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(71) Applicant(s): Dunlop Slazenger Group Limited (Incorporated in the United Kingdom) Maxfli Court, Riverside Way, CAMBERLEY, Surrey, GU15 3YL, United Kingdom	(56) Documents Cited: GB 1237958 A GB 0712224 A BE 001011745 A6 DE 003204442 A1 NL 008701068 A US 6402646 B1 US 5413335 A US 3891211 A US 3891211 A
(72) Inventor(s): Paul Angell	(58) Field of Search: INT CL ⁷ A63B Other: Online: WPI, EPODOC, JAPIO
(74) Agent and/or Address for Service: Mathys & Squire 100 Grays Inn Road, LONDON, WC1X 8AL, United Kingdom	

(54) Abstract Title: **Sports racket**

(57) A sports racket (100) comprising: a frame, having a head; a detachable sub-frame (102) for housing racket strings; and means (112, 202) releasably securing the sub-frame to the head.

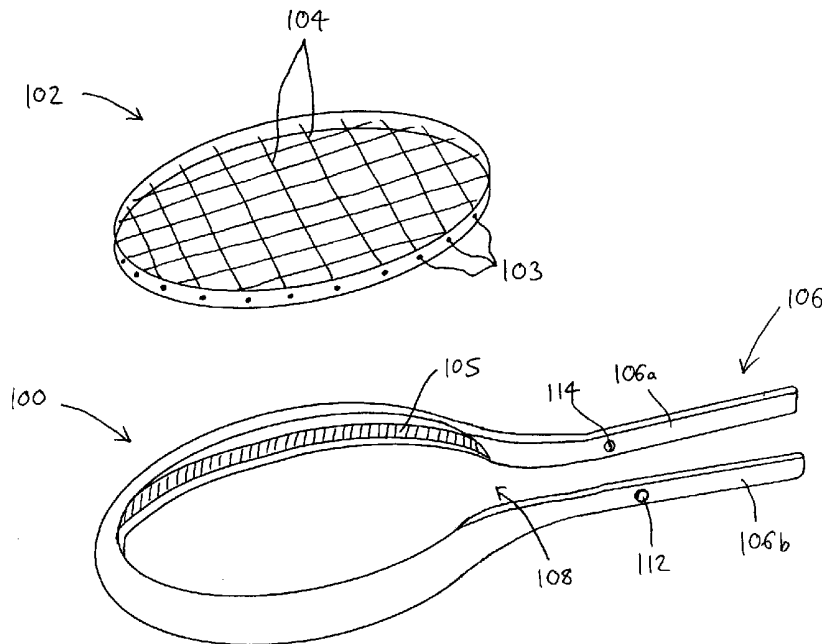


Fig. 1.

