A tennis racquet apparatus comprises a handle integral with a neck and a frame, the frame strung to define a face of the racquet. A weighting device engaged with or within the frame, neck or handle, is in a position for urging the face of the racquet into a vertical attitude relative to a ground surface when the handle of the racquet is near horizontal. The weighting device may be a solid, a granulate or a liquid and of such consistency as to flow to the lowest point of the racquet.
TENNIS RACQUET WITH BALLAST URGED PREFERRED FACE POSITION

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] This invention relates generally to the construction and use of tennis racquets and more particularly to a tennis racquet with moving ballast for urging the racquet into a preferred position during use in hitting a tennis ball and in playing the game of tennis.

[0003] 2. Description of Related Art and Background

[0004] The following art defines the present state of this field:

[0005] Kencerson, U.S. Pat. No. 2,737,216 describes a hammer head construction comprising a body member having means for attachment of a handle thereto and a cap member for striking a blow with said hammer, said cap and body members having integrally formed opposed cup-shaped recesses with said body member being telescopically received by said cap and provided with an external wall of reduced cross section forming a shoulder against which the cupped rim of said cap is seated, the cup of said body member having an internally shouldered rim forming a lip with a closure disc seated on said rim and engaged by said lip to anchor said disc against removal therefrom, a quantity of weighted material partially filling the chamber formed by the disc and recess of said body member, the bottom of said cupped recess of the cap member being in spaced relation to said disc and said disc receiving the direct impact of said weighted material in shifting the material towards said cap when a blow is struck by the hammer.

[0006] Kuban, U.S. Pat. No. 4,057,250 describes the construction of sports rackets, such as those used for tennis and similar games. The racket has weight means which moves transverse to the plane of the racket stringing, mounted adjacent to the bow or head of the racket to provide inertial rebound deadening when the racket strikes a ball.

[0007] McCutchen, U.S. Pat. No. 5,605,327 describes a butt cap for a racquet comprising walls defining a cavity for slidably engaging the handle of the racquet and walls defining a butt ballast cavity for containing a butt ballast. The butt cap is preferably an ellipsoidal, rounded, tapering approximate egg-shape protruding in excess of 1 cm axially beyond the handle end of the racquet so as to add length to a racquet and provide a comfortable surface such that the player may simultaneously grip the handle and the distal extension, particularly on the serve. The advantage of a butt weight for adding power and control to sports striking implements in general is discussed. A racquet having a distal particulate butt ballast not only damps shock but prevents it by adding more mass to the racquet at the distal end thereof. The butt ballast is preferably of loose metal balls approximately 1 mm in diameter. Retrofit of the butt cap in replacement of a conventional butt cap is possible. Means for attachment of the butt cap include axial extensions extending along the handle.

[0008] Severa et al., U.S. Pat. No. 6,050,909 describes a game racquet including a frame having an elongated shaft, which provides a handle and a hoop-shaped head, which supports a generally planar string bed. The head includes a lower portion attached to the shaft, a pair of opposed side portions, and an upper portion. Each of the side portions and the upper portion has a hollow tubular cross section having an outer wall and an inner wall. The inner wall of each of the side and upper portions is provided with a plurality of elongated slots, which extend perpendicularly to the plane of the strings, and each of the outer walls is provided with a plurality of circular openings which are aligned with the slots and which lie in the plane of the strings. A grommet strip extends along each of the side portions of the head, and a bumper strip extends along the upper portion of the head. Each of the grommet strips and the bumper strip includes a tubular sleeve for each of the circular openings, which is aligned with a slot which extends through the circular opening and which terminates outwardly of the aligned slot.

[0009] Davis et al., U.S. Pat. No. 6,234,921 describes a sports racquet having a lightweight frame and a pair of pods, having an increased cross-sectional width, at the 11 o'clock and 1 o'clock positions of the head. The pods also preferably have an increased wall thickness, or a molded-in weight element, so as to provide increased weight at such regions. Preferably also, the handle has at least one weight pod at the butt portion. The three pod weighting system, i.e., having weight pods located at the 11 o'clock, 1 o'clock, and butt end positions, not only increases the polar moment of inertia of the racquet about its longitudinal axis, but also increases the moment of inertia of the racquet about the center of gravity, providing a very stable racquet. Also, because the pods in the head portion increase the width of the frame, the torsion of the frame near the tip region is greatly increased, improving the power of the racquet with respect to balls hit further out on the string bed. In a preferred embodiment, the weight pods are formed of metal-coated carbon fibers.

