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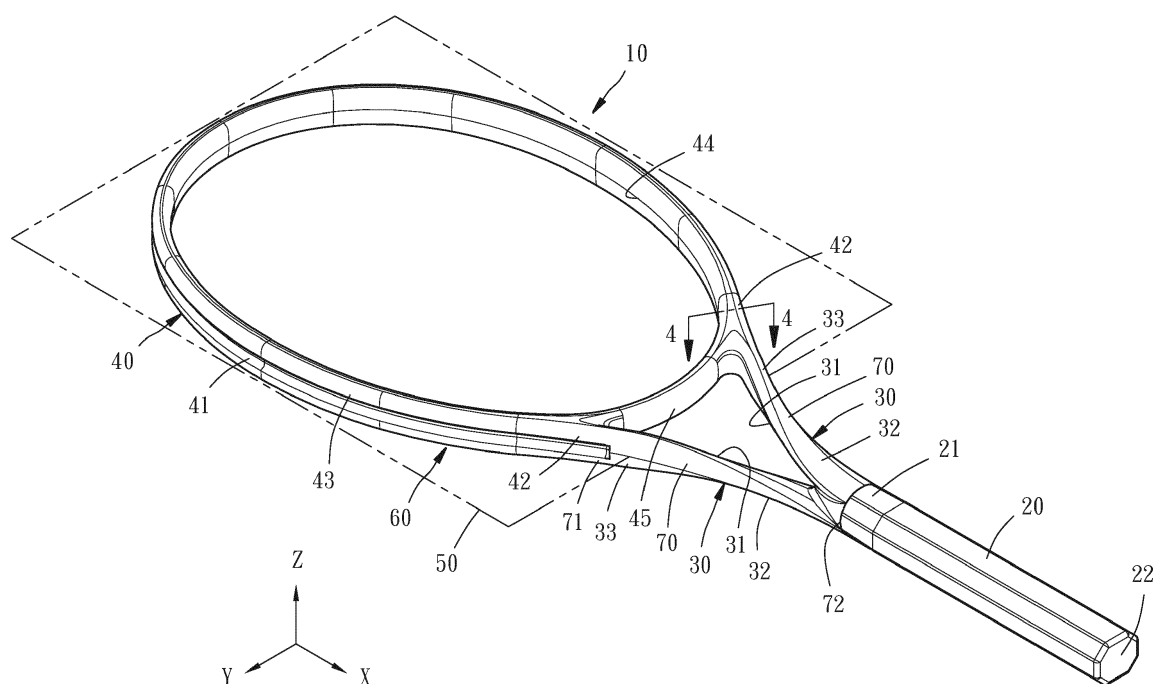
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(54) **TWISTED TENNIS RACKET FRAME**

(57) A twisted tennis racket frame (10) includes a handle (20), two supporting arms (30) having outside surfaces (32) facing reverse directions, and an annular-shaped head (40) provided on an imaginary plane (50) with large and small arc portions (41, 45). The large arc portion (41) has an external arc surface (43), which composes a continuous curved surface (60) with the outside surfaces (32) of the two supporting arms (30). The continuous curved surface (60) has at least one twisted section (70) having a starting end (71) located at the large

arc portion (41) and faces toward a first facing direction (81) that is situated on the imaginary plane (50), and a terminal end (72) connected with the handle (20) and faces toward a second facing direction (82). The included angle between the first and second facing directions (81, 82) is larger than 0 degree and not larger than 180 degrees. As a result, the racket performs well in controlling the ball and enables the user to turn the hitting surface quickly.



EIG 1

Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates generally to sports goods and more particularly, to a twisted tennis racket frame, which has better performance in controlling the tennis ball and enables the user to turn the hitting surface of the tennis racket quickly.

