June 21, 1938. L. R. GLEADALL 2,121,289

BALANCE ADJUSTMENT FOR TENNIS RACKETS

Filed May 15, 1937

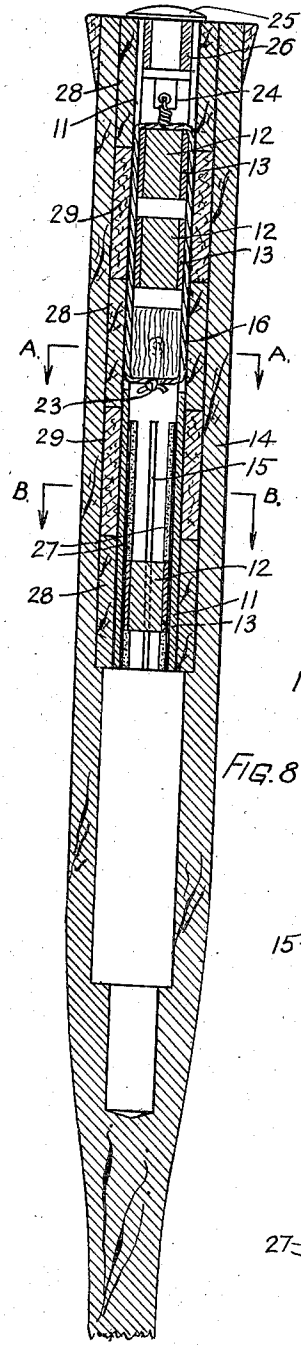


FIG. 8

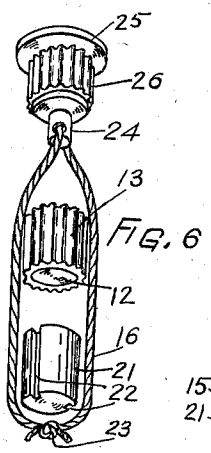


FIG. 6

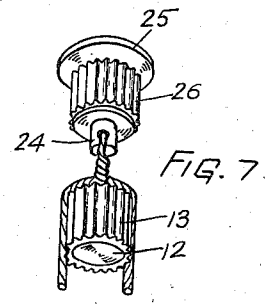


FIG. 7

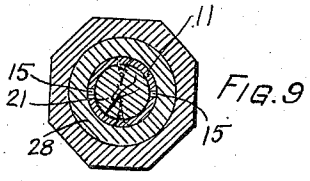


FIG. 9

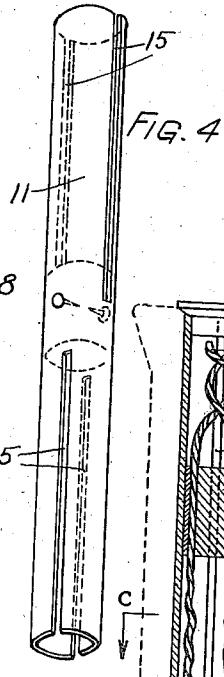


FIG. 4

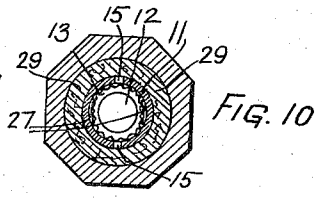


FIG. 10

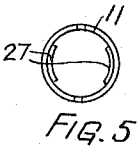


FIG. 5

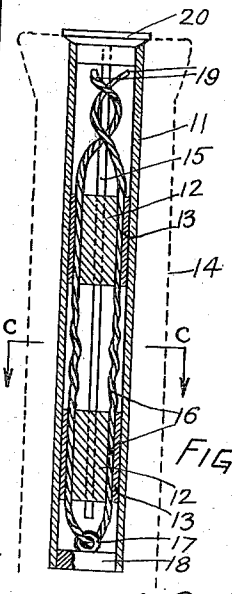


FIG. 1

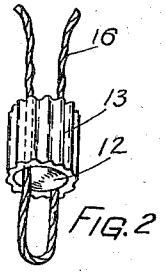


FIG. 2

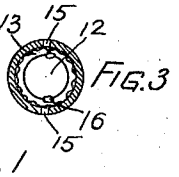


FIG. 3

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BALANCE ADJUSTMENT FOR TENNIS RACKETS

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Application May 15, 1937, Serial No. 142,922
In Australia May 23, 1936

7 Claims. (Cl. 273—73)

This invention relates to weight and balance adjustment means especially applicable for use in association with the handles of tennis rackets.

