March 20, 1951 J. N. TYNAN ET AL 2,546,140

RACKET

Original Filed April 1, 1941

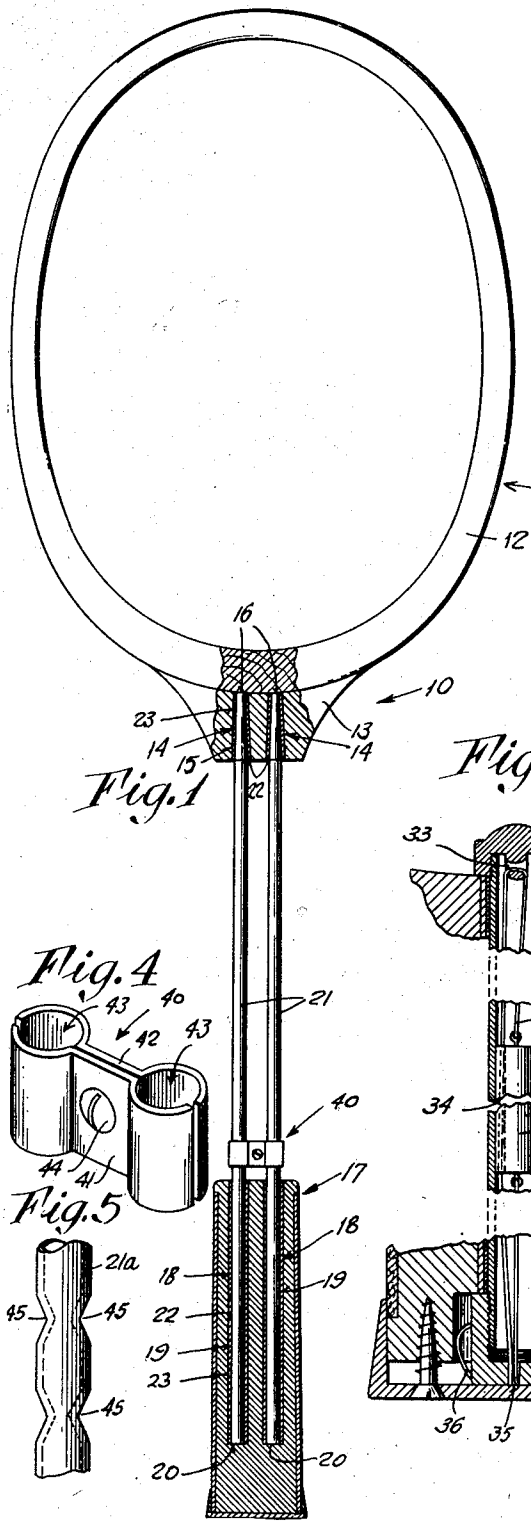


Fig. 1

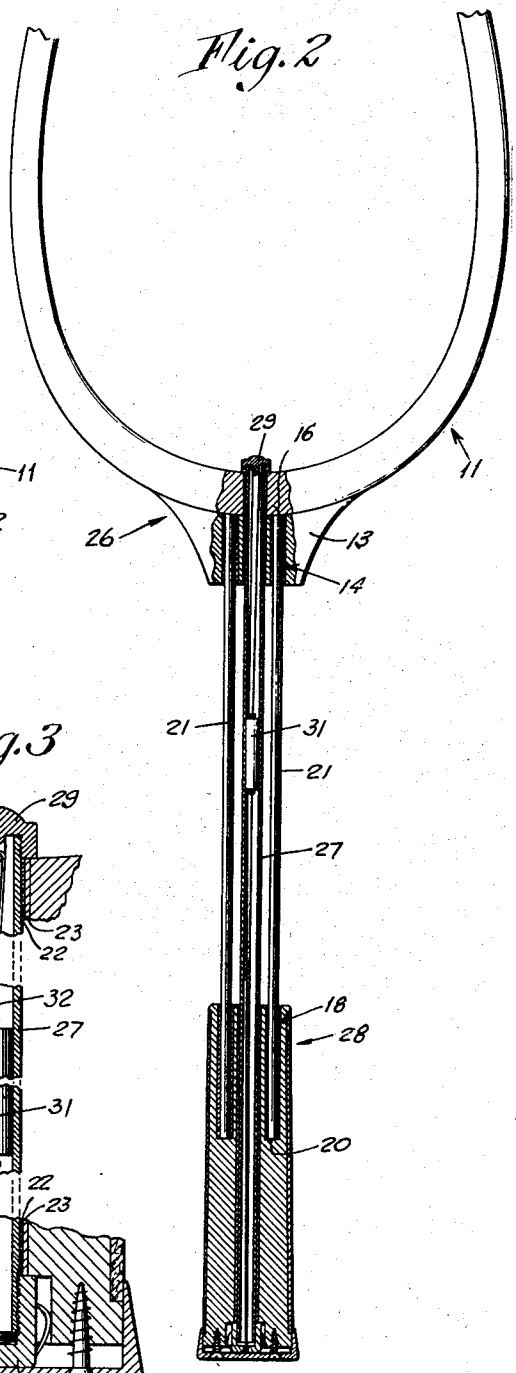


Fig. 2

Fig. 3

Fig. 4

Fig. 5

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RACKET

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3 Claims. (Cl. 273—73)

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This invention relates to sport rackets, such as are used for tennis, badminton, squash, etc., and particularly to rackets adapted to possess a resilient action in play. It relates to the connecting members joining the handle and bow portions of sport rackets, and also to means for controlling the moment of inertia, flexibility, center of balance, length of stem, weighting and other properties of sport rackets.

This application is a division of our application Serial Number 386,278, filed April 1, 1941, now Patent No. 2,395,864, granted March 5, 1946.

Ordinarily the ends of a wooden bow member of a racket are extended downwardly to cooperate with flank members to constitute a handle, as exemplified by the drawing in Williamson Patent 1,630,683, May 31, 1927, hereinafter sometimes designated as a conventional racket. However, the bow has sometimes been formed separately from the handle, as exemplified by the disclosure of Reissue Patent 20,684 to John B. Dickson, April 5, 1938. A racket of the type illustrated in said patent will hereinafter sometimes be designated as a Dickson racket. It includes a single resilient metallic stem connecting separate bow and handle sections.

Sidewise movement refers to movement of the bow with respect to the handle in the plane defined by the stringing. Arcuate movement or rotational movement refers to movement of the bow with respect to the handle about the longitudinal axis of the handle. Backward and forward movement refers to movement in a plane including the longitudinal axis of the handle, said plane being perpendicular to the plane of the stringing. Sport rackets inherently possess at least an infinitesimal trace of sidewise resiliency, arcuate resiliency and forward-backward resiliency. Athletes differ greatly regarding the desired amount of each of said resiliencies. Heretofore, there has been no satisfactory method of or structure for providing exactly the desired degree of each of said resiliencies in a sport racket; or, at least such characteristics were not interchangeably provided in individual rackets.