2. Description of the Related Art

[0002] Before swinging the tennis racket and hitting the tennis ball with the tennis racket, the tennis player has to turn the hitting surface of the tennis racket appropriately according to the hitting method such as forehand, backhand, smash, chop, volley, and so on. Therefore, a tennis racket frame enabling the tennis player to turn the hitting surface of the tennis racket is required. However, the manufacturers of the conventional tennis racket frames are not aware of such requirement, and never attend to fill such requirement. Besides, the tennis racket's performance in controlling the tennis ball has much influence on the performance of the tennis player, so how to improve the tennis racket's performance in controlling the tennis ball is an important subject for the related industry.

SUMMARY OF THE INVENTION

[0003] It is an objective of the present invention to provide a twisted tennis racket frame, which has better performance in controlling the tennis ball and enables the user to turn the hitting surface of the tennis racket quickly.

[0004] To attain the above objective, the present invention provides a twisted tennis racket frame which includes a handle, two supporting arms, and a head. Each of the two supporting arms is extended from an end of the handle and has an inside surface and an outside surface. The inside surfaces of the two supporting arms face each other, and the outside surfaces of the two supporting arms face reverse directions. The head is annular-shaped and provided on an imaginary plane with a large arc portion and a small arc portion. The large arc portion is C-shaped and has two ends connected with ends of the two supporting arms respectively. The small arc portion is connected with the two ends of the large arc portion. The large arc portion has an external arc surface and an internal arc surface. The external arc surface and the outside surfaces of the two supporting arms compose a continuous curved surface. The continuous curved surface has at least one twisted section provided with a starting end and a terminal end. The starting end is located at the large arc portion of the head and faces toward a first facing direction that is situated on the imaginary plane. The terminal end is connected with the handle and

faces toward a second facing direction. The included angle between the second facing direction and the first facing direction is larger than 0 degree and not larger than 180 degrees.

5 [0005] Resulted from the configuration design of the twisted section, the twisted tennis racket frame enables the user to turn the hitting surface of the tennis racket quickly for changing hitting method nimbly, and improves the performance of the tennis racket in controlling the tennis ball.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006]

15 FIG. 1 is a perspective view of a first preferred embodiment of the present invention.

FIG. 2 is a top view of the first preferred embodiment of the present invention.

20 FIG. 3 is a partial lateral view of the first preferred embodiment of the present invention.

FIG. 4 is a sectional view taken along the line 4-4 in FIG. 1.

25 FIG. 5 is a perspective view of a second preferred embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

30 [0007] The structural features and effects of the present invention will be specified in the following description of two preferred embodiments of the present invention.

35 [0008] Referring to FIGS. 1-3, a twisted tennis racket frame 10 according to a first preferred embodiment of the present invention includes a handle 20, two supporting arms 30, and a head 40.

[0009] The handle 20 has a front end 21, a rear end 22, and octagonal cross sections.

40 [0010] Each of the two supporting arms 30 are extended from the front end 21 of the handle 20 and has an inside surface 31 and an outside surface 32. The inside surfaces 31 of the two supporting arms 30 face each other, and the outside surfaces 32 of the two supporting arms 30 face reverse directions.

45 [0011] The head 40 is annular-shaped and provided with a large arc portion 41 and a small arc portion 45. The large arc portion 41 and the small arc portion 45 are located on an imaginary plane 50. For the convenience of illustration, the imaginary plane 50 is the X-Y plane in this embodiment. The large arc portion 41 is C-shaped and has two ends 42 connected with ends 33 of the two supporting arms 30 respectively. The small arc portion 45 is also connected with the two ends 42 of the large arc portion 41. The large arc portion 41 has an external arc surface 43 and an internal arc surface 44. The external arc surface 43 and the outside surfaces 32 of the two supporting arms 30 compose a continuous curved surface 60 which has two twisted sections 70. Each of the

