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(71) Applicant: **Soong, Tsai Chen**
Penfield New York 14526 (US)

(72) Inventor: **Soong, Tsai Chen**
Penfield New York 14526 (US)

(74) Representative: **Ablewhite, Alan James**
MARKS & CLERK,
57/60 Lincoln's Inn Fields
London WC2A 3LS (GB)

(54) Sports racket

(57) A sports racket (1) comprises a racket body (2) having a longitudinal axis (3), said racket body (2) having a handle (4) and a frame (5), said frame (5) including a head part (6), a middle part (7), a throat element (8), and a shank element (9) connecting said throat element (8) to said handle (4); at least two string segment systems in a plane (10), one system comprising longitudinal string segments (12) running from the head part (6) towards the handle (4) in a direction substantially parallel to the longitudinal axis (3) of the racket, at least one different system comprising transverse string segments (11) running from one side of said axis (3) towards the opposite side in a direction substantially perpendicular to said axis (3), each string segment possessing two ends anchored on said members of the frame, said transverse string segments (11) and said longitudinal string segments (12) intersecting with one another; wherein a portion of said throat element (8) is provided with at least one opening (21) enabling a plurality of said longitudinal string segments (12) to pass through and be anchored in the region (30) between the throat element (8) and the handle (4), and at least for two longitudinal string segments, one on either side of the longitudinal axis (3), anchored in the region between the throat element (8) and the handle (4), there is no structural, load-carrying member between said side string segments and the outboard space beyond. The frame (5), which surrounds the string network (11, 12), is essentially not continuous.

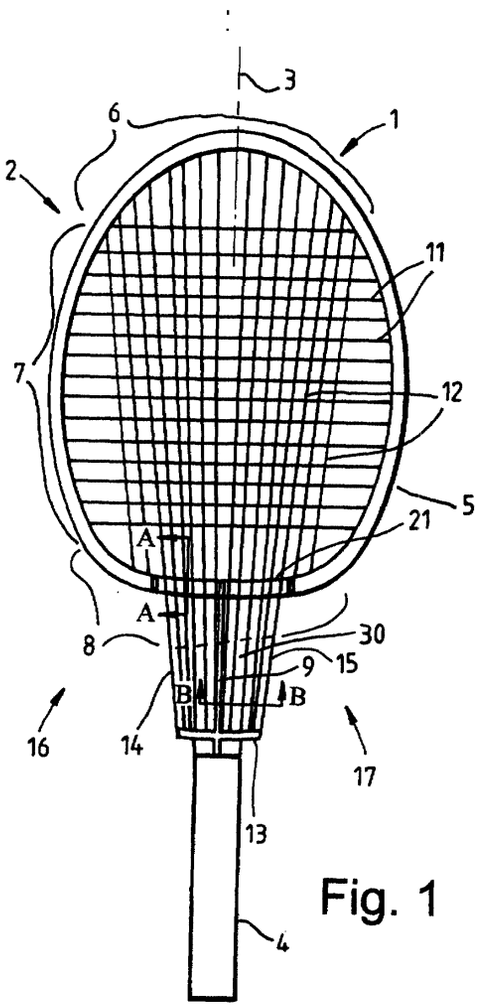

Fig. 1

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Description

[0001] This invention relates to an improved sports racket, in particular an improved tennis racket.

[0002] The present inventor's US-A-4 437 662 and EP-A-93 210, also relating to a sports racket, disclosed a string network, wherein a majority of longitudinal strings, inclined at a moderate angle with respect to the axis of the frame, converge from the head towards the handle and are anchored at a string anchoring device in the shank region behind the throat. This long converging string system improves power and control of the racket.

[0003] The present invention uses a similar stringing concept, but the frame of the racket takes the form of the earlier classical wood racket form in which the throat is not the open yoke type, and the shank is a long beam which extends from the throat to the handle.

