There is disclosed herein a game racket having a frame made of metal tubing formed into a loop portion, convergent throat portion, and parallel spaced handle portions which project from the throat portion. A curved yoke made of the same tubing as the remainder of the frame is bridged across the throat to complete the loop. The yoke is notched longitudinally inwardly from the ends thereof, said notches being formed on the center line of the yoke in plane of the loop. The tubing wall portions are compressed together on either side of the notches and shaped to nest over inwardly facing wall portions of the loop portion adjacent to the throat portion, and the ends of the yoke are brazed or welded to the loop along the edges of the notches adjacent to the center line of the racket in the plane of the loop.
Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.
VOKE CONSTRUCTION FOR GAME RACKET

This invention relates to game rackets and particularly to a yoke construction wherein the racket frame is formed from a single piece of metal tubing to provide a loop portion, a convergent throat portion, and parallel handle portions projecting from the throat portion.

In game rackets of the type referred to above, as shown in U.S. Letters Pat. No. 3,086,777, a bridge or yoke has been provided across the throat portion of the frame in the form of a piece of tubing which is substantially identical with the tubing of the remainder of the frame. The piece of tubing is given an arcuate form complementary to the shape of the loop, and the ends of said piece of tubing are welded, brazed, or otherwise secured to the inner wall portions of the loop adjacent to the throat portion. Thus a loop is completed whereby the same may be provided with taut cross strings in a well-known manner.

In the known tubular yoke construction referred to, the brazed points or areas are disposed adjacent to the front and rear of the racket frame, the terms front and rear referring to the striking surfaces of the racket either of which may be considered the "front" or the "rear." Thus as the racket is seen edgewise or in the plane of the loop, the brazed points are adjacent to the wall portions of the frame defining the extreme front and rear planes of the loop. When the racket is placed under stress by forcefully striking a ball in play, it will be readily seen that these referred to outside edges are constantly being subjected to alternate elongation and compression stress as the racket is swung by the player and the ball is struck. Thus the brazing is commonly placed in the most highly stressed areas where as a consequence it is most subject to fatigue from the constant flexing of the racket frame.

In the present invention, a curved yoke is formed from a piece of the same tubing as the remainder of the frame, and the ends of the yoke are notched longitudinally inwardly along the center line of the yoke in the plane of the loop as the racket frame is seen edgewise or from one side. A brazo or weld is disposed along the edge of the notch adjacent to the aforementioned center line of the racket medially between and away from the above-referred to front and back edge portions of greatest stress. This center line, as the racket is viewed edgewise, will hereinafter be referred to as the "neutral plane" since in any flexing of the racket, the least amount of compression and elongation takes place in this zone. The result is less stress in the brazed areas and increased fatigue life of the frame.

In view of the foregoing, the general object of the present invention is to provide an improved yoke construction in a game racket frame of the type having a yoke or bridge brazed or welded across the throat portion thereof.

Another object of the invention is to provide such a yoke construction which is characterized by an increased fatigue life.

Still another object of the invention is to provide a yoke construction in a game racket as set forth above wherein the brazing or welding is confined to an area adjacent to the neutral plane of the racket.

A further object of this invention is to provide a yoke construction in a game racket as set forth above wherein the brazing or welding is provided over a substantial area adjacent to the neutral plane at either end of and beyond the yoke.

Other objects of the invention and a number of advantages thereof will be readily apparent from the following description of one embodiment of the invention illustrated in the accompanying drawings, in which said drawings:

FIG. 1 is a front elevation of a game racket embodying the yoke construction of this invention;

FIG. 2 is an enlarged detail in front elevation of one end of the yoke and a portion of the frame loop to which it is secured;

FIG. 3 is a vertical section taken along the line 3—3 of FIG. 2;

FIG. 4 is a still further enlarged sectional detail taken along the line 4—4 of FIG. 3;

FIG. 5 is a perspective view drawn substantially to the scale of FIGS. 2 and 3 showing an end portion of the yoke as seen from the concave side thereof before being brazed across the throat portion; and

FIG. 6 is a perspective view similar to FIG. 5 showing the end of the yoke from the outer or convex thereof.