Some players prefer heavy rackets and others desire rackets of light weight. Heretofore, storekeepers have sometimes had to stock several weights of each model of racket. Similarly, some players prefer long stems; some prefer short stems; and others prefer stems of medium length. There has also existed a lack of uniformity of preference regarding not only such properties of rackets as flexibility, stem length and racket weight but also such properties as center of balance, type of handle, moment of inertia and other properties of rackets. Heretofore, storekeepers have had to stock large quantities of rackets to supply the demand of particular sportsmen.

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Sport rackets have heretofore been bulky when packed for shipment. Moreover, they have occupied considerable space in the store. Because rackets are in demand only during certain seasons in many sections of the country, storage space for the out-of-season goods constitutes an important problem for the storekeeper.

It is an important object of the present invention to provide a racket in which the amount of resilient backward and forward movement of the bow relative to the handle can be accurately controlled and/or adjusted.

Other objects are: to substantially eliminate all sidewise movement of the bow; to provide a racket in which the amount of resilient absorption of the arcuate force can be accurately controlled and/or adjusted; to provide a racket having adjustable weighting means; and to provide sport rackets which can be easily modified to fulfill a specific set of requirements not only as to the aforementioned resiliency and weighting means, but also as to length of stem, center of balance, type of handle, moment of inertia of the bow about the longitudinal axis of the handle, moment of inertia of the racket about the average instantaneous center of the racket in play, and other properties.

It is an object of the present invention to provide a racket requiring a minimum of space for shipment and/or storage.

An important feature of the present invention is the provision of a racket having a plurality of flexibly resilient shafts adapted to provide a predetermined amount of flexibility of forward and backward movement of the bow and to substantially prevent any sidewise movement of the bow.

Another feature of the present invention is the provision of a variety of metallic shafts differing as to flexibility, length, weight and other properties.

Another feature is the locating of stem members an appreciable distance from the longitudinal axis of the handle.

