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### **Racket handle.**

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A handle, for a tennis racket including a racket head having a substantially planar ball-striking surface, including a pair of minor surfaces and at least one major surface in which, viewing the handle in cross-section, the minor surfaces are generally perpendicular to the ball-striking surface of the racket head and the major surface is at an angle of between 25° and 40° with a plane parallel to the ball-striking surface of the racket head. A player's grip on the racket handle may be accurately and quickly changed between a forehand grip and a backhand grip by means of the «feel» of the handle contours. In the forehand grip, the palm of the player's hand engages the major surface of the handle, and in a backhand grip the player's palm engages one of the minor surfaces, with the fingers encircling but substantially not contacting the major surface.

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RACKET HANDLEDescription of the Invention

5 This invention relates generally to rackets and handles therefore and more particularly concerns tennis rackets in which the correct orientation of a player's grip on the racket handle is facilitated by the shape of the handle.

10 In the play of tennis, a tennis racket is generally gripped in a different fashion for a forehand stroke than for a backhand stroke. If the tennis racket is properly gripped for each of these strokes, the ball is struck by the head of the racket with the ball-contacting surface of the racket head oriented so that a proper trajectory of the ball results. In such a case  
15 the ball-contacting surface, defined by the racket strings, is generally, though not necessarily exactly, perpendicular to the ground.

In order to obtain the proper racket orientation in the player's hand, the player typically relies  
20 upon the feel of the racket handle to locate the handle relative to the player's palm, fingers, and thumb. It is generally impractical for the player to actually view the orientation of the racket in the player's hand in the course of play due to the speed with which the correct  
25 grip, forehand or backhand, must be selected, while the player also establishes proper position for striking the ball.

In the construction of a typical tennis racket, the handle is symmetrical, when viewed in endwise cross-section, about the plane of the striking surface of the  
30 racket head. Often the racket is also symmetrical about

a plane perpendicular to the plane of the racket head. In such racket handles, the principal, or longest, surfaces of the handle are generally either parallel or perpendicular to the plane of the strings of the head of the racket. Consequently, in order to effect the proper grip, whether forehand or backhand, on the racket handle the player must, by sense of feel, locate the appropriate major surface to be engaged by the hand and, by rotation of the racket handle in the hand, arrive at the desired orientation of these surfaces in the hand.

The principal "feel" of the racket handle is obtained by the contact of the palm, fingers, and thumb of the player's hand with the major surfaces of the racket handle. In gripping a typical tennis racket handle, the exact location of, for example, a major surface of the racket handle within the palm of the hand may be readily obtainable for an expert tennis player. However, obtaining this proper handle orientation is much more difficult for a less experienced player. Since even a relatively small degree of misorientation of the racket in the player's hand can result in an improper trajectory for the ball, inaccuracies in a player's grip can have a greatly adverse effect upon the player's game.

In the past, various types of racket handles have been proposed which include such features as special contours, or finger and thumb-receiving grooves, for assisting in orienting a player's hand on the racket handle. Such proposed handles have been formed more or less in the shape of "pistol grips" and the like. Such grips, while they permit better orientation of the hand on a racket handle, have been found objectionable because they lack the "feel" of a conventional tennis racket handle to which players have become accustomed. In addi-

tion, such "pistol grip" types of formed racket handles often fail to provide proper hand orientation for both forehand and backhand grips. In most cases, such rackets must be custom made for each individual player, which  
5 greatly adds to the cost of the racket.

It is consequently the general aim of the present invention to provide a tennis racket handle which can be easily and accurately positioned in a player's hand for either a forehand or a backhand stroke, and with  
10 which the "feel" of a conventional racket handle is retained.

This objective has been accomplished in accordance with certain principles of the invention by the provision of a tennis racket having a head portion with a  
15 substantially planar ball-striking surface and a handle portion having a pair of minor surfaces and at least one major surface in which, viewing the handle portion in cross-section, the minor surfaces are generally perpendicular to the ball-striking surface of the head portion  
20 and the major surface is at an angle of between 25° and 40° with a plane parallel to the ball-striking surface of the head portion of the racket.