Referring now to the drawings in all of which like parts are designated by like reference numerals, FIG. 1 shows a game racket 10 the frame of which is formed from a piece of tubing 20 having a medial portion shaped into a loop 11 and the remainder forming a converging throat portion 12 and parallel handle portions 13. A yoke or bridge extends across and completes the lower end of the loop 11, said loop affording means for mounting taut cross strings 15 thereto in a known manner. The handle portions 13 provide means for mounting a suitable handgrip 16 secured thereto in any suitable manner.

As clearly shown in FIG. 4, the tubing 20 of the game racket frame is generally figure-8 shaped comprising a pair of like beads 21 joined along the center line of the tubing by a neck portion 22. Thus the beads 21 are disposed adjacent to the front and rear of the racket and the neck portion 22 is disposed in the neutral plane defined by the center line through the framing or tubing as the racket is viewed from the side or perpendicular to the view shown in FIG. 1. The center line thus referred to is indicated by the line C—C of FIG. 3.

The yoke 14 is made from tubing which is substantially identical with the tubing of the remainder of the frame, the same comprising beads 21 joined by a neck portion 22. As clearly shown in FIGS. 5 and 6, each end of the yoke 14 is cut away inwardly of the end to provide a notch 25 defined by elongated, outwardly flaring side edges 26 and a generally transverse innermost edge 27. The wall portions on either side of the notch 25 are compressed together and formed with a slight transverse concavity whereby to provide a pair of tabs 28 adapted to nest over the beads 21 of the tubing at the bottom of the loop adjacent to the throat portion 12.

Referring now to FIG. 3 of the drawings, the bifurcated ends of the yoke 14 are connected to the bottom of the loop 11 by means of brazing or welding 30 disposed in the notches 25 along the side edges 26 and the innermost edges 27 and preferably extending longitudinally beyond said notch to increase the securing area.

The brazing or welding is disposed at the neck 22 of the tubing which forms the loop, on or closely adjacent to the neutral plane or center line C—C.
It will be readily seen that any flexing of the tubing 20 under impact of a struck ball, and the reaction of the frame as the ball bounces away, will cause maximum elongation or compression along the outermost edge portions of the beads 21, with said outermost edge portions being indicated at 21a in FIGS. 3 and 4. These are the areas in which the metal is subjected to maximum stress, the amount of stress decreasing inwardly toward the center line C—C and being minimal along said center line which defines the neutral plane. Thus by placing the brazing or welding 30 in and closely adjacent to the neutral plane, the same is disposed as far from the highly stressed areas at 21a as possible. This substantially reduces the stresses to which the yoke 14 is subjected throughout the life of the racket and increases the fatigue life of the frame.

The yoke construction of the present invention is applicable to steel rackets with brazed yokes and to welded yokes in all types of steel, or aluminum alloys suitable for welding, and other metal materials wherein the ends of the yoke can be joined to the frame adjacent to the throat portion of a game racket by means of metal heated to a flowable state. Thus in the following claims, the description “metal heated to a flowable state” shall mean either brazing or welding.

Although the embodiment of the invention herein illustrated utilizes a tubing of substantially figure-8 shape cross section, it will be understood that the form shown is not meant to exclude any other form. It will also be understood that many changes in the details of the invention as herein described and illustrated may be made without, however, departing from the spirit thereof or the scope of the appended claims.

