ABSTRACT OF THE DISCLOSURE

A game racket comprises an aluminum extrusion that includes a central wall separating the hollow outside portion from a pair of flanges pointed toward each other to define an inside that receives a series of plastic string supporting elements in the head portion of the frame. The string support elements are formed with upwardly and downwardly extending base portions seated in the upper and lower grooves, respectively, of the inside channel in the extrusion. A hollow string support portion extends transversely from the base portions and has an inward edge of generally C-shape through which a string may be looped. Keeping the base portions urged apart seats the string support in the inside channel. A cross piece at the lower end of the head portion of the racket carries additional string support elements and fastens together opposed portions of the aluminum extrusion to form the head portion of the racket. A handle member secures the lower portions of the extrusion together to define the handle portion of the racket and complete the racket assembly.

BACKGROUND OF THE INVENTION

The present invention relates in general to game rackets and more particularly to a novel game racket having excellent playing characteristics that is relatively easy and inexpensive to fabricate and especially suitable for nearly automatic manufacture. The invention is characterized by the excellent playing characteristics of an aluminum racket such as the Spalding Smasher, while capable of being produced at lower costs.

It is an important object of this invention to provide a game racket with excellent playing characteristics that is relatively easy and inexpensive to fabricate and especially suitable for manufacture by nearly automatic techniques.

It is another object of the invention to achieve the preceding object with a game racket assembly that may be strung before the racket frame is complete while the string supports are partially inserted and then finish the racket frame rapidly and easily while establishing high tension in the game racket strings when the assembly is completed.

It is another object of the invention to achieve one or more of the preceding objects with a racket that may also be strung manually according to conventional techniques.

It is a further object of the invention to achieve one or more of the preceding objects while anchoring the racket strings in a manner that lessens the chance of breakage while maintaining a desired string tension during string play.

It is a further object of the invention to provide a racket frame in accordance one or more of the preceding objects made largely of metal, such as extruded aluminum, or other suitable materials.

It is another object of the invention to achieve one or more of the preceding objects while absorbing shock without reducing touch control and enabling the player to hit the ball off center without feeling vibration stresses and torsional strains.

It is another object of the invention to achieve one or more of the preceding objects with a racket characterized by good balance.

BRIEF SUMMARY OF THE INVENTION

According to the invention, a game racket comprises frame means having at least head and handle portions. Each of the head and handle portions is formed with a continuous channel therearound with the head portion having a part thereof curved in an arcuate shape with the continuous channel on the inside of the arc. The channel is bounded on one side by the inner wall of the frame and has upper and lower grooves formed by upper and lower overhanging walls of the frame means. String support means substantially fill the inside channel of the head portion and have upper and lower base portions with upper and lower outside walls respectively for seating in the upper and lower grooves respectively with the upper and lower outside walls in at least partially overlapping relationship with the inside of the upper and lower overhanging walls respectively and matingly engaged with the inside of the overhanging walls and having a hollow string receiving portion for receiving a game racket string. There is means for urging the base portions apart to firmly anchor the string receiving means in the channel.

Preferably there is brace means adjacent to the lower portion of the head portion that keeps both portions of the frame means apart and in fixed relationship to help define the head portion of the game racket and may also carry string receiving means for anchoring strings at the lower portion of the head portion.

In one form of the invention, the means for urging the base portions apart comprises a spline that may be inserted around the groove between the base portions. In another form of the invention, the means for urging the base portions apart may be a transverse projection extending into the groove formed in the extrusion itself. In still another form of the invention, the means for urging the base portions apart may be the portion that is coextensive with the base portion.

Numerous other objects, features and advantages of the invention will become apparent from the following specification when read in connection with the accompanying drawing in which:

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view of a game racket according to the invention;
FIG. 2 is a perspective view of one string receiving element according to the invention;
FIG. 3 is a perspective view showing how a string receiving element may be inserted into the groove of the extruded frame manually;
FIG. 4 illustrates how a spline may be used to keep the base portions apart and thereby secure a string receiving element into the inner groove;
FIG. 5 is a top view of the top portion of a game racket according to the invention with a portion cut away to illustrate a detail of how a string receiving element is seated and the arcuate support for holding the string to virtually eliminate breakage at the support points.
FIG. 6 is a sectional view through section 6—6 of FIG. 5;
FIG. 7 is a sectional view through section 7—7 of FIG. 5;
FIG. 8 is a sectional view through section 8—8 of FIG. 5;
FIG. 9 is a sectional view of the racket through section 9—9 of FIG. 1 illustrating how the handle element and
molded supports may secure the handle portions of the frame together;