[0010] McMillan et al., U.S. Pat. No. 6,383,099 describes a tennis racquet with increased resistance against twisting of the racquet frame by increasing the width of the frame, the width of the frame in that area is preferably at least 0.600 inch, and more preferably about 0.640 inch. The ratio of the width and the height is about 0.54. The increased resistance to twisting permits the frame to be wider, thereby increasing the maximum width of the strings, reducing the difference between the maximum string width and maximum string length, and increasing the polar moment of inertia of the racquet.

[0011] Weights have been used to make the head of sport racquet heavier to increase its striking power. Their purpose is to add power to the racquet head in a symmetric fashion and does not add to aiming or racquet positioning. Weights also have been used to increase the moment of inertia of the racquet and improve racquet stability as shown in Davis et al. These concepts however do not use ballast to guide the positioning of racquets. The use of a ballast is a well known and is used extensively in many industries. Ballasts have not been used much in the design of racquets. Ballast on a butt cap has been used to absorb shock, increase the power and add momentum of the swinging racquet as described in McCutchen. The emphasis here is to decrease the strain to the elbow tendon. However, this does not help to align the racquet face perpendicular to the ground.
[0012] Pellets made out of fine comminuted material as fine lead shots have been described by many authors including Kenerson et al in U.S. Pat. No. 2,737,216.

[0013] Shifting weights have been used to change the center of mass of the racquet and to change the balance of the racquet as it is swung. For example, one such construction is shown in British Patent 879,477. However, the weights are capable of axial movement only and do not help racquet face alignment.

[0014] Prior art designed to enhance the perpendicularity of a racquet face to the ground is not present in the prior art. It is assumed that the players will instinctively and proprioceptually hold the racquet face correctly. However, inexperience, poor proprioception, inattention, lack of preparatory time, and poor balance are just a few of the many reasons that the racquet face may not be held perpendicularly during ground stokes.

[0015] Beginning players generally have poor control of the racquet and the swing. Many ground strokes hit the net when the racquet face is down or hit out of bound when the racquet face is up. These swings end in a lost point. To keep the racquet face perpendicular to the ground, professional tennis instructors emphasize that the palm of the player's hand holding the racquet should be kept perpendicular. If a racquet has a mechanism that can enhance the perpendicularity of the racquet face, the player may win a few more points to his/her advantage.

[0016] The present invention fulfills the need for a tennis racquet having dynamic ballast movement for maintaining vertical racquet positioning during ground strokes, and provides further related advantages as described in the following summary.

SUMMARY OF THE INVENTION

[0017] The present invention teaches certain benefits in construction and use which give rise to the objectives described below.

[0018] The present invention is a tennis racquet apparatus comprising a handle integral with a neck and a frame, the frame strung to define a face of the racquet. A weighting device is engaged with or within the frame, neck and or the handle, in a position for urging the face of the racquet into a vertical attitude relative to a ground surface when the handle of the racquet is near horizontal. The weighting device may be a solid, a granulate or a liquid and of such consistency as to flow to the lowest point of the racquet.

[0019] It is an object of the present invention to use ballasts to help the racquet face fall into the perpendicular default position to improve a player's game.

[0020] It is a further object of the present invention to provide varying the ballast positions to suit a player's style and requirements.

[0021] It is a further object of the present invention to use the concept of shifting weights, i.e., cavities partially filled with metal particles, to enhance the advantages and convenience of racquet ballasts. This redistributes the weights as gravity re-balances the racquet for easier racquet handling. Additionally, this design allows symmetric redistribution of the weights to the contra-lateral side so that the racquet can be flipped over and can therefore be held either way.

[0022] It is a further object of the present invention to use the metal particles for shock dampening, and to enhance the dampening through the use of Styrofoam® for effective and light-weight dampening.

