROAT PIECE

The invention is a novel configuration of a metal tennis racket characterized by an extruded magnesium frame substantially I-shaped in cross section, and having inside and outside channels. A molded grommeted string cushion strip seats in the outside channel of the bow of the frame insulating the strings from all metal contact. An inverted U-shaped element bridges the throat of the racket completing the bow and seats in the interior channel of the frame for added structural support. A separate grommeted string cushion element seats along the bridge and features a recess therein which receives balancing slugs of different weights enabling adjustment in weight and balance of the racket prior to stringing.

2 Claims, 10 Drawing Figures
MAGNESIUM TENNIS RACKET WITH WEIGHTED THROAT PIECE

BACKGROUND

This invention is in the field of sports rackets and specifically relates to the construction of a tennis racket having a frame of unique design which incorporates a resilient string cushion member and means to change the weight and balance of the racket.

Over the past several years, metal tennis rackets of varying designs have been circulated on the market and have experienced a degree of acceptance. However, these rackets have exhibited shortcomings which it is a purpose of this invention to overcome. For example, rackets made with a steel frame have been found to be too flexible. The player is required to adjust his sense of timing to this added flexibility, and some feel that they do not have the same control over the ball as they have with the conventional wood racket. There have also been reports of rusting of the steel frames.

Other rackets have been made in a manner similar to aluminum frames. These rackets have been found to be extremely stiff and surprisingly heavy. While some players appear to like this added firmness, a racket having a weight and flexibility similar to that of wood rackets is generally preferred.

Another problem encountered with metal rackets is in the stringing. It has been found that many of these rackets cannot be restrung on conventional stringing machines without a special adapter, and that the unorthodox manner of stringing requires additional time to complete the job. Reports of string breakage after a short time in play are common, causing the manufacturers to seek various methods of protecting the strings from the sharp metal edges of the racket holes. One approach to this problem was to provide individual plastic grommets inserted into each string hole. These grommets had to be of different diameters and lengths to accommodate single or double thicknesses of string and variation in the thickness of the bow and throat sections. These individual grommets were difficult to handle in that they tended to fall out leaving the purchaser of the unstrung racket with the problem of determining which grommet went into which hole. In addition, the individual plastic grommets often cracked and became ineffective. A better solution to the problem of breaking strings was suggested in U.S. Pat. No. 2,742,289, which broadly taught the placing of a molded plastic strip in a channel around the outside of the racket bow, with integral grommets or sleeves extending through the holes of the bow.

It is a purpose of this invention to improve upon the aforementioned string cushion and to overcome the aforementioned objections to and difficulties with metal tennis rackets in general. Accordingly, one objective of the invention is to provide a metal racket having a selected weight and flexibility, including weight and flexibility combinations substantially matching those of wooden rackets. A further objective of the invention is to provide a racket which can be strung and restrung in the same manner as with conventional stringing machines without the need for special adapters. Another objective of this invention is to provide a racket frame structure which includes means for adjusting the weight and balance of the racket to suit the user.

Still another objective of this invention is to provide a unique throat construction for the frame which particularly resists twist and distortion of the frame structure during stringing and play.

A still further objective of the invention is to include means which in conjunction with the string insulating means across the bridge section, accepts elements of varying specific gravity to change the weight of the racket.

It is an additional objective of this invention to provide a racket which meets all the aforementioned objectives and having an extruded frame.

SUMMARY

Basically, the invention is a tennis racket comprising a metallic frame of generally I-shaped cross section, which frame has a first channel in its exterior face thereof and a second and like channel in its interior face. A central portion of the frame is bent into a conventional bow across which the strings of the racket are strung, while the end portions of the frame extend outwardly from the bow in parallel forming the stock of the racket to which the handle is attached. A throat bridge comprised of a generally U-shaped element closes the throat of the bow; said bridge having a plurality of laterally extending tongues which ride softly within the interior channel of the frame, and are selectively located to brace the frame against twist. A combination string cushion and weight adjustment means, disposed along that portion of the throat bridge which closes the bow, cushions the strings passing therethrough and provides a recess for the reception of weighting elements of selected density by which the swing weight and balance of the racket may be adjusted prior to stringing. Grip means adapted to receive therein the ends of said parallel frame elements forms the handle of the racket.