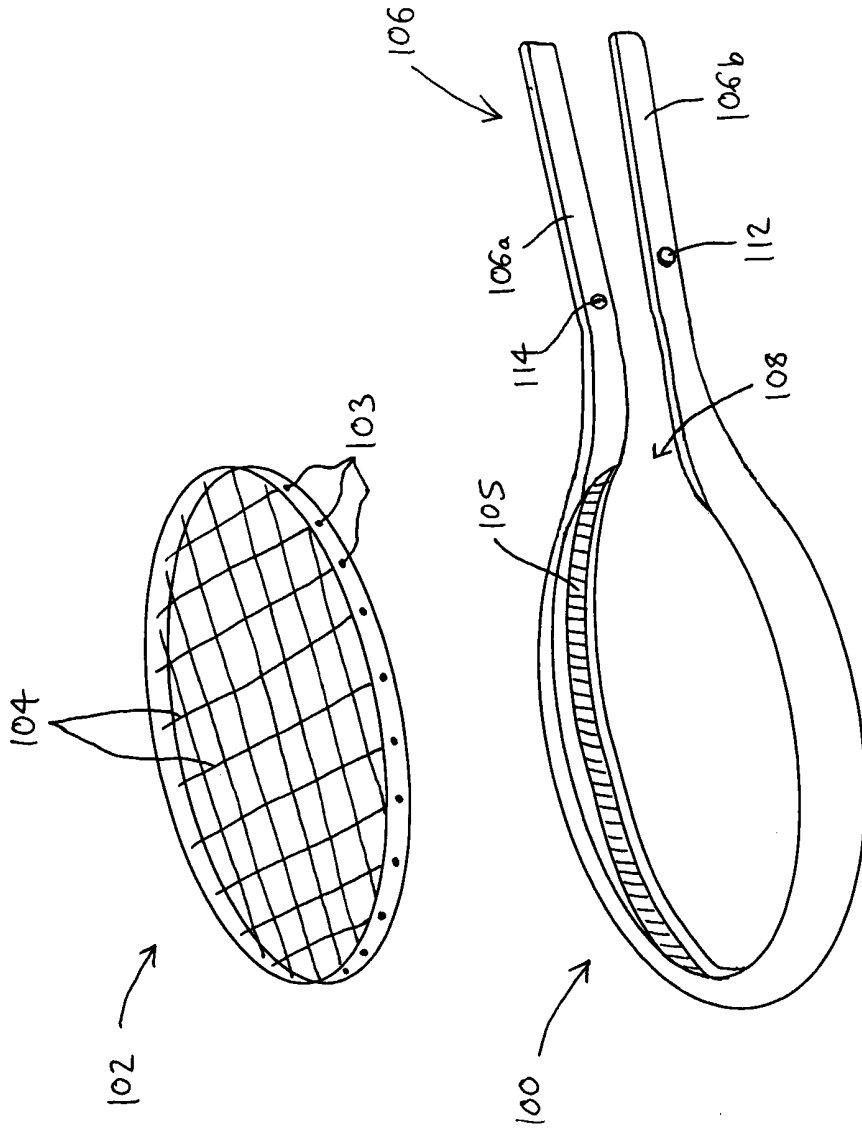


Fig. 1.