Other objects, features and advantages will hereinafter appear.

Referring now to the drawings, it will be seen that:

Figure 1 represents a front view of a racket.

Fig. 2 is a front view of the present invention.

Fig. 3 represents a detailed front view of a portion of Fig. 2.

Fig. 4 is a perspective view of the balance control weight, and

Fig. 5 is a fragmentary view of a modified form of shaft.

Before describing the present improvements and mode of operation thereof in detail it should be understood that the invention is not limited to the details of construction and arrangement of parts shown in the accompanying drawings, which are merely illustrative of the present preferred embodiments, since the invention is capable of other embodiments, and the phraseology employed is for the purpose of description and not of limitation.

In the racket shown in Fig. 1, there is provided a racket 10 having a bow 11 formed by bending a peripheral member 12 such as a laminated ash strip into a closed curvilinear shape such as an oval. Stringing may be secured to the bow 11 in the usual manner. A throat member 13 is glued to a portion of the bow 11 and is provided with sockets 14 defined by cylindrical walls 15 and end walls 16.

Positioned apart from the bow 11 is a gripping member such as a handle 17, provided with sockets 18 each defined by a cylindrical wall 19 and an end wall 20.

Of particular importance it should be noted that a plurality of metallic shafts 21 connect the handle 17 and the bow 11. The upper ends of the shafts 21 pass into the sockets 14 of the throat member 13. Interposed between the shafts 21 and cylindrical walls 15 of the sockets 14 are cloth sleeves 22 containing heat-sensitive adhesive material 23 such as thermoprene, polystyrene, etc. Glue, Bakelite (phenolic) or other adhesive material may be used if desired. The shafts 21 are affixed to the handle 17 by the cloth sleeves 22 and adhesive 23. The shafts abut against the end walls 16 and 20 of the throat member 13 and handle 17, respectively.

The process of manufacturing the racket 10 includes the steps of forming a bow 11, and placing the sleeves 22 and the shafts 21 in the sockets 14 and 18. The handle 17, throat member 13, shafts 21 and cloth sleeves 22 are then secured together by the adhesive 23. For example, if a heat-sensitive material is used the assembly may be heated so that the adhesive material 23 is forced into some of the pores of the wooden throat member 13 and handle 17, and so that the cloth sleeve 22 is securely adhered to the metallic shafts 21 and to the handle 17 and throat member 13. If it becomes desirable to change the metallic shafts, the heat-sensitive adhesive material 23 can be heated and the shafts withdrawn from the sockets.

It should be particularly noted that the shafts 21 are positioned in parallel relation so that their axes lie substantially in the plane defined by the bow 11 of the racket 10, which plane also contains the longitudinal axis of the nonmetallic handle 17. Thus, the shafts 21 (sometimes herein designated as members or connectors) brace each other to substantially prevent all sidewise movement of the bow 11 relative to the somewhat cylindrical handle 17. Because the shafts of the racket 10 are both in the same plane, a relatively high degree of flexibility and resilient backward and forward flexing movement is possible, provided reasonably flexible material is used for the shafts. Thus, the racket 10 can have the characteristic of absorbing a substantial amount of shock, so that the hand receives relatively little shock even when a ball is driven a considerable distance. If, however, it is desirable to change the racket to a stiff racket, it is only necessary to remove the flexible shafts and substitute stiff shafts. The cost of substituting shafts is only a small portion of the cost of substituting an entire racket.

Attention is directed to the fact that if the racket is provided with very stiff shafts not only sidewise and backward and forward movement is prevented but rotational movement is also prevented, inasmuch as the two shafts brace each other in preventing rotational movement. A Dickson racket permits a certain amount of rotational movement inasmuch as a metallic member inherently has torsional resiliency. The Dickson racket is able to function somewhat as a torsional pendulum. The racket 10, however, may be provided with two off-center rigidly stiff stem members adapted to brace each other to minimize rotational movement. Moreover, rotational movement of the bow is decreased by the increased moment of inertia, incident to positioning the weight of the stem members a substantial distance from the cylindrical axis of the handle. Rotational movement is also resisted by the stiffness of two members instead of one.

