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Alloy racket frame.

An alloy racket frame has a head (1) with two ends (11), a shaft (3) and a handle. A slim foam portion (20) surrounded by a number of first adhesive layers (21) fit in the two ends of the head. The two ends of the head and an end of the shaft are surrounded by a number of second adhesive layers (22). The racket is heated and compressed so as to simultaneously cure the first and second adhesive layers, so that the head is securely joined with the shaft.

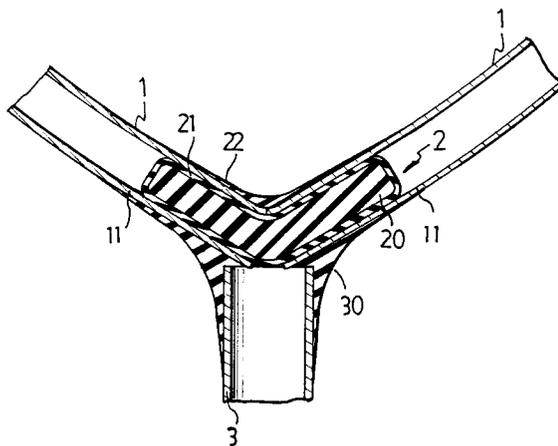


FIG. 1

EP 0 561 040 A1

BACKGROUND OF THE INVENTION

Field of Invention

The present invention relates to bonding of an alloy racket frame, especially an aluminum alloy racket frame.

Related Prior Art

According to prior art as shown in Figure 4, an aluminum racket for badminton, squash or tennis is shown. Two ends 511 of a head 51 are bonded with a shaft 6 by a three-way joint 5 having adhesives therein (not shown), thereby obtaining a bonded frame with a three-way joint 5 exposed. However, the prior bonding possesses the following drawbacks.

The bonding of the two ends 511 of the head 51 will gradually deteriorate along the boundary of the adhesive when the racket hits balls because of the impact coming therefrom directly transfers to the three-way joint 5, producing considerable stress, thereby resulting in cracks on the boundary. Therefore, the prior bonding cannot satisfy the essential properties of sport rackets. Also, the obvious adhesive portion of the exposed three-way joint 5 does not have aesthetic value.

It is the purpose of this present invention, therefore, to mitigate and/or obviate the above-mentioned drawback in the manner set forth in the detailed description of the preferred embodiment.

SUMMARY OF THE INVENTION

Accordingly, it is an object of this invention to provide an alloy racket frame by applying foam portion surrounded by first adhesive layers and second adhesive layers around the bonding portion, respectively, and by heating and compressing, thereby resulting in rackets having strong bonding regarding the bonding portions of the heads and shafts.

Another object of this invention is to provide an alloy racket frame which possesses aesthetic value.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a cross-sectional partial view of a racket head and a shaft in accordance with the present invention;

Figure 2 is a partial front view of a racket head and a shaft at a bonding portion thereof;

Figure 3 is a cross-sectional partial view of a racket head and a shaft; and

Figure 4 is a cross-sectional partial view of a bonding portion of a racket head and a shaft according to prior art.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings and, more particularly, to Figure 1, an alloy racket frame, particularly an aluminum alloy racket frame, is shown in a cross-sectional partial view. The racket frame consists of a head 1, a shaft 3 and a handle (not shown). The head 1 has two ends 11 slightly contacting each other. A first end of the shaft 3 slightly contacts the ends 11 and a second end of the shaft 3 is coaxially joined with the handle.

A member 2 for connecting the head 1 and the shaft 3 comprises a slim foam portion 20, a plurality of first adhesive layers 21 and a plurality of second adhesive layers 22. The slim foam portion 20 which is made from, for example, EVA (copolymer of ethylene and vinyl acetate) is surrounded by the first adhesive layers 21. The slim foam portion 20 has a first end inserted into a first end 11 and a second end inserted into the second end 11, for connecting the first and second ends 11.

The first end of the shaft 3 is sited below the ends 11. The ends 11 which have been connected to each other and the first end of the shaft 3 are then surrounded by a number of second adhesive layers 22, thereby obtaining a bonding portion 30. The adhesive layers 21 and 22 are prepregs, i.e., fibers such as carbon fibers, glass fibers, and boron fibers which are impregnated with thermosetting resins incorporating curing agents and, preferably, fillers therein. Alternatively, fibers having impregnated thermosetting resins are wound about the ends 11 and the first end of the shaft 3 by means of filament winding with one or more fibers so as to form the bonding portion 30.

The bonding portion 30 is then hot pressed. Thus, the slim foam portion 20 expands so that its two ends are secured in the ends 11. The first adhesive layers 21 help securely attach the slim foam portion 20 to the head 1, which cure thereafter. Meanwhile, the second adhesive layers 22 tightly secure the head 1 and shaft 3 after being heated and compressed and cured.

