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⑤④ **A racquet with a vibration absorbing device.**

⑤⑦ The present invention relates to a racquet with a vibration absorbing device. The racquet comprises a head (2) supported upon opposite arms (3) and (4) of a yoke, said head (2) having a gap (7) between the yoke arms (3) and (4) and an insert (10,30) of resilient material positioned within the gap (7) to cushion flexure in the head (2) tending to narrow the gap (7).

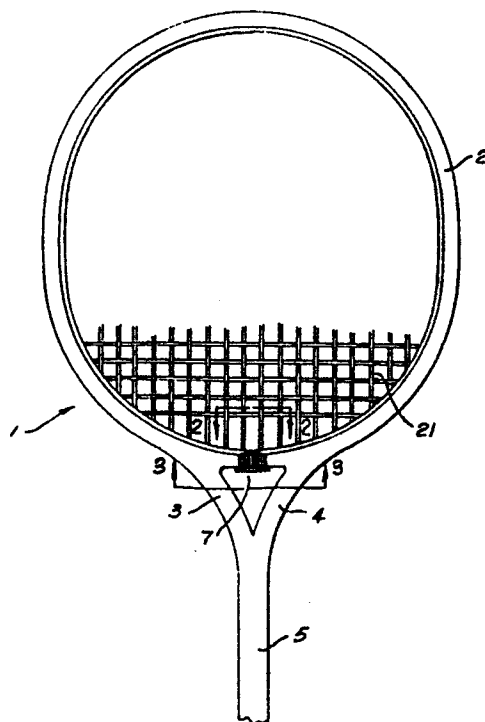


FIG. 1

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A Racquet With a Vibration Absorbing Device

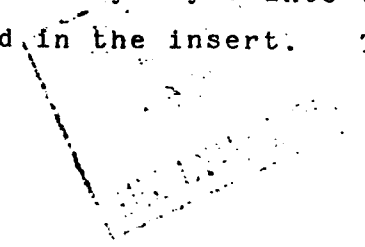
This invention relates to racquets, and more particularly to strung racquets of the kind utilized in such games as tennis, squash racquets, racquet ball and other sports.

5 A common feature of these racquets is that they are tightly strung for imparting driving power to a ball while the frame should have a degree of resiliency and be of light-weight construction. Racquet frames composed
10 entirely of graphite, or of graphite/fiberglass or even metal, have become popular because of the strength of the material. However, graphite is a material relatively susceptible to damage when subjected to impacting forces which can occur by misuse, or even with normal usage with
15 a high-powered stroke where the ball strikes the racquet off-centre. Frequently, also, jarring of the racquet under these conditions is transmitted through the frame to the arm of the user which over a period of time can result in injury.

20 It is an object of the invention to provide a racquet incorporating means for absorbing forces created by impacts.

 Accordingly this invention consists in a strung racquet comprising a head supported at spaced positions upon opposite arms of a yoke, said head having a gap
25 between the yoke arms, and an insert of resilient material positioned within the gap to cushion flexure in the head tending to narrow the gap.

 For preference, the confronting ends of the head defining the gap are keyed into the insert to cushion
30 flexure in the head tending to cause misalignment of the confronting ends. The ends are preferably keyed into the insert by fitting into sockets formed in the insert. The



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sockets can be of any suitable shape, for example arcuate or of truncated V-shape. The socket can, in one embodiment, be formed wholly or partially by the insert overlapping the sides of the head adjacent the confronting ends.

The insert can be held in place entirely by the force exerted by the opposing ends when the racquet is strung or by any other suitable means. For example, a base plate can be positioned adjacent the outer periphery of the head to hold the insert in position. The base plate can be separate or integrally formed with the insert. In addition the base plate can be provided with two or more holes through which the string of the racquet passes to hold the base plate in position.

The invention will be described in more detail with reference to the accompanying drawings, in which:

Figure 1 is a side view of a strung racquet according to the invention;

Figure 2 is a part sectional view along the line 2-2 of Figure 1;

Figure 3 is a part sectional view along the line 3-3 of Figure 1;

Figure 4 is a side view of a vibration absorbing insert forming part of the racquet of Figure 1;

Figure 5 is an end view of the insert of Figure 4;

Figure 6 is a plan view of the insert of Figure 4;

Figure 7 is a sectional view along the line 7-7 of Figure 6;

Figure 8 is a side view similar to Figure 4 showing a second embodiment of the vibration absorbing insert;

Figure 9 is an end view of the insert of Figure 8;

Figure 10 is a plan view of the insert of Figure 8;

Figure 11 is a sectional view along the line 11-11 of Figure 10; and

Figure 12 is a side view similar to Figures 4 and 8

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showing a third embodiment of the vibration absorbing insert.

