

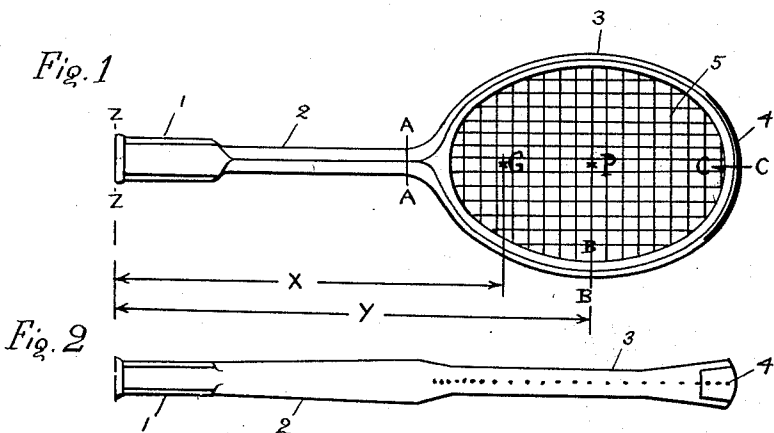
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J. P. NIKONOW

TENNIS RACKET

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A-A



Fig. 3

B-B



Fig. 4

C-C



Fig. 5

John P. Nikonow

INVENTOR

UNITED STATES PATENT OFFICE.

JOHN P. NIKONOW, OF NEW YORK, N. Y.

TENNIS RACKET.

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To all whom it may concern:

Be it known that I, JOHN P. NIKONOW, citizen of the United States, and resident of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Tennis Rackets, of which the following is a specification.

My invention relates to tennis rackets and has for its object to provide a racket with greater efficiency for striking the ball.

In ordinary tennis rackets the weights are so distributed that the center of gravity is located approximately in the middle of the racket length, consequently its center of percussion, or center of application of the force of the blow for a circular swing around its handle, is located near the racket end of the gut, and not in its center. But since in most cases the ball is struck with the center of the racket face (or gut), it follows, that with ordinary rackets a more or less large part of the force of the blow is wasted in reaction on the player's hand.

In my racket I provide a construction in which the weights are so distributed that the center of percussion for a wrist swing, or a swing around the handle, is located at the center of the racket face.

My invention is more fully described in the accompanying specification and drawing in which—

Fig. 1 is a plan view of my racket, Fig. 2 is a side view, Fig. 3 is a section of the handle on a line A—A, Fig. 4 is a section B—B, and Fig. 5 is a section C—C.

My racket is provided with a handle 1 of a standard size of a sufficient length only for a hand grip, made of some light material, such as a light sort of wood. The intermediate portion 2 of the racket is made of a light section reinforced only in a transverse direction (section A—A) to render this racket sufficiently stiff and, at the same time, to reduce the air resistance to the rapid movement of the racket. The racket oval 3 is also made light and of a streamline section (B—B) to reduce the air resistance. The end of the racket oval is made substantially heavier by increasing its width (section C—C), this increased width also helping to reduce the air resistance by improving its streamline effect. An additional weight 4 may be also added in the form of a metal

strip, or of some other heavy material. An ordinary racket gut 5 is strung in the oval 3.

It should be noted that the oval 3 may be of any ordinary shape, even approaching an octagonal, square or round shapes and will be called an "oval" in this general meaning.

The object of such weight distribution is to displace the center of gravity G towards the oval end of the racket to such distance X from the handle end, that the center of percussion P for an axis passing through its handle end (axis $z-z$, Fig. 1) becomes located in the middle of the oval, or at its geometrical center.

We have a formula for determining this distance Y from the center of percussion to the handle end:

$$Y = I/wX$$

Where I is a moment of inertia of racket in relation to the axis $z-z$, w —weight of the racket, and X —distance of its center of gravity. Expressing in terms of a moment of inertia in relation to the center of gravity (which we denote I_0), we have:

$$I = \frac{I_0 + X^2w}{wX}$$

From this equation we can determine the distance X for a given distance Y, as the weight of the racket w and the moment of inertia I_0 are known.

It can be seen from this equation that in order to move the center of gravity inside of the oval it is necessary to increase X or I_0 .

The distance X can be lengthened by reducing the weight of the handle and increasing the weight of the oval. The moment of inertia for the same weight can be increased by concentrating a large part of this weight near the racket end.

This may be accomplished best by increasing the racket section C—C near its end and by adding an extra heavy metal strip 4. The section should be increased in a streamline fashion in a direction perpendicular to the face of the oval so as to reduce the air resistance.

An ordinary racket is about 26 inches long with center of gravity at about 13 in. from the end, and with the center of the oval at about 19½ inches from the handle end, the center of percussion being at about 16½ in. from the handle end.

In order to have the center of percussion

in the middle of the oval, the distance X should be made about 16 inches, or from 15 to 17, depending on the distribution of the weights: it will be shorter for greater additional weight 4.

With the center of percussion at the middle of the oval it is possible to use lighter racket for the same effect in striking the ball, for instance, a 12 oz. racket may develop just as much power in driving the ball at the same speed, as a 14½ oz. ordinary racket. The muscular effort will be reduced by having a lighter racket to swing, and the accuracy of driving may be improved on account of more uniform force of striking the ball, as in my racket the force is about the same on both sides of the center of the oval, while in an ordinary racket the force is much lower at one end of the oval, and greater nearer the handle.

Important advantages of my racket are that it can be made lighter for the same striking force, or may give greater force for the same weight, also that it relieves the player's hand from the reaction when the ball is struck too far from the center of percussion. Consequently the racket may be held loosely relieving the hand muscles, and the driving may be more accurate on account of more uniform striking force.

I claim as my invention:

1. In a tennis racket, the combination with an oval, a gut strung in said oval, a handle an intermediate member connecting said oval with said handle, said intermediate member and said oval being shaped in a

streamline form in a direction perpendicular to the face of said racket.

2. In a tennis racket, the combination with an oval, a gut strung in said oval, a handle, an intermediate member connecting said handle with said oval, said intermediate member and said oval being flattened and sharpened in a direction perpendicular to the face of said racket.

3. In a tennis racket, the combination with an oval, a gut strung in said oval, a handle, an intermediate member connecting said handle with said oval, said oval with said intermediate member being of a flattened section with sharp edges extending in a direction perpendicular to the face of said racket, the cross-sectional area of said oval being greater at the end opposite to said handle.

4. In a tennis racket, the combination with an oval, a gut strung in said oval, a handle, an intermediate member connecting said oval with said handle, the weight of said oval being greater than the weight of said handle with said intermediate member, said oval being of a heavier section at the end opposite to said handle.

5. In a tennis racket, the combination with an oval frame, a gut strung in said frame, and a handle extending from said frame, the cross-sectional area of said frame being greater at the end opposite to said handle.

Signed at New York in the county of New York and State of New York this 5th day of February A. D. 1924.

JOHN P. NIKONOW.