Other objects and advantages of the invention, and the manner of their implementation, will become apparent upon reading the following detailed description and  
25 upon reference to the drawings, in which:

Figure 1 is a perspective view of a tennis racket having a head portion and a handle portion constructed in accordance with the present invention;

30 Figure 2 is a cross-sectional view of the handle of Figure 1 taken along the line 2-2 and in the direction of the arrows;

Figures 3a and 3b are perspective views of a portion of the tennis racket handle showing a forehand grip thereon;

5        Figures 4a and 4b are perspective views of the handle portion of Figures 3a and 3b showing a backhand grip thereon; and

Figures 5a, 5b and 5c are cross-sectional views of modified forms of handle construction.

10        While the invention is susceptible to various modifications and alternative forms, certain illustrative embodiments thereof have been shown by way of example in the drawings and will herein be described in detail. It should be understood, however, that it is not intended to limit the invention to the particular form disclosed,  
15        but, on the contrary, the intention is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the invention as defined by the appended claims.

Turning now to the figures, a tennis racket 10  
20        includes a head portion 11 and a handle portion 12 joined by a neck portion 13. The particular construction of the head 11 and the neck 13, and the internal construction of the handle 12, are not critical to the practice of the present invention. As best shown in Figure 2, the peri-  
25        meter of the handle 12 is made up of six faces, identified A through F. Viewed in cross section, the handle is symmetrical about a plane 14 of the striking surface of the head 11 of the racket 10, which may be regarded as a plane of the strings 16 in the racket head 11.

30        In the illustrated racket handle 12, the six handle surfaces include two longest, or major, surfaces A and B, two minor surfaces C and D, and two intermediate surfaces E and F. In the illustrated form of the inven-

tion, the minor surfaces C and D are perpendicular to the plane 14, and in the illustrated handle the surfaces D, E and F are equal in length, as viewed in the cross section of Figure 2.

5           The illustrated major surfaces A and B are also equal in length, as viewed in Figure 2, and form equal angles "a" and "b" with planes parallel to the ball-striking plane 14. The angles "a" and "b" are between 25° and 40°, and preferably lie in the range of 29° to 10 37°. For angles falling within this range, it is presently believed that proper forehand and backhand grips on the racket, in a manner to be discussed, can be obtained by players having a range of forms in striking the ball. In rackets thus far constructed, it has been found 15 that the angles "a" and "b" are between 31° and 36°. In the illustrated racket handle, the angles "a" and "b" are 34°.

          In the cross section of Figure 2, the handle 12 has two principal dimensions. The first is the distance 20 between the minor surfaces C and D, indicated CD in the figure. The second principal dimension is the distance between the intersection points AE and BF, indicated W in the figure. In the illustrated form of the invention, the distance W is preferably greater than or equal to the 25 distance CD.

          A right-handed player grips the racket 10 for a forehand stroke as shown in Figures 3a and 3b. In the forehand grip illustrated, for a righthanded player, the palm of the hand engages the major surface B of the handle 12. The thumb grasps the handle about the surfaces F 30 and D, with the tip of the thumb extending onto the surface E. The bases of the fingers contact the surface C, with the fingertips extending about the handle into con-

tact with the surfaces E and D. The fingers encircle the surface A, without significantly contacting the surface.

The principal gripping force on the racket is exerted between the surfaces B and E, with the spacing  
5 between these surfaces cooperating with the arrangement of the other faces to produce the "feel" of a conventional tennis racket handle. The angle of the racket face is ensured to be substantially correct due to the angle "b" of the major surface B with the ball-contacting plane 14  
10 of the racket face. The relative size of the surface B results in the accurate orientation of the racket in the player's hand to produce the proper orientation of the racket head when the ball is struck.

To grip the racket for a backhand stroke, the  
15 racket handle is grasped as shown in Figures 4a and 4b. For a backhand stroke, by a righthanded player, the palm of the hand engages the surfaces D and E, with the thumb extending along the surface A. The bases of the fingers lie along the surface F, and the fingers extend around  
20 the surface B, without significant contact thereon, with the fingertips engaging the surface C and extending partially onto the surface A. The primary grasping force for the backhand stroke is exerted between (a) the surfaces D and E and (b) the surface C. Due to the spacing  
25 between these surfaces, and the contour of the other surfaces, the "feel" of the racket in the backhand grip is similar to that of a conventional racket.

The forehand and backhand grips for the racket handle 12, for a lefthanded player, are analogous to  
30 those illustrated for a righthanded player. For a forehand grip, for example, a lefthanded player grasps the racket handle 12 with the player's palm engaging the surface A. For a backhand stroke, the palm-engaging surfaces are the surfaces D and F.