The drawings show the application of the invention to a squash racquet but it will be clear from an understanding of the following description that it may be applied just as readily to other forms of strung racquets such as those used in the game of tennis, racquet ball, badminton, etc.

With reference to Figures 1 to 3 it will be observed that racquet 1 has a frame composed of a head 2 supported upon integrally formed opposite arms 3 and 4 of a yoke integral with a shaft 5 terminating in a hand grip, or handle, (not shown). The racquet frame may be composed entirely of graphite, or graphite together with other fibres, or even metal.

In accordance with the invention the head 2 at a position equally spaced between the yoke arms 3 and 4 is provided with a gap 7 which for example can be created by a single straight cut through the head 2, the gap 7 is defined by confronting ends 8, 9. The confronting ends 8, 9 are bevelled on each side at 11 and a close-fitting insert 10, as more particularly shown in Figures 4 to 7, is introduced into the gap 7 to cushion flexure in the head 2 tending to cause narrowing of the gap 7 or misalignment of the confronting ends 8 and 9 of the head 2.

The keying is effected by the bevelled confronting ends 8, 9 neatly fitting into the truncated V-shaped sockets 13. Flexure tending to cause misalignment is thus opposed by the resilience of the insert 10.

The insert 10 has a main body 12 generally of hour glass shape when viewed in plan, achieved by providing lateral recesses 13 or sockets of truncated V-shape producing a narrow waist section 14. The cushioning of flexure tending to cause misalignment is achieved by keying confronting ends 8, 9 into the insert 10. The

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underside of the body 12 is connected by a tapering stem 15 to a narrow base 16. A pair of spigots 17 provided with bores 18 are upstanding from the base 16 and extend through respective ones of the sockets 13. An elongated recess 19 in the underside of the base 15 interconnects the bores 18 of the spigots 17.

As can be seen from Figures 1 and 2 the ends 8 and 9 of the head 2 closely adjacent the gap 7 are provided with stringing holes 20. The insert 10 is introduced to the gap 7 from the outside of the head 2 so that the spigots 17 pass through the string holes 20. The bevelled ends 8 and 9 of the head 2 are snugly accommodated within the truncated V-shaped sockets 13 of the insert 10. When the racquet frame is strung with gut 21, or other material, a string is passed downwardly through the bore 18 of one of the spigots 17, along the recess 19 of the base 16 and upwardly through the bore 18 of the other spigot 17. When the string 21 is drawn taut the insert 10 is tightly held within the gap 7. It will be noted that due to the matching shape of the recesses 13 of the insert 10 and the ends 8 and 9 of the head 2, cushioning of impact forces tending to narrow the gap 7 will be achieved by the resiliency in the waist section 14, while forces tending to misalign the ends 8 and 9 will be resiliently restrained by the body 12 of the insert 10.

Figures 8 to 11 show a second embodiment of an insert for use in the racquet described with reference to Figures 1 to 3. The insert 30 of the second embodiment has a main body 31 of a generally H-shape when viewed in plan. Sides 32 define two sockets 33 separated by a waist portion 34. The underside of the body 31 joins an integrally formed floor 35 which extends between sides 32. Apertures 36 are formed in floor 35 to receive a pair of spigots 37 upstanding from a base plate 38. Spigots 37 are provided with bores 39 and an elongated recess 40 in the underside

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of base plate 38 interconnects the open ends of the bores.

With the insert 30 of this embodiment the confronting ends 8, 9 of the head 2 are not bevelled but are flat.

5 The confronting ends 8, 9 are keyed into the insert 30 by snugly fitting into sockets 33 with the sides 32 of the insert 30 overlapping the sides of the head 2 adjacent the confronting ends 8, 9.

10 In use the body of insert 30 is introduced into the gap 7 from the outside of the head 2. The apertures 36 are aligned with string holes 20 and the spigots 37 on base plate 38 inserted through the apertures and string holes until the base plate 38 abuts floor 35. The racquet is then strung in the manner described above for the insert of the first embodiment. As with the first
15 embodiment described above cushioning of impact forces tending to narrow the gap 7 is achieved by resiliency in the waist section. Forces tending to misalign the confronting ends 8, 9 are in this embodiment resiliently restrained by the sides 32 of insert 30.