Although in this specification the invention will be particularly described in its application to a tennis racket handle it will be obvious that the invention is subject to analogous uses and may be applied with advantage to the handles of articles for use in various sports such for example as cricket bats, base ball bats, polo clubs, hockey clubs, croquet clubs, badminton rackets and squash rackets.

The invention provides special means whereby the racket or the like may be conveniently loaded, according to the particular requirements and fancy of the person requiring to use same, such objective being achieved by the use of a hollowed or apertured handle formation adapted to detachably receive snugly disposed longitudinally within it a casing or cartridge which in turn carries adapted to be detachably arranged in selected location within it one or more weighting pieces or balance weights.

The said casing or cartridge is formed of papier-mâché or approved fibrous material or it may be of wood or of metal or of other suitable material. It is preferably of circular cross-sectional configuration and of diameter adapting it to fit tightly and snugly within the said hollowed or apertured handle formation.

Each said weighting piece or balance weight (which may for example be about half of one ounce in weight and one half or three quarters of an inch in length if to be applied in association with a tennis racket handle) may conveniently be comprised by a piece of lead of tubular form having its outer surface tightly embraced by a piece of rubber tubing whose outer surface may be corrugated or otherwise adapted to engage and closely fit within the said casing or cartridge.

According to one form of the invention a required plurality of the said weighting pieces or balance weights may be strung together longitudinally as on a length of string, twine, cord, gut fibre, or light wire or the like portion of which is normally so located as to be in position to be gripped by the fingers when it may be desired to withdraw from the said hollowed or apertured handle formation the said casing or cartridge together with its contained weighting pieces or balance weights, as for the purpose of positionally adjusting the latter or adding to or diminishing the number thereof to secure a particular or different weighting or balance, the number of weighting pieces or balance weights being of course governed by the requirements of each individual user in regard to the total weight of and balance of the racket.

According to another form of the invention the said weighting pieces or balance weights are not strung together longitudinally although snugly nested within the said casing or cartridge which latter is again adapted to be withdrawn when required from the said hollowed or apertured handle formation by a length of string, twine, cord, gut fibre or light wire or the like.

The entrance to the said hollowed or apertured handle formation is adapted, when the said casing or cartridge has been inserted in the handle, to be neatly and tightly closed as by a cap having a tight "push-in" fit—or if preferred a screw cap fitting may be employed.

By the simple expedient of forming the said casing or cartridge with one or more longitudinally arranged cuts each adapted to admit an end of a suitable adjusting implement, each said weighting piece or balance weight may be either adjustably moved longitudinally of and within the said casing or cartridge thus to alter the balance of the racket or said weighting piece or balance weight may be forced completely out of the said casing or cartridge. Alternately of course a weight or weights may be added.

To ensure a desired snug and comparatively tight fit at all material times as and between the exterior surface of the said casing or cartridge and the inner surface of the said hollow or aperture of the handle, the latter is fitted with a composite lining of wood and felt materials which lining is formed of alternately arranged adjacently fitted rings of the said wood and felt. In lieu of felt other approved resilient material as cork may be used. The said composite lining further functions as a necessary reinforcement to the said hollowed or apertured handle formation to prevent collapse of the latter when it is gripped in a vice during re-stringing operations.

The inner surface of the said casing or cartridge (or a selected portion or portions thereof) may have glued or otherwise suitably fixed thereto glass paper or the like material adapted to further ensure desired tight engagement in selected location within the said casing or cartridge of each said weighting piece or balance weight.

But in order that the invention may be more clearly understood reference will now be made to the accompanying sheet of drawings wherein

like reference numerals denote like parts throughout the several views wherein:—

Figure 1 is a longitudinal sectional view of one form of the invention associated with the handle of a tennis racket (the latter shown in dotted lines).