1. In a game racket, a frame comprising a metal tube shaped to form a loop portion and converging throat portion; a handgrip rigid with respect to said throat portion and projecting away from said loop portion; said frame having a neutral plane of minimum stress disposed on the center line of the racket as viewed edgewise of the plane of the loop, and front and back edge portions on either side of said neutral plane subject to maximum compression and elongation stresses in use; a metal yoke disposed across the bottom of and completing said loop portion, said yoke having a pair of opposite, spaced, bifurcated, elongated end portions overlapping spaced external surface portions of said tubular frame facing inwardly of said loop portion; each of said spaced yoke bifurcated end portions having an elongated notch between the bifurcated end portions, said notch being disposed substantially on said center line, each of said elongated, bifurcated end portions being secured to said loop at opposite ends of said yoke by metal heated to a flowable state disposed in each said notch, said yoke being connected substantially in the neutral plane of said racket only, away from said front and back edge portions.

2. In a game racket as set forth in claim 1: said yoke comprising a piece of metal tube of substantially the same size and cross-sectional shape as said first mentioned metal tube, end portions of said yoke being compressed together on either side of said notch and transversely shaped to nest over inner surface portions of said loop portion.

3. In a game racket, a frame comprising metal tubing shaped to form a loop portion, converging throat portion, and parallel handle portions projecting away from said loop portion; said frame having a neutral plane of minimum stress disposed on the center line of the racket as viewed edgewise of the plane of the loop and front and back edge portions on either side of said neutral plane subject to maximum compression and elongation stresses in use; a metal yoke disposed across the bottom of and completing said loop portion, said yoke having a pair of opposite, spaced, bifurcated, elongated end portions overlapping spaced external surface portions of said tubular frame facing inwardly of said loop portion; each said spaced yoke bifurcated end portion having an elongated notch between the bifurcated end portions, said notch being disposed substantially on said center line, each of said elongated, bifurcated end portions being secured to said loop at opposite ends of said yoke by metal heated to a flowable state disposed in each said notch, said yoke being connected substantially in the neutral plane of said racket only, away from said front and back edge portions.

4. In a game racket as set forth in claim 3: said yoke comprising a piece of tubing of the same size and cross-sectional shape as said first mentioned metal tubing, said elongated end portions of said yoke being compressed together on either side of said notch and transversely shaped to nest over inner surface portions of said loop portion.

5. In a game racket as set forth in claim 3: said metal tubing being of generally figure-eight shape in cross-section comprising a pair of parallel beads joined by a neck portion, said neck portion being disposed in said neutral plane; said yoke comprising a tube of the same size and cross-sectional shape as said first mentioned metal tubing; said notch at each end of said yoke being disposed through the neck portion of said tube; the portions of said tube on either side of said notch being compressed together to form longitudinally extending tabs, each said tab transversely curved to nest over one of the beads of said metal tubing.

6. In a game racket as set forth in claim 3: said metal heated to a flowable state extending longitudinally from each said notch beyond the associated bifurcated end portion to increase the securing area of each said bifurcated end portion.

7. In a game racket, a frame comprising an elongated metallic framing member shaped to form a loop portion and converging throat portion; a handgrip rigid with respect to said throat portion and projecting away from said loop portion; said frame having a neutral plane of minimum stress disposed on the center line of the racket as viewed edgewise of the plane of the loop, there being front and back edge portions of said framing on either side of said neutral plane subject to maximum compression and elongation stresses in use; a metal yoke disposed across the bottom of and closing said loop, said yoke having a pair of opposite, spaced, bifurcated, elongated end portions overlapping spaced external surface portions of said framing member facing inwardly of said loop portion; each said spaced yoke bifurcated end portion having an elongated notch defined by elongated inner edge portions disposed on either side of and adjacent to said neutral plane; said inner edge portions being secured to said frame substantially in a flowable state, said front and back edge portions of said framing being free of said yoke whereby said yoke is secured to said framing substantially only along the neutral plane of minimum stress.

8. In a game racket as set forth in claim 7: said metal heated to a flowable state extending longitudinally from each said notch beyond the associated bifurcated end portion to increase the securing area of each said bifurcated end portion.

* * * * *