The perimeter dimension of the handle 12 may be increased or decreased, preferably while maintaining the relative proportions of the handle surfaces, to properly size the handle dependent upon the size of the hand of the player. In this way, a racket handle of the configuration shown may be provided wherein the palm, fingers and thumb of any size hand lie on the requisite surfaces, as set forth above.

While only a single preferred embodiment of the present invention has thus far been described, those persons skilled in the art to which the invention pertains will readily appreciate that changes and modifications may be made without departing from the spirit of the invention. For example, the intermediate surfaces E and F and the minor surfaces D need not be of the same length, as viewed in the cross-sectional view of Figure 2. As another example, the end of the handle may be of an enlarged cross-section relative to the remainder of the handle to reduce the tendency of the handle to slide from the player's grasp during play.

It has been found, as a further example, that the major surfaces A and B (as shown in Figure 2) can be more easily located by making these surfaces slightly larger. This can facilitate obtaining a proper grip upon the racket handle.

As shown in Figure 5a, the major surfaces A' and B' are lengthened, and the intermediate surfaces E' and F' are slightly shortened (relative to the surfaces A, B, E and F of Figure 2). The lengths of the minor surfaces C and D remain the same, and the angles "a" and "b" remain the same, as those shown in the handle of Figure 2.

In the handle of Figure 2, the angles DF and DE are about  $124^\circ$ . In the handles illustrated in Figures 5a, 5b and 5c, these angles are increased, with resultant lengthening of the surfaces A' and B' (Figure 5a), A'' and B'' (Figure 5b), and A''' and B''' (Figure 5c). In Figure 5a the angles DF' and DE' are about  $135^\circ$ . In Figure 5b the angles DF'' and DE'' are about  $140\frac{1}{2}^\circ$ , and in Figure 5c the angles DF''' and DE''' are about  $146^\circ$ .

CLAIMS

1. A tennis racket comprising a head portion  
2 having a substantially planar ball-striking surface and a  
handle portion having a pair of minor surfaces and at  
4 least one major surface in which, viewing the handle  
portion in cross-section, the minor surfaces are general-  
6 ly perpendicular to the ball-striking surface of the head  
portion and the major surface is at an angle of between  
8 25° and 40° with a plane parallel to the ball-striking  
surface of the head portion.

2. The racket of claim 1 in which the major  
2 surface is at an angle of between 29° and 37° with a  
plane parallel to the ball-striking surface.

3. The racket of claim 2 in which the major  
2 surface is at an angle of about 34° with a plane parallel  
to the ball-striking surface.

4. The racket of claim 1 in which the handle  
2 portion has a second major surface wherein, viewing the  
handle portion in cross-section, the second major surface  
4 is at an angle of between 25° and 40° with a plane paral-  
lel to the ball-striking surface.

5. The racket of claim 4 in which the second  
2 major surface is at an angle of between 29° and 37° with  
a plane parallel to the ball-striking surface.

6. The racket of claim 5 in which the second  
2 major surface is at an angle of about 34° with a plane  
parallel to the ball-striking surface.

7. The racket of claim 4 in which the handle  
2 portion further includes a first intermediate surface  
between said at least one major surface and one of said  
4 minor surfaces and a second intermediate surface between  
the second major surface and said one minor surface.

8. The racket of claim 7 in which the first  
2 intermediate surface is at an angle relative to said one  
minor surface which is equal to the angle between the  
4 second intermediate surface and said one minor surface.

9. The racket of claim 8 in which the angles  
2 between the intermediate surfaces and said one minor  
surfaces are between  $124^{\circ}$  and  $146^{\circ}$ .

10. The racket of claim 9 in which the angles  
2 between the intermediate surfaces and said one minor  
surface are between  $135^{\circ}$  and  $146^{\circ}$ .

11. The racket of claim 7 in which the handle  
2 portion of the racket, viewed in cross-section, has a  
first principal dimension which is the distance between  
4 said minor surfaces and a second principal dimension  
which is the distance between the intersection of said at  
6 least one major surface with the first intermediate sur-  
face and the intersection of said second major surface  
8 and the second intermediate surface, the second principal  
dimension being equal to or greater than the first prin-  
10 cipal dimension.

12. The racket of claim 11 in which the first  
2 major surface is at an angle of between  $29^{\circ}$  and  $37^{\circ}$  with  
a plane parallel to the ball-striking surface.