20 Figure 12 shows a third embodiment of an insert for use in the racquet described with reference to Figures 1 to 3. The insert closely resembles that depicted in Figures 4 to 7 and the same reference numerals have been used to depict like features. In the Figure 12
25 arrangement the recess or socket 13 is arcuately shaped instead of being formed in a truncated V-shape. With the Figure 12 insert, the confronting ends 8, 9 of head 2 are correspondingly arcuately shaped to snugly fit into sockets 13. The fitting of the insert and the manner in
30 which cushioning is achieved are otherwise identical to that described above in relation to Figures 4 to 7.

A particularly suitable material for the resilient insert is a plastics material known as Dupon ST-801.

35 It has been found that a racquet constructed according to this invention has been successful in absorbing nearly

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all of the harmful frame vibration inherent in strong racquets. It seems that by separating the yoke into individual arms and the vibration created by impact forces appears to be attracted to this area of the racquet and is absorbed to a large extent in the insert. String vibration, or what is commonly referred to as the "feeling" in the racquet continues to be transmitted to the user without substantial attenuation. It is not commonly realised that frame vibration is what apparently causes arm and shoulder injury to a user, as opposed to string vibration to which most attention has previously been applied. Furthermore, should the racquet be struck against a hard surface, it has been found that a racquet provided with the insert of this invention is more durable than one of conventional form.

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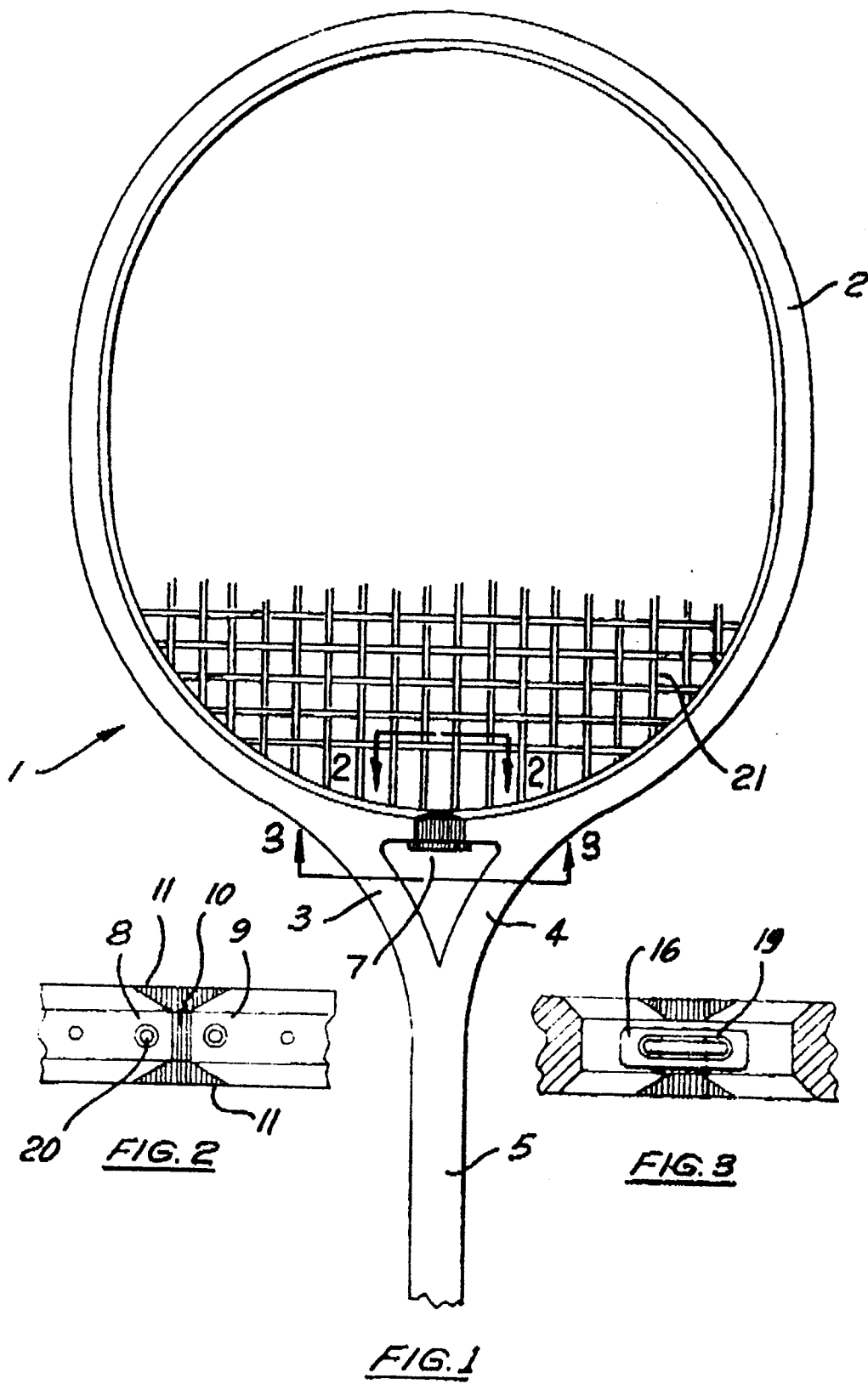
CLAIMS:

1. A strung racquet (1) comprising a head (2) supported at spaced positions upon opposite arms (3) and (4) of a yoke, said head (2) having a gap (7) between the yoke arms (3) and (4), and an insert (10,30) of resilient material positioned within the gap (7) to cushion flexure in the head (2) tending to narrow the gap (7).
2. A racquet as claimed in claim 1 wherein the confronting ends (8) and (9) of the head (2) defining said gap (7) are keyed into the insert (10,30) to cushion flexure in the head (2) tending to cause misalignment of the confronting ends (8) and (9).
3. A racquet as claimed in claim 2 wherein said confronting ends (8) and (9) are keyed into the insert (10,30) by fitting into sockets (13,33) formed in the insert.
4. A racquet as claimed in claim 3 wherein the confronting ends (8) and (9) and said sockets are arcuately shaped.
5. A racquet as claimed in claim 3 wherein the confronting ends (8) and (9) have bevelled sides to fit truncated V-shaped sockets (13) in the insert (10).
6. A racquet as claimed in claim 3 wherein said socket (33) is formed by the insert (30) overlapping the sides of the head (2) adjacent the confronting ends (8) and (9).
7. A racquet as claimed in any one of claims 1 to 6 wherein a base plate (16,38) is positioned adjacent the outer periphery of the head (2) to hold said insert (10,30) in position.

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8. A racquet as claimed in claim 7 wherein the base (16,38) plate is provided with two or more holes (18,36) through which the string of the racquet (1) passes to hold the base plate (16,38) in position.

9. A racquet as claimed in claim 7 or claim 8 wherein said base (16,38) is integrally formed with said insert (10,30).



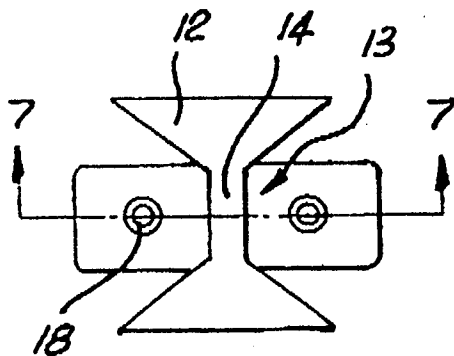


FIG. 6

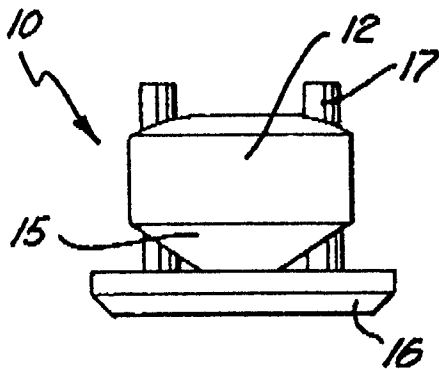


FIG. 4

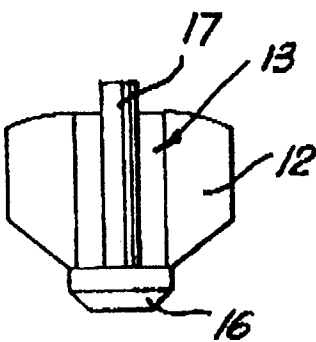


FIG. 5

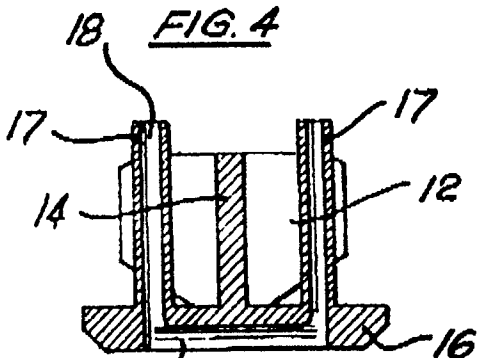


FIG. 7