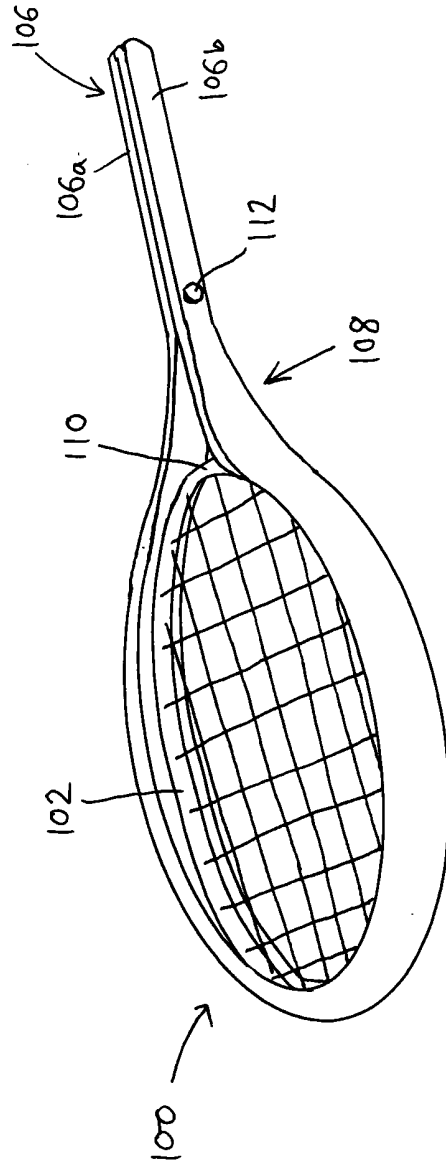


Fig. 2

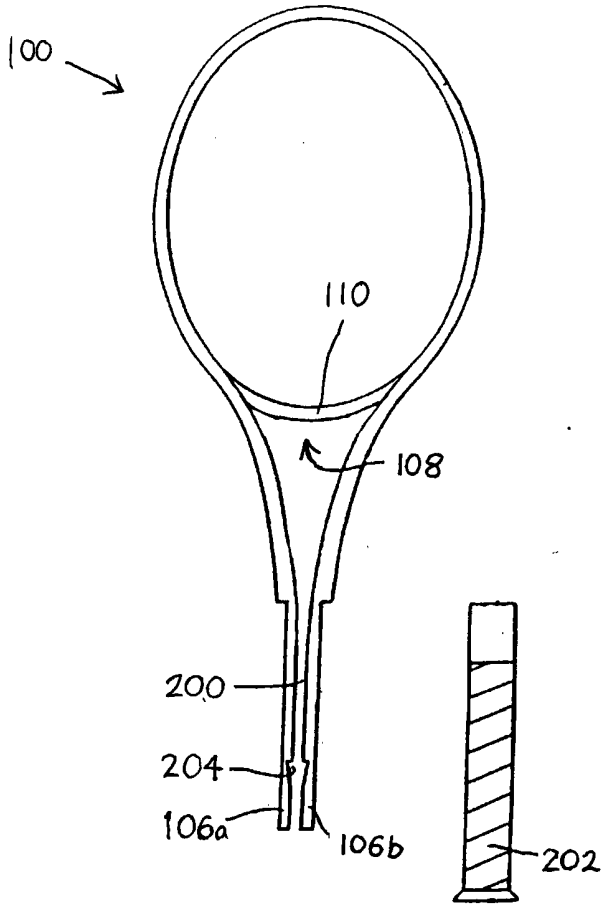


Fig. 3a

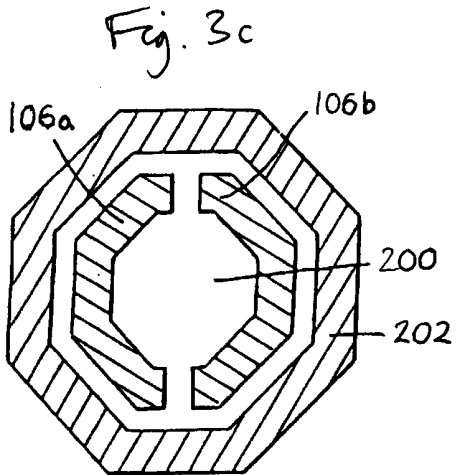


Fig. 3c

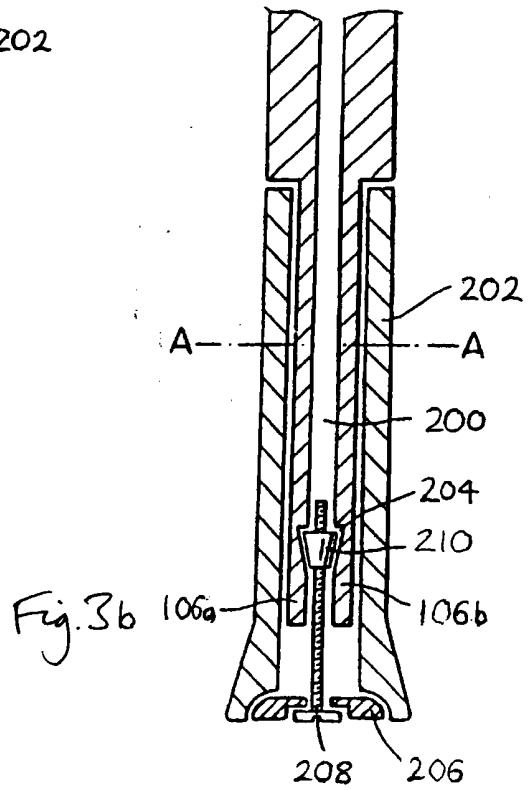


Fig. 3b

SPORTS RACKET

This invention is directed to sports rackets, and in particular embodiments, to strung sports rackets.