[0004] According to the invention, there is provided a sports racket comprising:

> a racket body having a longitudinal axis, said racket body having a handle and a frame, said frame composed of structural load-carrying boundary members including a head part, a middle part, a throat element, and a shank element connecting said throat element to said handle;
> at least two string segment systems defining a plane, one system comprising longitudinal string segments running from the head part towards the handle in a direction substantially parallel to the longitudinal axis of the racket, at least one different system comprising transverse string segments running from one side of said axis towards the opposite side in a direction substantially perpendicular to said axis, each string segment possessing two ends anchored on said members of the frame, said transverse string segments and said longitudinal string segments intersecting with one another;
> werein a portion of said throat element is provided with at least one opening enabling a plurality of said longitudinal string segments to pass through and be anchored in the region between the throat element and the handle, and at least for two longitudinal string segments, one on either side of the longitudinal axis, anchored in the region between the throat element and the handle, there is no structural, load-carrying member between said side string segments and the outboard space beyond.

[0005] It is a key feature of the present invention that at least for two side string segments, one on each side of the longitudinal axis, there is no structural, load-carrying member of the frame standing between said side string segments and the outboard space beyond. In other words, as far as the string network is concerned, the boundary encircled by the structural members of the frame is not continuous. Preferably this structural discontinuity occurs between the throat element and the handle.

[0006] The invention will now be described by way of example with reference to the accompanying drawings, in which:

> Fig. 1 is a plane view of the frame of a tennis racket according to the invention in section at the stringing plane of the frame showing the structure and the string network;
>
> Fig. 2 is a view along the line A-A of in Fig. 1, in section at the throat element to show detail of the hollowed frame at the throat; and
>
> Fig. 3 is a view along the line B-B of Fig. 1, in section at the shank element to show an I-beam type cross section of the shank element.

[0007] A tennis racket is used to illustrate the innovative concept, but it is understood that the concept applies to other applicable sports rackets.

[0008] Fig. 1 is a plane view of a racket 1 according to a preferred embodiment of the invention in section through the stringing plane of the frame, comprising a racket body 2 having a longitudinal axis 3. The racket body 2 is composed of a handle 4 and a frame 5 composed of structural load-carrying boundary members, including, from top down, a head part 6, a middle part 7, a curved throat element 8 and a straight shank element 9 connecting the throat element to the handle.

[0009] The body of the racket also includes a string system defining a stringing plane 10, shown in Fig. 2, which coincides with the mid-plane of the racket body, composed of two string segment systems. Each string segment possesses two ends, attached to the frame. The lateral string segments 11 run substantially perpendicular to the longitudinal axis 3, and intersect with the longitudinal string segments 12.

[0010] Fig. 2 shows a section along the line A-A of the throat element 8 of Fig. 1, wherein a majority of the longitudinal string segments pass through the opening 21, towards the shank element 9.

[0011] Further detail is shown in Fig. 3, which is a cross section along the line B-B of the shank element 9 of Fig. 1. The cross section shows an I-beam as an example, wherein a plurality of the longitudinal string segments 12, which pass through the opening 21 of the throat element, is converging to the anchoring region, a region 30 between the throat element and the handle, which is generally referred to here as the region of the shank element.

[0012] The upper flange 32 of the cross section may join the upper wall 22 of the throat of Fig. 2, and the lower flange 33 may join the lower wall 23.

[0013] A preferred arrangement of anchoring the longitudinal string segments in the shank element region 30 is shown in Fig. 1 by installing a string seat element

13, which is shown as a bar element in the stringing plane, rigidly attached to the shank element thereof, extending outwardly as an arm in a symmetrical manner on both sides of the central column 31. There may be more than one of such seat in the shank element.

[0014] A characteristics of the present invention is that at least for two side string segments, one on each side of the longitudinal axis, such as 14 and 15 in Fig. 1, after exiting from the opening 21, which are anchored in the region between the throat element 8 and the handle 4, there is no structural, load-carrying member of the frame standing between said side string segments and the outboard space beyond, such as the space 16 and 17 respectively in Fig. 1. In other words, as far as the string network is concerned, the boundary encircled by the structural members of the frame is not continuous.

[0015] For the longitudinal string segments, which enter the region of the shank element, a plurality of them, are anchored in a string seat rigidly attached to the shank element.

[0016] The majority of the longitudinal string segments generally converge from the head part towards the shank element, ie they are typically spaced further apart from each other at the head part than at the shank element.