[0023] Other features and advantages of the present invention will become apparent from the following more detailed description, taken in conjunction with the accompanying drawings, which illustrate, by way of example, the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024] The accompanying drawings illustrate the present invention. In such drawings:

[0025] FIG. 1 is a perspective view of the preferred embodiment of the invention in use;

[0026] FIG. 2 is an exploded perspective view thereof showing an attached clamping ballast;

[0027] FIG. 3 is the same as FIG. 2 showing the ballast attached;

[0028] FIG. 4 is a sectional view taken along line 4-4 in FIG. 1 showing a hollow frame of the invention with a flowing medium fill ballast material;

[0029] FIG. 5 is a sectional view taken along line 5-5 in FIG. 3 showing how a solid flexible weight is held on the frame by compressive gripping;

[0030] FIGS. 6 and 7 are side elevational views of the racquet of FIG. 1 showing the shifting of ballast material depending on racquet position;

[0031] FIGS. 8A, 8B and 8C are partial plan views thereof of a racquet frame showing position and mounting details of an applied weight;

[0032] FIGS. 9A and 9B are partial sectional views of the frame showing one and two chambers respectively, filled with a ballast material and further showing the location and adaptation for receiving a tennis racquet string;

[0033] FIGS. 10A and 10B are schematic diagrams showing the approximate location of a flowing ballast material within the invention depending on positional attitude thereof;

[0034] FIGS. 11A and 11B are partial cutaway views showing a prior art string attachment to the frame, and a modified attachment according to the present invention respectively.

DETAILED DESCRIPTION OF THE INVENTION

[0035] The above described drawing figures illustrate the invention in at least one of its preferred embodiments, which is further defined in detail in the following description.

[0036] Generally, the principal design in the present invention is that of a standard tennis racquet modified by the presence of ballast 50 to urge the racquet face 40 into a vertical attitude when the handle 10 of the racquet is near horizontal, as shown in FIG. 1. In its simplest form, the ballast 50 is built into the racquet as a solid element or applied to the exterior of the racquet by any well known fastening device or method. The most important ballast
Ballast 50 may also be preferably placed on the lower side of the triangular neck 20 of the racquet. Ballast 50 as a longitudinal counter-weight, and also on the same lower side of the handle 10. Actual distribution of the ballast 50 is selected according to the objective of the user, i.e., how strong a return to vertical the user wants. This asymmetric design requires that the racquet be held only ballast-down and cannot be used when flipped over as the racquet becomes unstable. In this description, the words “ballast,” “weight,” “weighting means,” and “means for weighting” are used interchangeably to refer to material added to the tennis racquet in order to provide a force biasing the racquet into the vertical orientation. Reference numerals: 50-53 are used to refer to the several types of ballast that may be applied as described in the following.

[0037] In a preferred embodiment, as shown in FIGS. 8A, 8B and 8C, the ballast 50 may be a non-flexible solid weight 52 held in place exteriorly on the tennis racquet by hardware 61, such as screws, as shown in FIG. 8A, or by straps or clips 60 as shown in FIGS. 8B and 8C. Such solid weights 52 may be attached as one or more separate weights and may be placed in positions of advantage depending on the user’s preferences and skills. Such weights may be remedial in correcting the tennis swing, changed as to amount of weight and location and further, removed altogether when desired.

[0038] As shown in FIGS. 2, 3 and 5, the ballast 50 may be a C-shaped and flexible weighting piece 51. The ballast 51 receives a flexed open adjustment in the frame 30, i.e., it is spread open slightly. This adjustment results in a compressive gripping force applied by the C-shaped and flexible piece 51 which holds it in place on the frame 30. Alternately, the ballast 51 may be applied with a bonding agent, or any other method. FIG. 5 shows the manner in which the flexible ballast weight 51 is mounted on the frame 30.

[0039] Clearly, a solid weight ballast 50 may, as well, be built into the racquet similar to what is shown in FIG. 10A, where in this schematic diagram, the shaded portions may represent locations where the ballast 50 may be placed to advantage. The remainder of the hollow frame can stay empty or be occupied by Styrofoam® for very effective but light-weight dampening.

[0040] In the cross-sectional views of FIGS. 4, 9A and 11B, we see that the frame 30 may be hollow and filled with ballast 53, a particulate, fluid, such as Mercury metal, or combination of the two. In a preferred embodiment, shown in FIG. 9B compartments 80, 80' within the racquet are partially filled with ballast 53 and these two, long parallel compartments may be separated and distinct from the location of the attachment for the racquet strings 70, or, alternately, they may define a common hollow space within the frame 30 interrupted only partially by spaced apart conical compartments 85 used for conducting racquet strings 70.

[0041] It is desired that the ballast 53 shift according to the position of the racquet. The symmetric design and continuous oval hollow interior of the racquet allows the ballast to move to the lowest point in the frame, whereby the racquet may be rotated 180 degrees without any effect on the racquet feel and appearance as the partial-fill ballast 53 completely shifts to the opposite side of the frame 30 under gravitational forces.