A wide variety of sports rackets are known to the art, such as those employed in tennis, squash and badminton. When a string on such a sports racket breaks, usually the entire racket head has to be re-strung. This is normally
5 required to be done by a high-tension re-stringing machine, usually only available to the amateur user through retail outlets, which take several weeks to return the racket. When a professional user breaks a string during a game, the racket is typically replaced by another racket brought onto the court in case of such an
10 eventuality. Also, a professional often has access to a number of differently strung rackets, from which to choose according to playing conditions, his opponent or his own form. This facility is not available to an amateur without substantial financial outlay.

It is therefore an object of the present invention to address such problems,
15 and to provide an improved sports racket.

Accordingly, the invention consists in one aspect in a sports racket comprising: a frame, having a head; a detachable sub-frame for housing racket strings; and means releasably securing the sub-frame to the head.

This racket and detachable string bed arrangement has a number of
20 advantages. The racket has the ability to be effectively instantly re-strung by changing the string-bed. Thus if only one racket is owned, the amateur user need not wait for a professional re-stringing. Furthermore, the professional user has no need for a spare racket in case a string breaks during a match – only a spare string bed is required.

25 Preferably, the racket is deformable, in order to permit attachment of the sub-frame. In one form, the head of the frame is radially expandable into an open position, in order to permit the sub-frame to be accommodated within the head, and wherein in a closed position, the frame securely encloses the sub-frame.

Suitably, the frame is expandable by means of an opening in the frame, which may be widened to permit expansion into the open position, and fastened into the closed position by fastening means.

5 Such an arrangement may also help to limit vibrations transmitted from the racket strings to the handle of the racket.

In one form of the invention, the fastening means comprises a threaded fastener extending between two parts of the frame separated by the opening.

10 Advantageously, the opening is located in a handle portion of the frame, and the handle portion comprises a moveable portion which operates the fastening means. Suitably, the moveable portion comprises a removable grip, in which case the handle preferably comprises wedging means, the removable grip being securable onto the handle by purchase on said wedging means.

15 In another form of the invention, the sub-frame is deformably contractable, in order to permit insertion into the head, and expansion into a secured position within the frame.

Preferably, the racket comprises a compressible lining interposed between a perimeter of the sub-frame and a surface of the frame head.

Suitably, the racket comprises a further sub-frame, for housing racket strings in an alternative configuration, or at an alternative tension.

20 A further advantage of the invention is that as the main outer frame of the racket does not incorporate the holes for the racket strings, the frame can be more stiff, or may be manufactured of a lighter material whilst maintaining the required rigidity.

25 In another aspect, the invention provides a string bed attachment for a sports racket, comprising a bed frame for housing racket strings, the frame being configured to be releasably securable to a racket frame.

The invention will now be described by way of example with reference to the accompanying drawings, in which:

30 Figure 1 is a diagram illustrating an exploded view of a racket and insert according to an embodiment of the invention;

Figure 2 is a diagram illustrating the racket and insert of Figure 1 in an assembled arrangement;

5 Figure 3a is a diagram illustrating an exploded view of a racket and removable sleeve grip according to another embodiment of the invention;

Figure 3b is a diagram illustrating a cross section of the assembled racket and grip of Figure 3a; and

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Figure 3c is a diagram illustrating a section along A—A of the assembled racket and grip of Figure 3b.

Referring initially to Figure 1, the embodiment shown comprises a racket
15 (100), and a detachable sub-frame or string-bed insert (102), having holes (103) for securing racket strings (104). The string-bed has essentially the same hoop-shape as the racket head, but the hoop is of slightly smaller diameter, in order to allow its insertion within the hoop of the head. The racket head incorporates a channel (105, shown hatched) running around its inner circumference, which aids
20 securing and gripping of the string-bed when inserted. This channel may be lined with a resilient compressible material, in order to provide a greater grip on the string-bed.