FIG. 10 shows a string of string receiving elements formed in a unitary structure;

FIG. 11 shows a similar chain curved around to conform to the curvature of the racket head;

FIG. 12 is a sectional view of a string receiving element in which the base portions are coextensive with the means for separating them;

FIG. 13 illustrates how the separator may be slid into the groove into position;

FIG. 14 is a sectional view of a string receiving element seated in the extrusion in which the means for urging the base portions apart comprises transverse projections formed in the extruded frame;

FIG. 15 is a perspective view of an extrusion generally of the type shown in FIG. 14 with a means for preventing sliding movement of the bridge spacing member and the string receiving elements along the channel; and

FIG. 16 is a view of a portion of a channel having grooves for accommodating an element like that shown in FIG. 15 for preventing sliding movement of the string receiving means.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

With reference now to the drawing and more particularly FIG. 1 thereof, there is shown a perspective view of a game racket according to the invention. The game racket 21 includes a head portion 22 and a handle portion 23. The game racket 21 includes a frame largely comprised of an aluminum extrusion 24 that is formed in the shape of the racket and has opposed portions connected together by a bridge spacing member 25 and a handle spacing element described below. A number of string receiving elements, such as 26, reside within the inside channel 36 (FIG. 3) formed in extrusion 24 and support the strings 27. Similar string receiving elements may be formed in the top of bridge member 25 to support the lower ends of vertical strings in this embodiment.

Referring to FIG. 2, there is shown a perspective view of a typical string receiving element 26 showing a string 31 looped through string receiving element 26. Element 26 includes an upper base portion 32, a lower base portion 33 and a transversely extending hollow portion 34 of generally U-shaped cross section formed with a C-shaped cross section 35 whose inside edge supports string 31 in an especially advantageous manner. There are no sharp edges that might tend to break a string under tension. Furthermore, the circular line of contact with the string ensures a firm grip on the string at all times. The radius of curvature preferably corresponds to half the separation between adjacent strings to minimize the curvature and thereby the tendency of the strings to break at the support points. Alternately, the string could be looped through a vertically aligned opening in the inward tab of element 26.

Referring to FIG. 3, there is shown a perspective view of how element 26 may be inserted into the inner groove 36 of extrusion 24. Extrusion 24 may be of aluminum, rolled steel or other suitable material and preferably includes an outside portion with a double-hollow or single-hollow extrusion separated from the inside channel 36 by a central wall 37. The inside channel 36 includes an upper groove 41 and a lower groove 42 for accommodating upper base portion 32 and lower base portion 33, respectively. A string may be looped through hollow portion 34 and then element 26 may be slipped into channel 36 with the assistance of means such as a screw driver as shown. Once the edges of base portions 32 and 33 have cleared the lips at the entrance of inside channel 36, the natural resiliency of element 26 allows them to spring apart and be seated in upper groove 41 and lower groove 42.

Referring to FIG. 4, there is shown a fragmentary per-
may be inserted in a similar manner when the extrusion is of the cross section of FIG. 14. Referring to FIG. 14, there is shown still another embodiment of the invention in which element 26 has its base portions 32 and 33 kept apart by upper ridge 72 and lower ridge 73 formed as a part of extrusion 24.

FIG. 15 is a view of a portion of extrusion 24 showing how ridges 72 and 73 may be interrupted at 74 and 75 to accommodate a pin 76 that may be inserted to prevent the bridge 25 and elements 26 from sliding. Pin 76 may be molded as part of the bridge.

Referring to FIG. 16, there is shown a portion of extrusion 24 illustrating how it may be nicked at 81 and 82 to accommodate a pin like 76 to keep the bridge 25 and elements like 26 and a hole where a screw or pin may be inserted to eliminate sliding.

There has been described a novel tennis racket that is characterized by at least the features of a high quality aluminum alloy or steel racket, albeit susceptible to automatic manufacturing techniques. The invention has other advantages. The elements that receive the strings help provide a shock absorbing effect. In addition these elements provide a large gripping surface for the strings arranged so as to eliminate the chances of breaking the string at the support.