[0042] A third compartment, that is preferably also partially filled with ballast 53, is in the triangular neck 20 of the racquet. This compartment is V-shaped as shown in the figures and is interconnected at its apex 22. It preferably is no more than half filled so that the ballast 53 is in only one half of the neck 20 at any time when the racquet is being used for a ground stroke. When the racquet is held horizontally with the face 40 vertical, the lower arm of the V-compartment is filled. As the racquet is rotated 180 degrees along its long axis 5, the other arm of the V-compartment becomes the lower one and fills with the ballast 53.

[0043] The above described three ballast compartments are the major ballasting components of the racquet. In an alternate embodiment, the handle 10 of the racquet can also contain ballast 53 (FIGS. 10A, 10B) which enhances the racquet’s axial balance when vertically positioned as shown in FIG. 10B. Preferably, the racquet cavities are symmetric allowing a full redistribution of the ballast 50 to the contra-lateral side when the racquet is flipped over.

[0044] As shown in FIG. 11A, the prior art teaches anchoring of racquet strings 70 within frame 30 and near the outside edge of the frame 30 so as to assure the largest “sweet spot” possible, i.e., longest string running length. FIG. 11B teaches a method for anchoring the racquet strings 70 but with loss of some string length. FIGS. 9A and 11B teach a method for anchoring of strings 70 but with loss of some string length while still maintaining the use of the hollow frame 30 for ballast material 53.

[0045] While the invention has been described with reference to at least one preferred embodiment, it is to be clearly understood by those skilled in the art that the invention is not limited thereto. Rather, the scope of the invention is to be interpreted only in conjunction with the appended claims and it is made clear, here, that the inventors believe that the claimed subject matter is the invention.

What is claimed is:

1. A tennis racquet apparatus comprising: a handle integral with a neck and a frame, the frame strung in defining a face of the tennis racquet; and further comprising a means for weighting engaged with at least one of the frame, the neck and the handle, in a position for urging the face of the racquet into a vertical attitude relative to a ground surface when the handle of the racquet is held in a near horizontal attitude.

2. The apparatus of claim 1 wherein the weighting means is C-shaped and flexible, the weighting means applying a compressive gripping force to engage the frame.

3. The apparatus of claim 1 wherein the weighting means is fixed to the frame mechanically.

4. The apparatus of claim 1 wherein at least one of the frame, the neck and the handle is at least partially hollow.

5. The apparatus of claim 4, wherein the weighting means is at least one solid weight fixedly positioned within at least one of the frame, the neck and the handle.

6. The apparatus of claim 4 wherein the weighting means is one of a granulate, a liquid and a combination granulate and liquid, the weighting means positioned within at least one of the frame, the neck and the handle; the weighting means of a consistency as to flow when the tennis racquet experiences at least one of a change in attitude and a change in inertial forces thereon.
7. The apparatus of claim 6 wherein the hollow frame provides plural separated and mutually sealed compartments, at least one of the compartments containing the weighting means.

8. A combination apparatus comprising: a tennis racquet and a means for weighting engaged with at least one of a frame, a neck and a handle of the tennis racquet, the weighting means positioned for urging the face of the racquet into a vertical attitude relative to a ground surface when the handle of the racquet is held in a near horizontal attitude.

9. The apparatus of claim 8 wherein the weighting means is C-shaped and flexible, the weighting means applying a compressive gripping force to engage the frame.

10. The apparatus of claim 8 wherein the weighting means is fixed to the frame mechanically.

11. The apparatus of claim 8 wherein at least one of the frame, the neck and the handle is at least partially hollow.

12. The apparatus of claim 11, wherein the weighting means is at least one solid weight fixedly positioned within at least one of the frame, the neck and the handle.

13. The apparatus of claim 11 wherein the weighting means is one of a granulate, a liquid and a combination granulate and liquid, the weighting means positioned within at least one of the frame, the neck and the handle; the weighting means of a consistency as to flow when the tennis racquet experiences at least one of a change in attitude and a change in inertial forces thereon.

14. The apparatus of claim 13 wherein the hollow frame provides plural separated and mutually sealed compartments, at least one of the compartments containing the weighting means.

15. The apparatus of claim 4 wherein the hollow portion of the at least one of the frame, the neck and the handle is at least partially filled with a light weight solid material.

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