The invention as described overcomes the difficulties previously encountered with metal rackets. It can be strung like a wood racket, has the advantages of lightness in weight, and a flexibility substantially the same as that of a wood racket; yet it will not rust, has great dimensional stability, and provides for weight adjustment to suit the user.

Other objectives, advantages, and various further features of novelty and invention will be pointed out or will occur to those skilled in the art from a reading of the following specification in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan view of a tennis racket of the invention.
FIG. 2 is a cross-sectional view in a portion of the throat section of the racket taken along line 2--2 of FIG. 1.
FIG. 3 is a cross-sectional view of a portion of the throat section of the racket taken along line 3--3 of FIG. 1.
FIG. 4 is a cross-sectional view of the bow of the racket taken along line 4--4 of FIG. 1.
FIG. 5 is a cutaway plan view of a portion of the bow of the racket taken along line 5--5 of FIG. 1.
FIG. 6 (a), (b), (c), is an exploded view, partially in cross section, of the center portion of the throat bridge of the racket illustrated in FIG. 1.
FIG. 7 is a cross-sectional view of the throat of a racket of the invention taken along line 7--7 of FIG. 1.
FIG. 8 is a top view of a throat bridge string cushion and weight receiving element of the invention illustrated in FIG. 6 (c).
FIG. 9 is a cross-sectional view of the handle and grip portion of the racket taken along line 9--9 of FIG. 1.
FIG. 10 is a plan view of a throat bridge of the invention incorporated in the racket of FIG. 1.

DETAIL DESCRIPTION OF THE INVENTION

Invention is an improved tennis racket, the various features of which will be described in connection with the drawings. Principal among these improvements is the shape and structure of the frame, best illustrated in FIG. 1, 2, 3, and 4.

The frame may be made of any suitable material; however, it has been found most advantageous to extrude the frame of a magnesium alloy such as ZK60. The extruded frame element 1 is I-shaped, forming an inside channel 2 and an outside channel 3 (see FIG. 2). Channel 2 is essentially a dovetailed groove, having sides which taper away from the open top of the groove to a wider flat base 2a. Channel 3 is similar to channel 2 except that the sidewalls thereof comprise a first tapered section 3a communicating with the opening of the groove and an inner section 3b standing perpendicular to the base 3c of the channel. FIG. 4 includes the general exterior
dimensions of a frame of the invention consistent with the objective of the invention.

Channel 3 is shaped to retain therein a shaped resilient, grommeted string cushion strip 4. String cushion strip 4 is preferably made of any suitable resilient plastic such as nylon and is molded to substantially fill channel 3. Strip 4 has spaced grommets 46 integrally molded therein, which grommets fit snugly into string holes 5 in the bow 1 (See Fig. 5). In addition, strip 4 has string recesses 4a wherein the strings to ride inside the outer periphery of the bow and enjoy the protection of the surrounding materials of strip 4 and frame 1. Strip 4 is forced into channel 2 where the angled sides 3a serve to retain strip 4 in place, greatly facilitating stringing of the racket.

Particularly unique to the invention is the throat bridge 7 of the racket. Frame 1 is bent into the general racket shape illustrated in FIG. 1, forming a bow 6 and a stock and handle section 14. Sharp bends in the frame 1 are avoided by gently curving the ends 8 and 9 outwardly from the bow 6 into a parallel disposition forming the stock 14. The circular string section of the racket, designated generally 6a, is then closed by a throat bridge element 7 illustrated in FIG. 1 and 10. Bridge 7 is an extruded or machined piece having a top section 10 and two opposing legs 11 and 12. Bridge 7 seats in the throat of the frame 1 with section 10 extending across the open throat of frame 1 closing the bow of the racket and establishing its string support area 6. Legs 11 and 12 extend down along the inside of frame legs 8 and 9 and are riveted to the frame 1 of the racket by rivets 13. Referring to FIGS. 10, 2 and 3, legs 11 and 12 are provided with tongues 11a and 12a which extend laterally from the sides thereof and fit snugly into interior channel 2 of the frame when bridge 7 is seated in the throat of the racket. The remainder of legs 11 and 12 are too large to fit within channel 2 and ride outside thereof and against the inside edges of frame 1. This embodiment of the invention tongues 11a and 12a do not extend for the entire length of legs 8 and 9, but extend inwardly from the extremities thereof only approximately one-third of the length of each leg. This construction provides four distinct areas of lateral support for frame 1, and leaves open the portion of channel 2 therebetween into which balancing weight elements may be inserted if desired. The racket may be made more rigid and twist resistant by extending tongues 11a and 12a along the entire length of legs 8 and 9 respectively.

