July 12, 1927. 1,635,943

W. A. LARNED

MEANS FOR CONTROLLING THE TENSION OF A TENNIS RACKET STRINGING

Filed Jan. 7, 1924

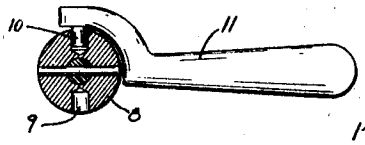

FIG. 3

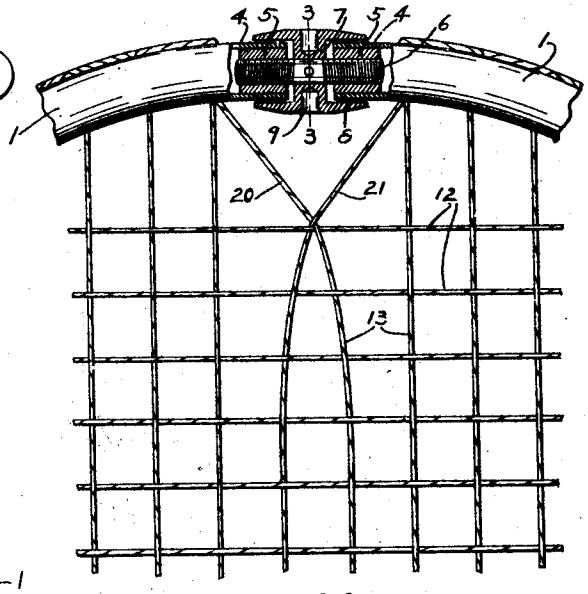

FIG. 2

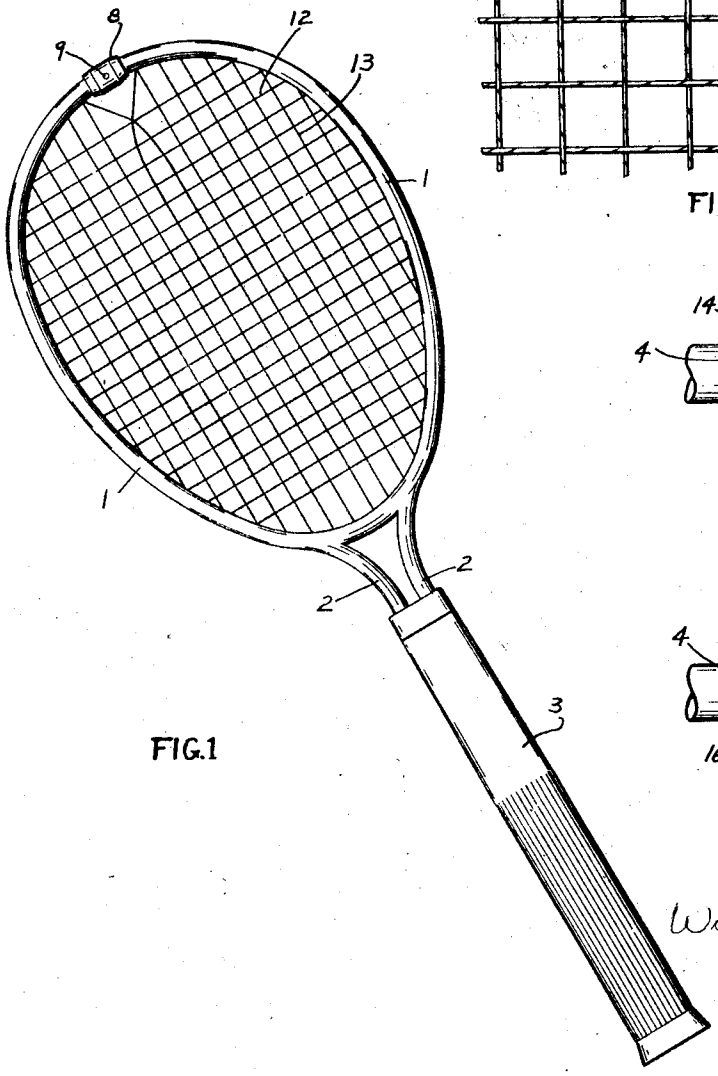

FIG. 1

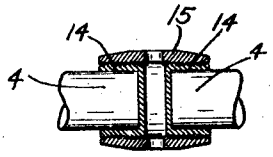

FIG. 4

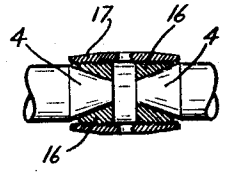

FIG. 5

William A. Larned

INVENTOR.

Patented July 12, 1927. 1,635,943

UNITED STATES PATENT OFFICE.

WILLIAM A. LARNED, OF SUMMIT, NEW JERSEY, ASSIGNOR TO THE DAYTON STEEL RACQUET COMPANY, OF DAYTON, OHIO, A CORPORATION OF OHIO.

MEANS FOR CONTROLLING THE TENSION OF A TENNIS-RACKET STRINGING.

Application filed January 7, 1924. Serial No. 684,810.

This invention relates to new and useful improvements in tennis rackets, and refers more particularly to a novel method of, and means for, controlling the tension of the stringing of the frame.

It is the principal object of my invention to control the tension of the stringing of a steel or wood tennis racket by increasing or decreasing the strung area enclosed by the frame.