It is evident that those skilled in the art may now make numerous uses and modifications of and departures from the specific embodiments described herein without departing from the inventive concepts. Consequently, the invention is to be construed as embracing each and every novel feature and novel combination of features present in or possessed by the apparatus and techniques herein disclosed and limited solely by the spirit and scope of the appended claims.

What is claimed is:

1. A game racket comprising, frame means having at least a head portion and a handle portion, each of said portions formed with a continuous channel therearound, said head portion having a part thereof curved in an arcuate shape with said channel on the inside of the arc, said channel bounded on one side by the inner wall of said frame and having upper and lower grooves formed by upper and lower overhanging walls of said frame means, string support means substantially filling said inside channel of said head portion and having upper and lower base portions with upper and lower outside walls respectively for seating in said upper and lower grooves respectively with said upper and lower outside walls in at least partially overlapping relationship with the inside of said upper and lower overhanging walls respectively and mattingly engaged with the inside of said overhanging walls and having a hollow string receiving portion for receiving a game racket string, and means for urging the base portions apart to firmly anchor the string receiving means in the channel with said at least partially overlapping relationship being sufficient to keep said base portions in said channel.

2. A game racket in accordance with claim 1 and further comprising bridge means adjacent to the lower portion of said head portion for keeping both portions of said frame means apart and in fixed relationship to help define said head portion.

3. A game racket in accordance with claim 2 wherein said bridge means is formed with an inside channel having upper and lower grooves for receiving said upper and lower base portions of said string support means.

4. A game racket in accordance with claim 3 wherein said bridge means comprises upper and lower separate elements formed with upper and lower projections for seating in said upper and lower grooves respectively, and means for fastening said upper and lower elements together while spacing them apart with said upper and lower projections seated in said upper and lower grooves respectively.

5. A game racket in accordance with claim 1 wherein said means for urging said base portions apart comprises a transverse projection inside said channel between said upper and lower grooves.

6. A game racket in accordance with claim 1 wherein said means for urging said base portions apart is co-extensive with said base portions and a part of said string support means.

7. A game racket in accordance with claim 1 and further comprising a number of said string support means in contiguous relationship about said head portion.

8. A game racket in accordance with claim 7 wherein a number of said string receiving means are arranged as parts of a unitary structure.

9. A game racket in accordance with claim 1 wherein said means for urging said base portions apart comprises spline means insertable between said base portions.

10. A method of making the game racket of claim 4 wherein method includes the steps of, placing one of said base portions of each of said string support means in a respective one of said grooves, looping racket strings through the string receiving portions of each of said string support means, then urging the other of said base portions of each of said string support means in the other of said grooves, and then inserting said spline means between the upper and lower base portions of each of said string support means.

11. A game racket in accordance with claim 1 and further comprising, racket strings in the hollow string receiving portions of said string support means, said racket strings applying forces to said string support means that urges said outside walls firmly against said inside of said overhanging walls so that the force applied by said inside of said overhanging walls against said outside walls keeps said string support means in said inside channel.

12. A method of making the game racket of claim 1 which method includes the steps of, placing said string support means one after another into one end of said continuous channel with the upper and lower base portions seated in said upper and lower grooves respectively, moving said string support means into the head portion of said continuous channel, and looping racket strings through the string receiving portions of each of said string support means.

References Cited

UNITED STATES PATENTS
1,526,734 2/1925 Andrews et al. .... 273—73 D
1,572,542 2/1926 Lawrence ........ 273—73 E
1,606,022 11/1926 Gallandet ........ 273—73 H
2,610,056 9/1952 Lowell ............ 273—73 D
3,547,440 12/1970 Deer ............. 273—73 G
3,582,073 6/1971 Melnick et al. .... 273—73 J

FOREIGN PATENTS
2,000,606 9/1969 France ............ 273—73 H
228,650 2/1925 Great Britain .... 273—73 H
212,195 3/1924 Great Britain .... 273—73 G

RICHARD C. PINKHAM, Primary Examiner
R. J. APLEY, Assistant Examiner
U.S. Cl. X.R.

273—73 G, 73 H, 73 J