twisted sections 70 has a starting end 71 which is located at the juncture of the large arc portion 41 of the head 40 and the supporting arm 30 and defined with a first facing direction 81. The first facing directions 81 of the two twisted sections 70 are both located on the imaginary plane 50, i.e. the X-Y plane. Each of the twisted sections 70 has a terminal end 72 which is connected with the handle 20 and defined with a second facing direction 82. In this embodiment, the second facing directions 82 of the two twisted sections 70 are both parallel to the Z-dimension; one of the second facing directions 82 points to the upside of the X-Y plane, and the other second facing direction 82 points to the downside of the X-Y plane. The second facing direction 82 and the first facing direction 81 of each twisted section 70 have an included angle therebetween. The two included angles are equal to each other, and each included angle is approximately equal to 90 degrees. The two twisted sections 70 are twisted in the same direction in a way that the juncture of one of the supporting arms 30 and the handle 20 is located above the imaginary plane 50 and the juncture of the other supporting arm 30 and the handle 20 is located below the imaginary plane 50.

[0012] It should be mentioned that each of the first facing directions 81 and the second facing directions 82 is a facing direction which is defined on a surface as the direction the surface faces. The concept of the facing direction is like that of the direction the human face fronts; no matter how curved the human face is, the human face fronts a direction which is just like the facing direction defined in the present invention. Refer to FIG. 4. FIG. 4 illustrates the cross section of the juncture of the large arc portion 41 and the supporting arm 30 of the tennis racket frame 10, and the starting end 71 of the twisted section 70 is located at the juncture. Because the part of the continuous curved surface 60 shown in FIG. 4 belongs to the external arc surface 43 of the large arc portion 41, the first facing direction 81 in FIG. 4 is illustrated as the arrow to the right. If an imaginary connecting line L is defined to connect two junctures 47 of the continuous curved surface 60, the part of which shown in FIG. 4 belongs to the external arc surface 43, and the internal arc surface 44, the first facing direction 81 is perpendicular to the imaginary connecting line L and passes through the midpoint of the imaginary connecting line L. In this embodiment, the imaginary connecting line L is parallel to the Z-dimension, and the first facing direction 81 is located on the X-Y plane. As shown in FIGS. 1-3, the facing direction of each twisted section 70 rotates counterclockwise (viewed from the rear end 22 of the handle 20) from the starting end 71 to the terminal end 72. At the starting end 71, the facing direction is the first facing direction 81 located on the X-Y plane. At the terminal end 72, the facing directions of the two twisted sections 70 become the second facing directions 82 which are parallel to the Z-dimension. One of the second facing directions 82 points to the positive direction of the Z-dimension and the other second facing direction 82 points

to the negative direction of the Z-dimension.

[0013] When the right-handed user is taken as an instance, the tennis racket frame 10 of the present invention is used in a way that the user holds the handle 20 with the right hand and slightly supports the two supporting arms 30, i.e. the twisted sections 70, with the left hand. When a force is applied from the left hand to turn the racket, the direction of the force is approximately perpendicular to the part of the continuous curved surface 60 there, so that the tennis racket frame 10 can be turned to the demanded angle quickly, enabling the user to change the hitting method nimbly. Besides, resulted from the configuration design of the twisted sections 70 of the continuous curved surface 60, the feeling of hitting the tennis ball with the tennis racket having the twisted tennis racket frame 10 is quite different from the feeling of hitting the tennis ball with the conventional tennis racket. The practical trial performed by tennis players indicates that the tennis racket frame of the present invention has better performance in controlling the tennis ball than the conventional tennis racket frame, thereby showing potential in marketability.

[0014] Based on the spirit of the present invention, the area of the twisted section can be modified, such as that of the twisted tennis racket frame 10 according to a second preferred embodiment of the present invention as shown in FIG. 5. The structure of the frame in the second preferred embodiment is similar to that in the first preferred embodiment. If the handle 20 is defined in the 6 o'clock direction relative to the head 40, the large arc portion 41 of the head 40 has two side ends 46 located at the 3 o'clock position and the 9 o'clock position of the head 40 respectively. The twisted tennis racket frame 10 of the second preferred embodiment is characterized in that the starting ends 71 of the twisted sections 70 are located at the side ends 46 respectively.