The handle (106) of the racket is formed of two halves 106a and 106b, each attached to one side of the racket head hoop, so that the racket is
25 essentially formed of a single piece of material. As shown in Figure 1, when the string-bed is to be inserted, the two halves of the handle are separated, leaving a gap between them, and also a gap in the neck (108) of the racket. This separation also necessarily increases the diameter of the racket head, thus allowing the string-bed's insertion. Upon securing of the string-bed in the channel
30 (105), the handle halves are brought together, closing the racket head around the string-bed, and narrowing the gap in the neck, so that the string-bed is fully

secured, as shown in Figure 2. The string-bed is held in place by contact with the channel in the inner circumference of the head. The only portion not in direct contact with the head is that portion (110) traversing the neck. The closure of the racket is finally secured by one or more threaded fasteners (112) (only one
5 shown), attached to one half of the racket handle, which is inserted into a threaded bore (114) on the other handle half.

For release of the racket head, the fastener (112) is removed from the bore (114), and the handle halves are separated. This releases the grip on the string-bed, and widens again the racket head, allowing easy removal of the
10 string-bed. This can then be replaced with a newly strung bed, should a string have broken. The replacement head could also have strings at different tension or of different material, should playing conditions, such as weather, have changed, demanding, for example, a better grip of the ball, or less weight in certain shots. The strings may also be in a different configuration in an additional
15 bed, in order, for example, to perform differently for a particular shot.

In other embodiments, the racket head is separable by different means. In one embodiment, there is simple a break in the racket handle in the neck portion (108), so that only one side of the racket head and the neck need be moved
20 apart in order to accommodate the insert. A similar fastener is used here, though typically across the break in the handle, rather than laterally across the neck of the racket.

The racket may also be expandable by other means, which do not necessarily demand a break in the racket handle or neck. In one embodiment, the racket head is formed as an incomplete but resilient hoop, and the string-bed
25 is simply slotted into the channel (105). Alternatively the head is a complete resilient hoop but is separable at the top so that the two halves can be pulled apart to insert the string bed and then closed-up and fastened together across the join, for example by a strap secured by an over-centre toggle.

In a further embodiment, the final securing of the racket is achieved by a
30 removable sleeve grip (202), such as that illustrated in Figures 3a to 3c. The racket handle halves (106a, 106b) define between them a channel (200), and

wedge profiles (204) are formed on the inner surfaces of the handle halves. The sleeve grip (202) is pushed onto the handle, as shown in Figures 3b and 3c, bringing the two halves together. The sleeve is secured by means of a wedging element (210) mounted as a bolt on a screw (208) inserted into the end (206) of the sleeve. The wedging element contacts the wedge profiles, such that as the screw is tightened, the wedging element moves along the wedge profiles, widening the channel (200) and forcing the handle halves further apart. This tightens the grip of the sleeve on the handle. The movement of the wedging element against the profiles also pulls the sleeve further onto the handle, further improving the grip, ensuring that the sleeve does not slip off the handle during use.

The inner profile of the sleeve grip (202) incorporates a "draw", so that it tapers inwardly from its base to the upper end adjacent the neck (108) of the racket. A draw of approximately 2 degrees is appropriate. The handle halves can therefore be expanded so as to diverge towards their free ends, so that the sleeve is even more firmly secured.

In another embodiment the handle-halves and the sleeve grip (202) may have conforming wedging surfaces such that pushing the sleeve on to the handle, or pushing it on and then twisting it, forces the handle-halves together and securely fixes the string bed. A locking means, such as a spring loaded catch, may be incorporated in order to secure the sleeve.

In the embodiments described above, additional securing of the string bed may be performed by a series of clips affixed to the racket head, which are opened when the racket is expanded, and closed around the head once the insert is located in the channel.

It should be noted that the invention is not limited to the expansion of the racket to accommodate the string bed. In one embodiment, the string bed is simply clipped to the racket head, either by the clips mentioned above, or by other fastening means, such as threaded fasteners, attached around the racket head.

In another embodiment, the string bed itself is deformable, so that the racket head is not required to expand to accommodate it. This deformation is achieved by additional flexibility of the string bed rim, or by a break or fold in the rim.

5 The hoop of the string bed may be formed from a number of materials, such as thermosets or thermoplastics. For example, the material be may be a long fibre composite thermoset, such as a carbon fibre pre-pregnated thermoset. Alternatively, a short fibre thermoplastic, such as carbon fibre in nylon, may be used.