Figure 2 is a perspective view of one of the weighting pieces or balance weights used in association with the invention and as shown in Figure 1.

Figure 3 is a cross sectional view on a line C—C of Figure 1.

Figure 4 illustrates an alternative form of inner casing or cartridge adapted to be utilized in association with the invention.

Figure 5 is a lower end view of the casing or cartridge illustrated by Figure 4.

Figures 6 and 7 illustrate a weighting piece or balance weight and the manner of its use in association with a pull string and an upper end plug associated with the invention.

Figure 8 is a longitudinal sectional view of the casing or cartridge illustrated by Figure 4 and fitted with a number of weighting pieces or balance weights and inserted into the hollowed or apertured handle of a tennis racquet which is in readiness for use.

Figure 9 is a cross sectional view on a line A—A of Figure 8.

Figure 10 is a cross sectional view on a line B—B of Figure 8.

Referring then to the said drawing in the casing or cartridge 11 is fitted a number of weighting pieces or balance weights 12 as of lead or other suitable metal.

Surrounding each weight 12 is a corrugated rubber tube 13 which adapts the weight 12 to be gripped tightly within the cartridge 11 particularly when the latter is inserted and snugly forced into the hollowed or apertured handle 14 of a tennis racket.

The said cartridge 11 may as before stated be a papier-mâché or approved fibrous material or of wood or metal and is provided with saw cuts 15 through which an end of a bent implement may be inserted to, by applied pressure in required direction, position the weights 12 within the said cartridge 11.

Referring to Figure 1 of the drawing, to enable the plurality of weights 12 and their cartridge 11 to be together withdrawn from the said apertured handle 14, a cord or string is passed between the weights 12 and rubber tubes 13 (on both sides of the said weights 12) the lower loop end of the string passing through an eyelet 17 of a lower end plug 18 which latter is applied to the lower end of the cartridge 11. The free ends 19 of the cord or string 16 may be loosely packed into the upper end of the cartridge 11 whose upper end is then closed in approved manner by a tight fitting upper end plug 20.

To remove the weights 12 or either one of the same or to slightly alter their or its position within and longitudinally of the cartridge 11 the upper end plug 20 is first removed and the free ends 19 of the string 16 are pulled whereupon the cartridge 11 may be bodily removed with its contained weights 12 from the apertured handle 14. Required adjustments of the said weights 12 may be effected without removal of the said weights from the said cartridge 11 following upon which the latter is again inserted within the apertured handle 14 and the upper end plug is again applied as a closure.

Referring to Figure 4 of the drawing the cartridge 11 has saw cuts 15 two in number disposed in planes at right angles to each other, adjacent extremities of the said saw cuts 15 being disposed approximately centrally of the length of the cartridge 11. Centrally and interiorly of the said cartridge 11 is secured the anchoring plug 21 as of wood or other approved material and having grooves 22 formed lengthwise of and from its surface.

Through the said grooves 22 a string 16 is passed and knotted at 23 behind the anchoring plug 21, the looped upper end of the string 16 passing through an eyelet 24 of an upper end plug 25 which latter is fitted with a corrugated rubber ring 26 which functions to render the upper end plug 25 tight fitting within the cartridge 11.

Portions of the string 16 may pass conveniently along the saw cuts 15, or between the inner surface of the cartridge 11 and the outer surface of the corrugated rubber tubing 13.

By removing and pulling on the upper end plug 25 the cartridge 11 with its contained weights may be removed by reason of the pull of the string 16 on the wooden anchoring plug 21.

After effecting any required adjustments of or adding to or depleting the number of the weights 12 the cartridge 11 is again inserted in the apertured handle 14. The upper end plug 25 is then turned to cause twisting of the string 16 which latter thus by reason of its twist is shortened and tends to draw inwardly and maintain in requisite tightly closed position the upper end plug 25 after it has been firmly pressed home.

In the last described form of the invention it will be noted that the string 16 does not pass between the weights 12 and the rubber tubes 13 as was the case in the form of the invention described with reference to Figure 1 of the drawing—thus complete removal from the cartridge 11 of weights 12 each together with its embracing rubber tube 13 may be more readily effected.