[0017] For appearance sake, if so desired, the structural discontinuity in the boundary of the frame may be disguised by a lightweight, non-structural connecting member. Whether this mending member is a structural load-carrying member or not can be seen by a simple test: If the frame can stand the rigour of ball playing after the shank element is cut between the throat element and the seat element, then the connecting member is a structural, load-carrying member, which has made the frame continuous; a frame having such a disguising member and shank element is not claimed by the present application. Otherwise, the disguising member is purely decorative; the racket with a seemingly continuous boundary is within the claims of the present invention.

Claims

1. A sports racket (1), comprising:

a racket body (2) having a longitudinal axis (3), said racket body (2) having a handle (4) and a frame (5), said frame (5) including a head part (6), a middle part (7), a throat element (8), and a shank element (9) connecting said throat element (8) to said handle (4);
at least two string segment systems in a plane (10), one system comprising longitudinal string segments (12) running from the head part (6) towards the handle (4) in a direction substantially parallel to the longitudinal axis (3) of the racket, at least one different system comprising transverse string segments (11) running from one side of said axis (3) towards the opposite side in a direction substantially perpendicular to said axis (3), each string segment possessing two ends anchored on said members of the frame, said transverse string segments (11) and said longitudinal string segments (12) intersecting with one another;

characterised in that a portion of said throat element (8) is provided with at least one opening (21) enabling a plurality of said longitudinal string segments (12) to pass through and be anchored in the region (30) between the throat element (8) and the handle (4),
and in that at least for two longitudinal string segments, one on either side of the longitudinal axis (3), anchored in the region between the throat element (8) and the handle (4), there is no structural, load-carrying member between said side string segments and the outboard space beyond.

2. The sports racket according to claim 1, wherein said structural discontinuity occurs between said throat element (8) and the handle (4).

3. The sports racket according to claim 1, wherein the shank element (9) has two ends and is substantially beam-like, said throat element (8) having two arms, joins a first end of the shank element, forming a fork, approximately perpendicular to each other, and the upper end of the handle (4) is located at the second end of the shank element.

4. The sports racket according to claim 3, including a string seat (13), positioned adjacent said shank element (9), and rigidly attached thereto, wherein a plurality of the longitudinal string segments (12), entering the region (30), are anchored in said string seat (13).

5. The sports racket according to claim 1, wherein the structural discontinuity in the boundary of the frame is disguised by a non-load-carrying connecting member.