[0015] In other potential embodiments, the twisted sections are not limited to be equal in the included angle between the second facing direction and the corresponding first facing direction, and the twisted sections may be twisted in opposite directions; alternately, the twisted tennis racket frame may have only one twisted section. Besides, the included angle between the first and second facing directions may be modified according to the user's habit of hitting ball, as long as the included angle is larger than 0 degree and not larger than 180 degrees. If the included angle doesn't equal 90 degrees, the junctures of the supporting arms and the handle may not located above and below the imaginary plane respectively.

[0016] It should be mentioned that the starting end of the twisted section is not limited to be located as in first and second preferred embodiments; the starting end can be located at any position of the large arc portion of the head, such as the 12 o'clock position, the 4 o'clock position, or the 8 o'clock position.

[0017] The above description represents merely the preferred embodiment of the present invention, without any intention to limit the scope of the present invention.

The simple variations and modifications not to be regarded as a departure from the spirit of the invention are intended to be included within the scope of the following claims.

Claims

1. A twisted tennis racket frame comprising:

a handle (20);

two supporting arms (30) extended from an end (21) of the handle (20) and each having an inside surface (31) and an outside surface (32), the inside surfaces (31) of the two supporting arms (30) facing each other, the outside surfaces (32) of the two supporting arms (30) facing reverse directions; and

a head (40) which is annular-shaped and provided on an imaginary plane (50) with a large arc portion (41), which is C-shaped and has two ends (42) connected with ends of the two supporting arms (30) respectively, and a small arc portion (45) connected with the two ends (42) of the large arc portion (41), the large arc portion (41) having an external arc surface (43) and an internal arc surface (44), the external arc surface (43) and the outside surfaces (32) of the two supporting arms (30) composing a continuous curved surface (60);

wherein the continuous curved surface (60) has at least one twisted section (70) provided with a starting end (71), which is located at the large arc portion (41) of the head (40) and faces toward a first facing direction (81) that is situated on the imaginary plane (50), and a terminal end (72), which is connected with the handle (20) and defined with a second facing direction (82), an included angle between the second facing direction (82) and the first facing direction (81) being larger than 0 degree and not larger than 180 degrees.

2. The twisted tennis racket frame as claimed in claim 1, wherein the starting end (71) of the twisted section (70) is located at a juncture of the large arc portion (41) of the head (40) and the supporting arm (30).

3. The twisted tennis racket frame as claimed in claim 1, wherein the starting end (71) of the twisted section (70) is located at a side end (46) of the large arc portion (41) of the head (40).

4. The twisted tennis racket frame as claimed in claim 1, wherein the included angle between the first facing direction (81) and the second facing direction (82) is substantially equal to 90 degrees.

5. The twisted tennis racket frame as claimed in claim 4, wherein a juncture of one of the two supporting arms (30) and the handle (20) is located above the imaginary plane (50) and a juncture of the other supporting arm (30) and the handle (20) is located below the imaginary plane (50).

6. The twisted tennis racket frame as claimed in claim 1, wherein the continuous curved surface (60) has two said twisted sections (70).

7. The twisted tennis racket frame as claimed in claim 6, wherein the included angle between the first facing direction (81) and the second facing direction (82) of one of the twisted sections (70) is equal to the included angle between the first facing direction (81) and the second facing direction (82) of the other twisted section (70).