10 It will be appreciated by those skilled in the art that the invention has been described by way of example only, and that a variety of alternative approaches may be adopted without departing from the scope of the claims. Each feature disclosed in this specification (which term includes the claims) and/or shown in the drawings may be incorporated in the invention independently of other
15 disclosed and/or illustrated features. Statements in this specification of the "objects of the invention" relate to preferred embodiments of the invention, but not necessarily to all embodiments of the invention falling within the claims.

CLAIMS

- 5 1. A sports racket comprising: a frame, having a head; a detachable sub-frame for housing racket strings; and means releasably securing the sub-frame to the head.
2. A racket according to Claim 1, wherein the racket is deformable, in order to permit attachment of the sub-frame.
- 10 3. A racket according to Claim 2, wherein the head of the frame is radially expandable into an open position, in order to permit the sub-frame to be accommodated within the head, and wherein in a closed position, the frame securely encloses the sub-frame.
- 15 4. A racket according to Claim 3, wherein the frame is expandable by means of an opening in the frame, which may be widened to permit expansion into the open position, and fastened into the closed position by fastening means.
- 20 5. A racket according to Claim 4, wherein the fastening means comprises a threaded fastener extending between two parts of the frame separated by the opening.
- 25 6. A racket according to Claim 4 or Claim 5, wherein the opening is located in a handle portion of the frame, and wherein the handle portion comprises a moveable portion which operates the fastening means.
7. A racket according to Claim 6, wherein the moveable portion comprises a removable grip securable onto the handle.

8. A racket according to Claim 7, wherein the handle comprises wedging means, the removable grip being secured by purchase on said wedging means.

5 9. A racket according to Claim 2, wherein the sub-frame is deformably contractable, in order to permit insertion into the head, and expandable into a secured position within the frame.

10 10. A racket according to any of the above claims, comprising a compressible lining interposed between a perimeter of the sub-frame and a surface of the frame head.

15 11. A kit of parts comprising a racket according to any of the above claims, the sub-frame having strings in a first configuration, and a further sub-frame having racket strings in an alternative configuration.

20 12. A kit of parts comprising a racket according to any of the above claims, the sub-frame having strings at a first tension, and a further sub-frame having racket strings at an alternative tension.

25 13. A string bed attachment for a sports racket, comprising a bed frame for housing racket strings, the frame being configured to be releasably securable to a racket frame.

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Examiner: John Eggers
Fohlmann

Claims searched: 1-13

Date of search: 6 September 2004

Patents Act 1977 : Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1-8, 13	GB 1237958 A (HELSINGBORGS GUMMIFABRIK) See figure 1, 4, 5 and 6; page 1, line 54-86; page 2, line 74-83; page 4, line 59-75 and line101 to page 5, line 17
X	1-5, 13	US 3891211 A (DIEFENBACH) See figure 2 and 3
X	1-4, 6, 10-12	NL 8701068 A (VAN DOORNEVELD) See figure 1 and 2; page 3, line5-12, WPI abstract
X	1-4, 6, 11-13	DE 3204442 A1 (MOMCILOVIC) See figure 1 and 2; page 5, line110-113; page 6, line155-156
X	1-4, 6, 13	GB 712224 A (BROOKS) See figure 1 and 5
X	1-4, 6,11-13	US 6402646 B1 (WOLF) See figure 6; column 4, line3-6 and line 23-27
X	1-3, 11-13	US 4804183 A (DORAN et al.) See figure 3 and 5, abstract
X	1, 10-13	BE 1011745 A6 (STRUYF) See figure 7, 10 and 16, WPI abstract
X	13	US 5413335 A (BRAUN) See figure 2, abstract

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^w:

Worldwide search of patent documents classified in the following areas of the IPC⁷:

A63B



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Application No: GB 0306038.1

Examiner: John Eggers
Fohlmann

Claims searched: 1-13

Date of search: 6 September 2004

The following online and other databases have been used in the preparation of this search report:

WPI, EPODOC, JAPIO