In the form of the invention shown in Figs. 2 and 3, there is provided a racket 26 somewhat similar to the racket 10 shown in Fig. 1, but differing therefrom in the following particulars. In addition to the two off-center shafts 21 the racket 26 is provided with a central shaft 27 of tubular shape. The shaft 27 is secured to the bow 11 and handle 28 by means of the adhesive 23 impregnated sleeves 22 and cap nuts 29 and 30. Within the central shaft 27 is a weight 31 to which is attached an endless belt 32 of rawhide, nylon or the like, which passes through an eyelet 33 on the cap nut 29, through a hole 34 in the weight 31, and through hole 35 in the cap nut 30. A loop 36 of the belt 32 is frictionally positioned between the cap nut 30 and a cap 37 normally fitting onto an end of the handle 28. Thus, the weight 31 is securely positioned within the central shaft 27 by means of the endless belt 32 which cannot move because of the frictional gripping by the cap 37, and cap nut 30. However, when the cap 37 is removed, the loop 36 is free and can be used to move the endless belt 32 and to thereby move the weight 31 along the cylindrical axis of the central shaft 27.

It should be particularly noted that the racket 26 has shafts 21 having ends in abutting relation with end walls 16 and 20 of the sockets 14 and 18 of the throat member 13 and of the handle 28, thereby preventing the throat member and handle from coming any closer together. The central shaft 27 and the cap nuts 29 and 30, however, prevent the throat member 13 and handle 28 from going farther apart. Thus, the racket 26 includes a doubly effective securing means to maintain the bow, handle and shafts detachably but normally firmly together, said means including the adhesive-impregnated cloth sleeves 22, the cap nuts 29 and 30 and the push-pull combination of the metallic shafts 21 and 27.

Furthermore, the shafts 21 and 27, hereinbefore described extending between and connecting the separate bow and separate handle may all or interspersedly be of solid or tubular wood, or of material other than tubular metal. For example, referring to Fig. 2, the center shaft 27 may be of tubular metal as shown and the two side

shafts 21 of wood, vice versa, or all three may be of wood. Furthermore, although there are certain advantages in having shafts, such as the shafts 21, bottoming in the bow and/or the handle as shown, it is possible to make the sockets full length so that they extend through the bow and/or the handle similarly to the shaft 27.

As shown in Figs. 1 and 4, the shafts may also serve as a guide and holding means for an external adjustable weight 40 including weight plates 41 and 42 with channels 43 adapted to engage and grip the shafts 21, for example, when a screw 44 passing through plate 41 is tightened in a conventional screw-thread connection with plate 42. The weight 40 is tightened on the shafts 21 near the bow when it is desired to have the bow section additionally weighted, or near the handle when it is preferred to have the weight there. One or more of the weights 40 may be used on a single racket if required to provide the desired weighting of the racket.

With weights such as 40, underweight rackets can be brought up to or over regulation weight, and standard weight rackets can be made heavier, if desired.

Fig. 5 shows a modified form of shaft 21*a* which may be used in place of shafts 21, including the provision of one or more depressions 45 which tend to stiffen the shaft against bending in a plane tangential to the depressions. Such a construction may be used to achieve the control and adjustable resiliency advantages of the present invention.

Other variations and modifications may be made within the scope of this invention, and portions of the improvements may be used without others.

We claim:

1. In a sport racket, the combination of a handle; a bow; a tube passing throughout the handle, and passing through the bow; means on the ends of said tube adapted to engage bow and handle and prevent separation of said bow and handle; a weight within said tube; means adapted to position the weight at diverse locations along the axis of said tube; and auxiliary tubular joining members connecting the bow and the handle, the ends of said auxiliary joining members being in abutting relation with the bow and handle, and being adapted to prevent any movement of the handle and the bow toward each other and the portions of the tubular joining members between the handle and bow being disconnected from one another whereby the tubes can act independently.

2. In a sport racket, the combination of a handle; a bow; a tube passing through the handle, and passing through the bow; means on the free ends of said tube adapted to engage bow and handle and prevent separation of said bow and handle; and auxiliary tubular joining members connecting the bow and the handle, the ends of said auxiliary joining members being in abutting relation with the bow and the handle, and being adapted to prevent any movement of the handle and the bow toward each other and the portions of the tubular joining members between the handle and bow being disconnected from one another whereby the tubes can act independently.

3. In a sport racket, the combination of a bow; mounting means, including at least one hole and at least on bore respectively through and only part way through said bow; a handle; mounting means, including at least one hole and at least one bore respectively through and only part way through said handle; at least one metallic connecting shaft passing through the mounting holes of the handle and of the bow; and means on the free ends of the last-named shaft and engaging the bow and handle to prevent the bow and the handle from separating, at least one other metallic shaft member extending into the bore of the handle and into the bore of the bow and adapted to limit movement of the bow and handle together.

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