13. The racket of claim 12 in which the first  
2 major surface is at an angle of about  $34^{\circ}$  with a plane  
parallel to the ball-striking surface.

14. A handle for a tennis racket which has a  
2 racket head with a substantially planar ball-striking  
surface, the handle comprising a pair of minor surfaces  
4 and at least one major surface in which, viewing the  
handle in cross-section, the minor surfaces are generally  
6 perpendicular to the ball-striking surface of the racket  
head and the major surface is at an angle of between  $25^{\circ}$   
8 and  $40^{\circ}$  with a plane parallel to the ball-striking sur-  
face of the racket head.

15. The handle of claim 14 in which the major  
2 surface is at an angle of between  $29^{\circ}$  and  $37^{\circ}$  with a  
plane parallel to the ball-striking surface.

16. The handle of claim 15 in which the major  
2 surface is at an angle of about  $34^{\circ}$  with a plane parallel  
to the ball-striking surface.

17. The handle of claim 14 in which the handle  
2 has a second major surface wherein, viewing the handle in  
cross-section, the second major surface is at an angle of  
4 between  $25^{\circ}$  and  $40^{\circ}$  with a plane parallel to the ball-  
striking surface.

18. The handle of claim 17 in which the handle  
2 further includes a first intermediate surface between  
said at least one major surface and one of said minor  
4 surfaces and a second intermediate surface between the  
second major surface and said one minor surface.

19. The handle of claim 18 in which the handle,  
2 viewed in cross-section, has a first principal dimension  
which is the distance between said minor surfaces and a  
4 second principal dimension which is the distance between  
the intersection of said at least one major surface with  
6 the first intermediate surface and the intersection of  
said second major surface and the second intermediate  
8 surface, the second principal dimension being equal to or  
greater than the first principal dimension.

20. A method of alternating between a forehand  
2 and a backhand grip on a tennis racket that has a head  
portion having a substantially planar ball-striking sur-  
4 face and a handle portion having a first and a second  
minor surface, a first and a second major surface, and a  
6 first and a second intermediate surface in which, viewing  
the handle portion in cross-section, the first and second  
8 minor surfaces are generally perpendicular to the ball-  
striking surface of the head portion, the first and sec-  
10 ond major surfaces are at an angle of between 25° and 40°  
with a plane parallel to the ball-striking surface, and  
12 the first intermediate surface is interposed between the  
first major surface and the second minor surface and the  
14 second intermediate surface is interposed between the  
second major surface and the second minor surface, com-  
16 prising the steps of:

gripping the racket handle for a forehand stroke  
18 in which the palm of the hand engages the first major  
surface, the thumb engages the first intermediate surface  
20 and the second minor surface, and the fingers engage the  
first minor surface and the second intermediate surface  
22 without substantially contacting the second major sur-  
face; and

24                    switching to a backhand grip in which the palm  
of the hand engages the second minor surface and the  
26                    second intermediate surface, the thumb engages the second  
major surface, and the fingers engage the first interme-  
28                    diate surface and the first minor surface substantially  
without contacting the first major surface.