To do this, I provide means for increasing the area referred to, but with provisions for preventing a counteracting change in the shape of the frame such as would tend to neutralize the effect of the area-increasing means.

As an area-increasing means, I adopt an expansion joint or turnbuckle located at the top of the racket frame; but I have found that when this turnbuckle is thus placed at the end of the major axis of the frame, and is then used to expand the area, it is necessary to have the long strings of the racket run parallel to this major axis, with the cross strings perpendicular thereto. The long strings thus act as an anchorage to prevent a neutralizing distortion of the frame, such for example, as would occur if the stringing were diagonal. This construction serves to prevent the tendency of the frame to become more elliptical when under tension which would decrease its area, since, as is well known, a true circle is the maximum area for a given perimeter.

In the accompanying drawings illustrating my invention, Figure 1 is a front elevational view of a rectangularly strung, oval tennis racket containing a turnbuckle in its divided head. Figure 2 is an enlarged front elevational view of the top of the racket frame, with the adjusting device shown in section. Figure 3 is a cross sectional view taken through said adjusting device on the line 3—3 of Figure 2, showing a turning instrument applied to it. Figure 4 is a longitudinal sectional view of a turnbuckle device in which cup nuts are fitted over the ends of the frame to dispense with a separate screw. And Figure 5 is a longitudinal sectional view taken through a turnbuckle device employing cup nuts with which the tubular frame ends have a cone connection.

While my improved string tensioning means may be employed in a tennis racket frame made of steel, wood or other material, I have illustrated in the drawings a tubular steel frame 1 having legs 2, 2 to which a wood handle 3 is secured. The frame 1 is split or divided at the top on its longitudinal axis to provide two free tubular ends 4, 4 in which are brazed or otherwise tightly secured, nuts 5, 5, one with a right and the other with a left thread. These nuts receive the threaded ends of a screw 6 to which a central web 7 of a turnbuckle sleeve 8 is pinned. The hollow ends of this sleeve 8 enclose the tubular frame ends 4, 4, with its central web 7 between them, said frame ends adapted to be moved away from each other when the screw 6 is turned by the sleeve in one direction, and to be drawn toward each other when the screw is rotated by the sleeve in the opposite direction. This sleeve 8 is formed with radial holes 9 to receive the toothed projection 10 of a spanner wrench 11 or other suitable instrument by means of which it may be easily turned to expand or contract the frame 1 for the purpose of controlling the tension of the stringing now to be described. (See Figures 2 and 3.)

In Figures 1 and 2 I have shown the form of stringing which I have adopted, viz, a rectangular one having horizontal strings 12 and vertical strings 13, the latter serving to anchor the top of the frame as referred to above. The principal expansion of the frame by turning the turnbuckle will be in the direction of its minor axis, thus most efficiently increasing its total area, and tightening the strings.

These vertical strings prevent the frame from becoming more elliptical in shape as it otherwise would tend to do under this increased pressure, as for example, with diagonal stringing. Any such effect of making the shape more elliptical would neutralize the string-tensioning effect produced by the expansion joint.

In Figure 4 I have shown for use in the top of the frame, a turnbuckle in which the central screw is eliminated. This construction comprises two cupped nuts 14, 14 that are firmly applied to the ends 4, 4 of the tubular frame 1. These nuts, one of which is provided with a right and the other with a left external thread, are encircled by an internally threaded turnbuckle sleeve 15 which, when it is turned in one direction, will force the nuts outwardly to move the ends 4, 4 of the frame apart, and when turned in the op-

posite direction, it will cause the nuts to draw the frame ends together for the purpose of controlling the tension of the strings.

Still another form of turnbuckle is illustrated in Figure 5. In this construction the central screw is also done away with, nuts 16, 16 with conical holes extending through them being employed to receive the ends 4, 4 of the tubular frame. In this instance, these frame ends are closed in to conical form so that the nuts may be firmly applied to them. They are also surrounded by a turnbuckle sleeve 17 which may be turned to force them apart or to draw them together to vary the area of the frame for the purpose of controlling the tension of its stringing as before described.

No matter what form of turnbuckle or expansion joint construction is employed, if it is located in the outer end of the frame on its longitudinal axis, and the stringing is arranged in the frame in such a manner as to anchor its outer end against undue extension when its divided ends are forced outwardly by the turnbuckle, the area of the frame will be increased and the stringing tightened.

As shown in Figures 1 and 2, I have provided an additional stringing feature for the particular two vertical strings which are nearest to the vertical axis. According to this feature, these two strings 20 and 21 are crossed over each other near the top, and likewise both crossed over the uppermost horizontal string 12, and then led downward to the throat of the racket. The advantage of this is that the uniformity of the mesh is preserved, although of course this could be done in a variety of ways, such as by an ordinary loop or other method of tying, to bring these two central vertical strings into proper alignment at the top. Incident to this there of course follows a better tensioning effect.

Having described my invention, I claim:

In a tennis racket, the combination with a frame and vertical and horizontal stringing therein of a turnbuckle located at the top of said frame for expanding and contracting the same, and with the two vertical strings which are nearest to the longitudinal axis, crossed upon each other and also crossed upon the top horizontal string.

In testimony whereof I have hereunto set my hand this 2nd day of January, 1924.

WILLIAM A. LARNED.