The stock 14 of the racket is formed by the extremities 8 and 9 of frame 1 which extend in parallel from the bottom 6. Below the throat bridge 7 and in the length of the handle 15 of the racket, sections 8 and 9 are held together by spacing braces 17 and 17a the ends of which also ride snugly within interior channel 2 and which are held in place by through rivets 18 and 19 (See FIGS. 1 and 9).

Referring to FIG. 9, the handle 15 of the racket is comprised of two wood halves 15a and 15b which ride between and over the tops and bottoms of legs 8 and 9. The handle is preferably made of molded plastic material such as Cycloac, but may be made of any material which will withstand the stresses encountered in play. The inserted handle pieces 15a and 15b are then wrapped with a suitable material to form a conventional grip 16 for the racket.

Another particularly unique feature of the invention is in the construction of a weight retaining throat string cushion 20 which seats in a recess 21 in the throat bridge 7 and provides for the installation for a weighted slug 22 in the throat area. Cushion 20 functions in the manner of grommet 4 to protect the strings of the racket from abrasion against the metal bridge 7 in that it is comprised of grommets 24 which fit into string holes 25 in bridge element 10 (See FIG. 6).

Referring to FIGS. 6, 7, 8 and 10, cushion strip 20 has a rectangular base 23, and a rectangular recess 26 therein the purpose of which is to accommodate a weighting slug 22 of chosen density. Slug 22 is sized to fit within recess 26 and has holes 28 therein to provide for the passage therethrough of grommets 24. FIGS. 6 (a) and 7 illustrate the two distinct positions of bridge element 10, cushion strip 20, and weighting slug 22. FIG. 7 illustrates steps 30 and 31 cut into the edges of bridge element 10, which steps receive the outside edges 32 and 33 of strip 20 in an overlapping relationship, so that upon assembly slug 22 is completely enclosed between bridge element 10 and cushion strip 20.

Weight of the slug 22 is varied by making it from a chosen variety of materials of different density, such as: lead for a heavy racket, zinc for a medium weight, and polyethylene for light weight. All of the slugs are the same size to prevent string cushion 20 from collapsing during stringing.

During the development of this invention it was found that not all magnesium alloys could be used. When magnesium alloy No. AZ31 was tried, for instance, the frame pulled out of shape during the stringing operation, and became further deformed in about 2 hours of actual play. This problem was overcome by employing magnesium alloy No. ZK60. With the use of alloy ZK60 the forementioned deformations did not reoccur. Field tests were conducted on aluminum, steel and wood rackets of prior art construction to test the rigidity of these rackets. It was found that under a 40-pound load, the tip of the bow of a steel racket deflected 1.75 inches, the tip of the aluminum racket deflected 1.95 inches, and the representative wood frame rackets deflected 1.35 inches. It was observed from this test that variations in flexibility between the wooden and prior art metal rackets was more than psychological reaction to the feel to the metal rackets and that a need existed for a metal racket having a flex equivalent to that to which players have become accustomed, or a flex which could be tailored to the likes of the individual.

By varying the cross-sectional area of the frame 1, with due regard for overall strength, and the length of tongues 11a, b and 12 a, b, with respect to legs 11 and 12, rackets having more or less flexibility can be produced, including flexes comparable to conventional wooden rackets.

While the principles of the invention have been described in connection with the above specific apparatus, it is to be clearly understood that this description is made only by way of example and not as a limitation to the scope of the invention as set forth in the accompanying claims.

1. A tennis racket or the like comprising a frame having an open throat, throat bridge means adapted to fit within and close said open throat and, balancing means attaching said bridge means to vary the weight and balance of said racket, said balancing means comprising a string cushion fitted to said throat bridge, and a weighted slug of preselected weight and density, said string cushion having a recess therein and said slug being adapted to fit within said recess.

2. The device of claim 1 wherein said throat bridge means comprises a portion of the bow of said tennis racket having holes therein for the passage of the racket strings, said string cushion includes grommets extending therefrom and passing through the string holes in said throat bridge, and said slug has holes therein adapted to permit passage of said grommets therethrough when said slug is fitted within said recess.

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