Tight fitting and steadiness of each said weight 12 is ensured by its tightly embracing corrugated rubber tube 13 and the tight fit of the latter within the said cartridge 11, which latter also is adapted to fit tightly within the apertured handle 14, as will later appear.

The desired snug and tight fit between the cartridge 11 and inner surface of the apertured handle 14 is ensured by the composite lining to the latter which lining is formed of the alternately arranged adjacently fitted wooden lining rings 28 and felt lining rings 29. The rings 29 may be of cork or other approved resilient material.

The rings 29 ensure a tight resilient fit and are of substance which retains its shape and texture for a prolonged period. The wooden lining rings 28 strengthen the handle formation against possible collapse or damage due to rough usage in play and/or when it is gripped as by a vice during the operation of re-stringing the racket.

The inner surface of the said cartridge 11 (or selected portions thereof) may have narrow strips 27 of glass-paper or the like material glued or pasted or otherwise suitably fixed thereto, so to provide very firm gripping surfaces which further definitely ensure that the weights 12 will not move from their adjusted positions when the player is using the racket.

Modifications may be made within the scope of the claims.

For example, the casing or cartridge **11**, although illustrated in Figure 8 as of lesser length than that of the hollowed handle **14**, may extend downwardly of and within the latter to any approved distance.

What I do claim is:—

1. Weight and balance adjustment means associated with the handle of a tennis racket, cricket bat, or the like having a hollowed portion; said means comprising a longitudinally split weight gripping cartridge of a tubular shape adapted to be snugly disposed detachably within and longitudinally of the hollowed portion of the said handle and at least one weighting piece detachably arranged in selected location within said cartridge.

2. Weight and balance adjustment means associated with the handle of a tennis racket, cricket bat, or the like having a hollowed portion; said means comprising a cartridge adapted to be snugly disposed detachably within and longitudinally of the hollowed portion of the said handle and at least one weighting piece detachably arranged in selected location within said cartridge and consisting of a piece of lead of tubular form, a piece of rubber tubing lightly embracing the outer surface of the piece of lead and having its outer surface engaging and closely fitting within said cartridge.

3. Weight and balance adjustment means associated with the handle of a tennis racket, cricket bat, or the like having a hollowed portion; said means comprising a cartridge adapted to be snugly disposed detachably within and longitudinally of said hollowed portion of the said handle and a plurality of weighting pieces strung together and detachably arranged in selected locations within said cartridge, each of said weighting pieces consisting of a piece of lead of tubular form, a piece of rubber tubing lightly embracing the outer surface of the piece of lead and having its outer surface engaging and closely fitting within said cartridge.

4. Weight and balance adjustment means associated with the handle of a tennis racket, cricket bat, or the like and having a hollow portion; said means comprising a cartridge adapted to be snugly disposed detachably within and longitudinally of the hollowed portion of the said handle and a plurality of weighting pieces detachably arranged in selected locations within said cartridge, a string flexibly connecting the pieces together, each of said weighting pieces consisting of a piece of lead of tubular form, a piece of rubber tubing tightly embracing the outer surface of the piece of lead while the outer surface of the rubber is adapted to engage and closely fit within the said cartridge, a closure plug for said cartridge provided with an eyelet the said string being passed between the said weighting pieces and their said embracing pieces of rubber and through the eyelet in the closure plug of the said cartridge and the free ends of the said string being loosely packed into the upper end of the said cartridge.

5. Weight and balance adjustment means as claimed in claim 1, wherein the inner surface of the said hollowed portion of the said handle is fitted with a composite lining of alternately and adjacently arranged lining rings of wood and of resilient material.

6. Weight and balance adjustment means as claimed in claim 1, wherein associated with the inner surface of the said cartridge is a material having a gripping surface which frictionally engages with at least one of the said weighting pieces.

7. Weight and balance adjustment means as claimed in claim 1, and wherein centrally and interiorly of the said cartridge is secured an anchoring plug which has grooves formed lengthwise of and from its surface, a string passed through the said grooves and knotted behind the said anchoring plug, a tight fitting upper closure cap for the said cartridge and for the said hollowed portion of the said handle and having an eyelet, and the other end of the string being looped and passed through the eyelet.

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