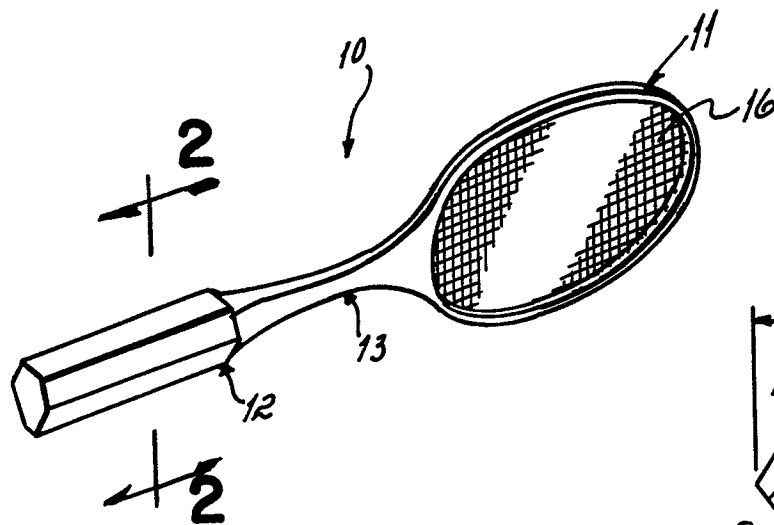


FIG. 1

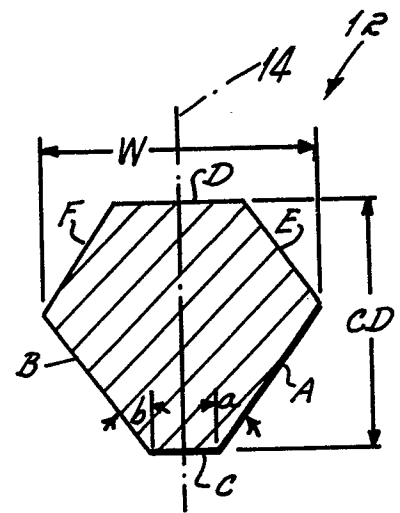


FIG. 2

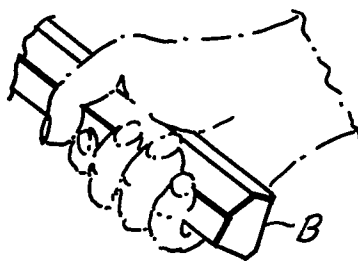


FIG. 3A

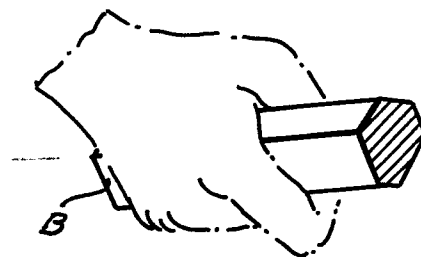


FIG. 3B

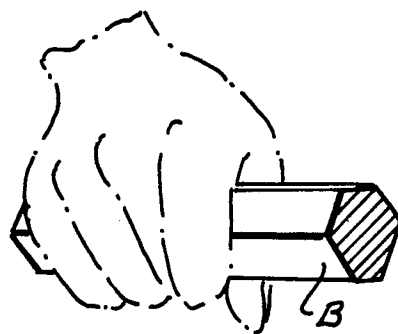


FIG. 4A

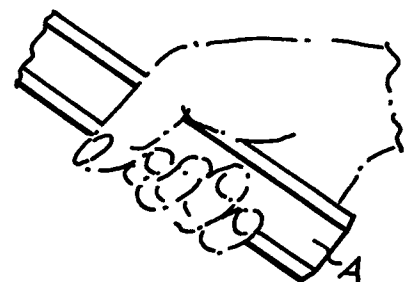
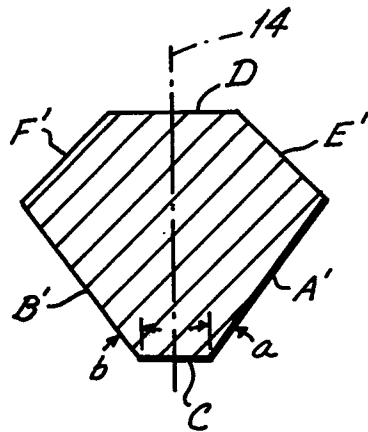
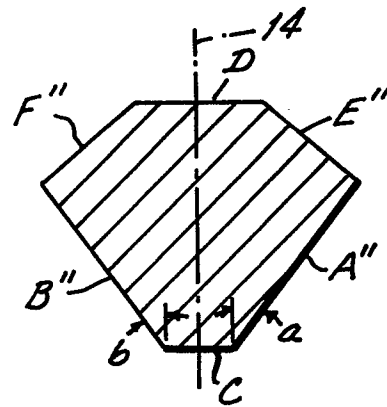
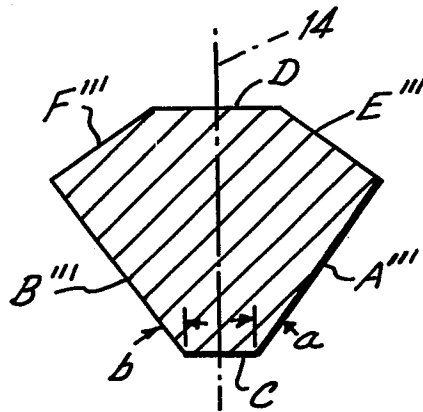


FIG. 4B

**FIG. 5A****FIG. 5B****FIG. 5C**