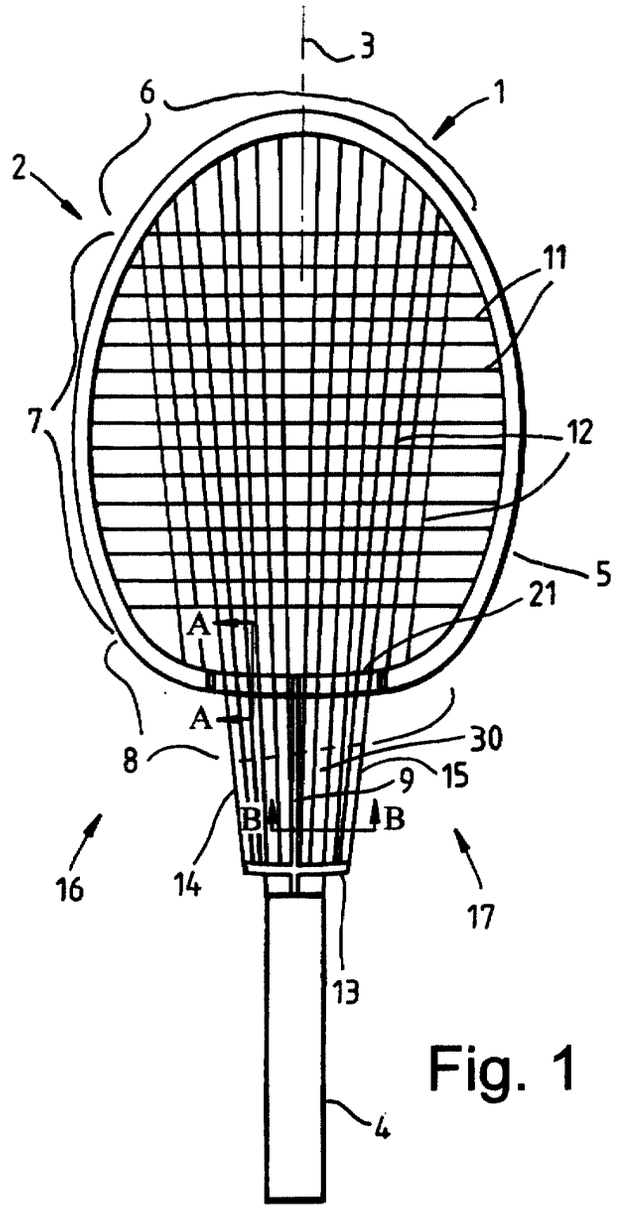

Fig. 1

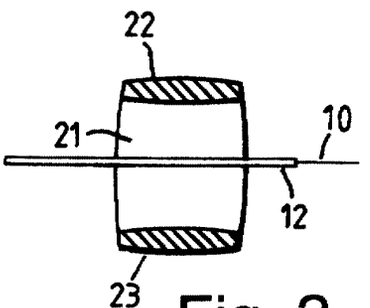

Fig. 2

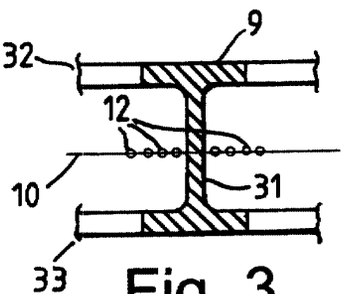

Fig. 3

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 99 31 0085

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
E	US 6 027 420 A (SOONG) 22 February 2000 (2000-02-22) * the whole document *	1-4	A63B49/02 A63B51/00
A	US 4 595 201 A (FISCHER) 17 June 1986 (1986-06-17) * column 3, line 25 - column 4, line 3; figure 1 *	1,2	
A	DE 32 11 738 A (FISCHER) 6 October 1983 (1983-10-06) * page 9, line 3 - page 11, line 26 * * page 14, line 8 - line 20; figures 1,2,13 *	1,2	
A	US 2 165 701 A (GOERKE) 11 July 1939 (1939-07-11) * page 1, left-hand column, line 55 - page 2, left-hand column, line 9; figures 1,2 *	1	
A	GB 2 226 250 A (JSENG) 27 June 1990 (1990-06-27) * page 2, line 2 - line 16; figure 1 *	1	TECHNICAL FIELDS SEARCHED (Int.Cl.7) A63B
A	US 5 141 228 A (SOONG) 25 August 1992 (1992-08-25) * the whole document *	1	
A	DE 28 29 818 A (HILDEBRAND) 17 January 1980 (1980-01-17)		

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	17 May 2000	Williams, M

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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17-05-2000

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6027420 A	22-02-2000	NONE	
US 4595201 A	17-06-1986	DE 3211738 A	06-10-1983
		AT 20575 T	15-07-1986
		AU 555845 B	09-10-1986
		AU 1376783 A	24-10-1983
		DE 3364342 D	07-08-1986
		DK 545683 A,B,	29-11-1983
		WO 8303358 A	13-10-1983
		EP 0106850 A	02-05-1984
		JP 5000589 B	06-01-1993
		JP 59500628 T	12-04-1984
		US 4754968 A	05-07-1988
DE 3211738 A	06-10-1983	AT 20575 T	15-07-1986
		AU 555845 B	09-10-1986
		AU 1376783 A	24-10-1983
		DE 3364342 D	07-08-1986
		DK 545683 A,B,	29-11-1983
		WO 8303358 A	13-10-1983
		EP 0106850 A	02-05-1984
		JP 5000589 B	06-01-1993
		JP 59500628 T	12-04-1984
		US 4595201 A	17-06-1986
		US 4754968 A	05-07-1988
US 2165701 A	11-07-1939	NONE	
GB 2226250 A	27-06-1990	NONE	
US 5141228 A	25-08-1992	NONE	
DE 2829818 A	17-01-1980	NONE	

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