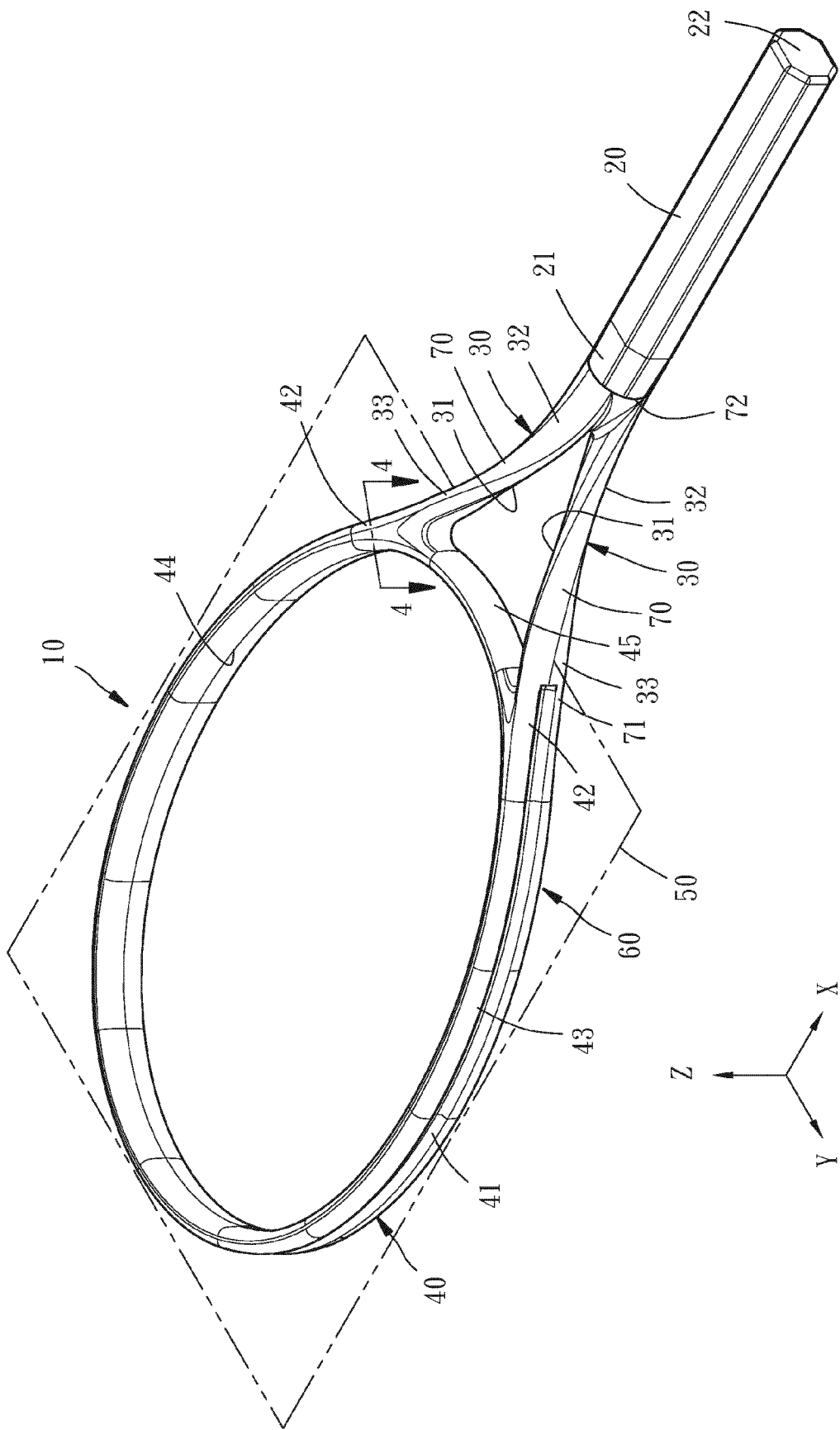


FIG 1

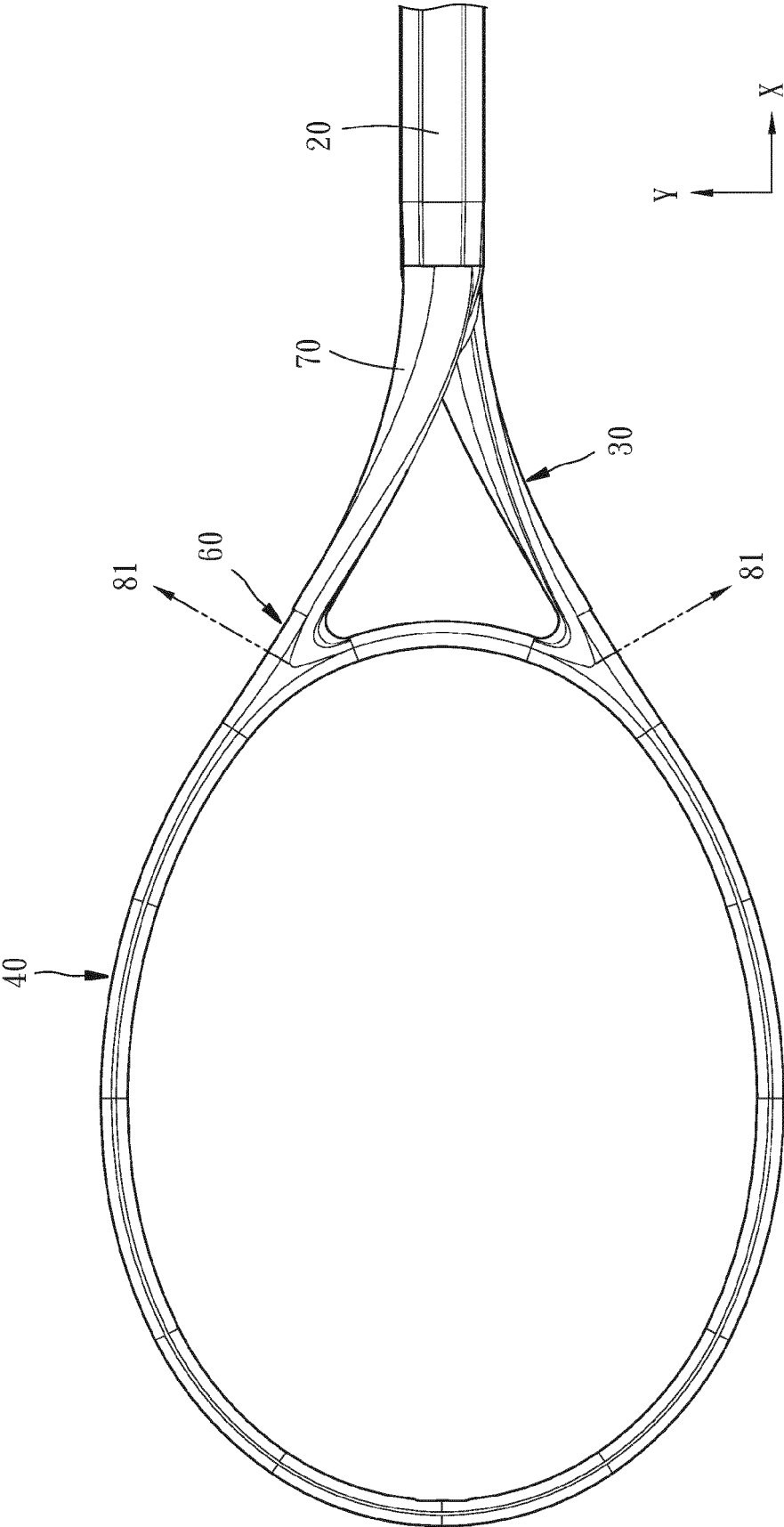


FIG 2

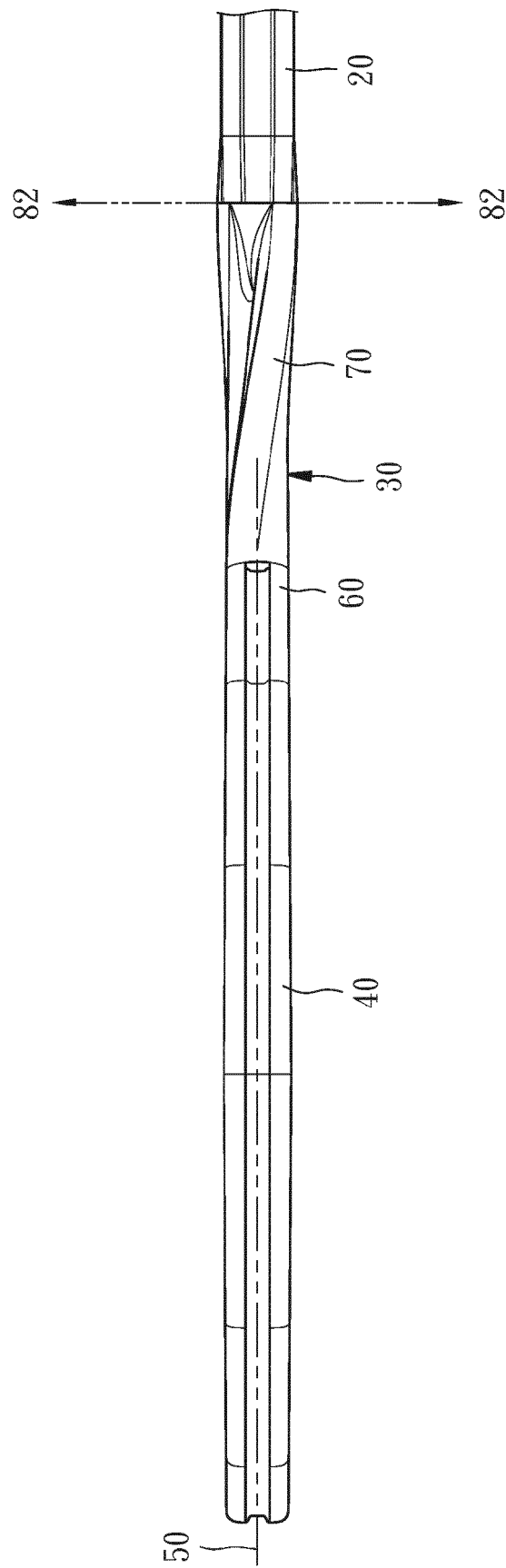


FIG 3

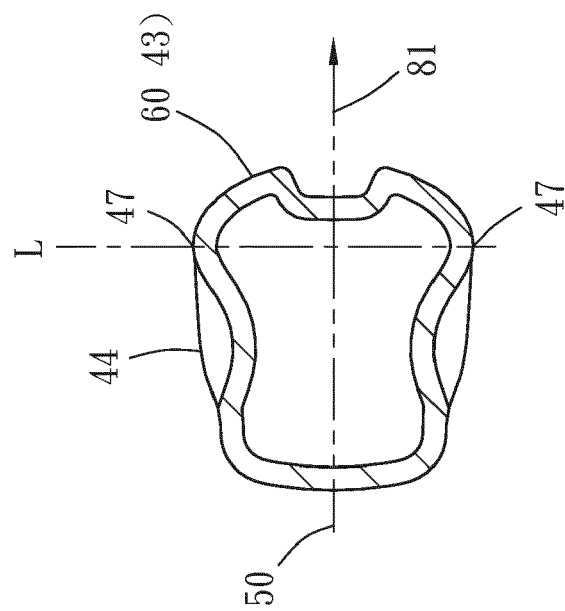
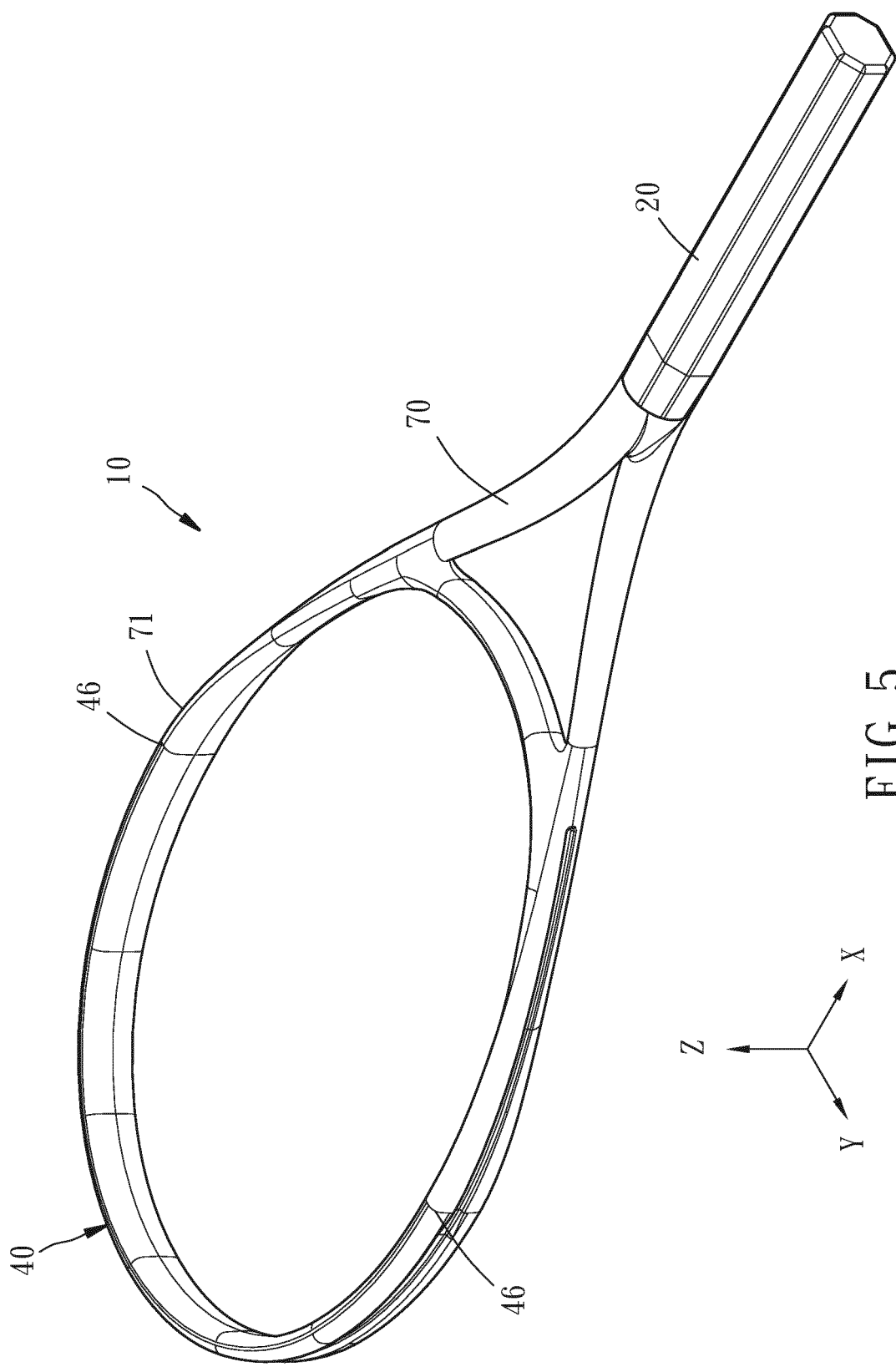


FIG. 4





EUROPEAN SEARCH REPORT

Application Number
EP 15 20 2825

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	FR 2 690 850 A1 (ROSSIGNOL SA [FR]) 12 November 1993 (1993-11-12) * page 4, line 5 - page 4, line 9; claim 2; figures 5,6 *	1,2,4-7	INV. A63B49/03
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A	DE 195 07 991 A1 (HACKEWITZ FRIEDRICH W VON DR I [DE]) 12 September 1996 (1996-09-12) * column 3, line 60 - column 4, line 50; figure 2 *	1-7	
			TECHNICAL FIELDS SEARCHED (IPC)
			A63B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 27 April 2016	Examiner Murer, Michael
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 15 20 2825

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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27-04-2016

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82