Referring to Figure 2, the bonding portion 30 after the curing cycle is shown. The frame is to be painted and the head 1 is to be drilled for insertion of a string.

Referring to Figure 3, squash rackets employ larger diameters for the head 1, the shaft 3 and the handle as they have to endure much higher impact than badminton rackets, so that a stronger bonding portion 30 is necessitated. Another layout of the bonding portion 30 is shown. Two members 2 each have a slim foam portion 20 surrounded by first adhesive layers 21. A first end of each member 2 is inserted in a corresponding end 11 and a second

end of each member 2 is inserted in the shaft 3. Hereinafter, the ends 11 and the first end of the shaft 3 are surrounded by a number of second adhesive layers 22 so as to form the bonding portion 30. The bonding portion 30 is then hot pressed and the slim foam portions 20 expand so as to force the first adhesive layers 21 to be respectively secured within the ends 11 and the first end of the shaft 3. Meanwhile, the second adhesive layers 22 tightly secure the head 1 and the shaft 3 together after being hot pressed and cured, thereby resulting in a squash racket possessing increased strength.

For enduring still higher impact, a wedge-shaped foam material can be sited between the two ends 11 and enclosed within the second adhesive layers 22.

Claims

1. An alloy racket frame having a head formed from an alloy tube with two ends, a handle and a shaft having a first end joined with the head and a second end joined with the handle, the improvements comprising (a) a slim foam portion having two ends respectively fitting in the ends of the head and (b) a number of cured adhesive layers surrounding the ends of the head and the first end of the shaft. 20
2. An alloy racket frame according to claim 1, further comprising a number of cured adhesive layers surrounding the slim foam portion. 25
3. An alloy racket frame according to claim 1, wherein the adhesive layers comprise fibers impregnated with thermosetting resins incorporating curing agents therein. 30
4. An alloy racket frame according to claim 3, wherein the fibers comprise at least one of carbon fibers, boron fibers, and glass fibers. 35
5. An alloy racket frame according to claim 1, wherein the alloy is an aluminum alloy. 40
6. An alloy racket frame having a head formed from an alloy tube with two ends, a handle and a shaft having a first end joined with the head and a second end joined with the handle, the improvements comprising (a) two slim foam portions each having a first end fitting in a corresponding one of the ends of the head and a second end fitting in the first end of the shaft and (b) a number of cured adhesive layers surrounding the ends of the head and the first end of the shaft. 45
7. An alloy racket frame according to claim 6, wherein the slim foam portions are each surrounded by a number of cured adhesive layers. 50
8. An alloy racket frame according to claim 6, wherein the adhesive layers comprise fibers impregnated with thermosetting resins incorporating curing agents therein. 55
9. An alloy racket frame according to claim 8, wherein the fibers comprise at least one of carbon fibers, boron fibers, and glass fibers.
10. An alloy racket frame according to claim 6, wherein the alloy is an aluminum alloy.

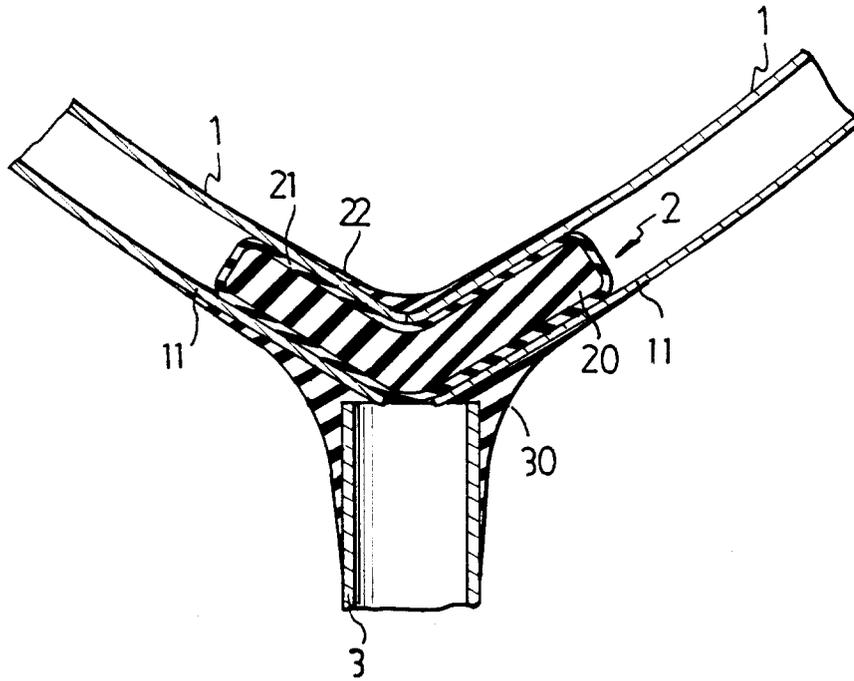


FIG. 1

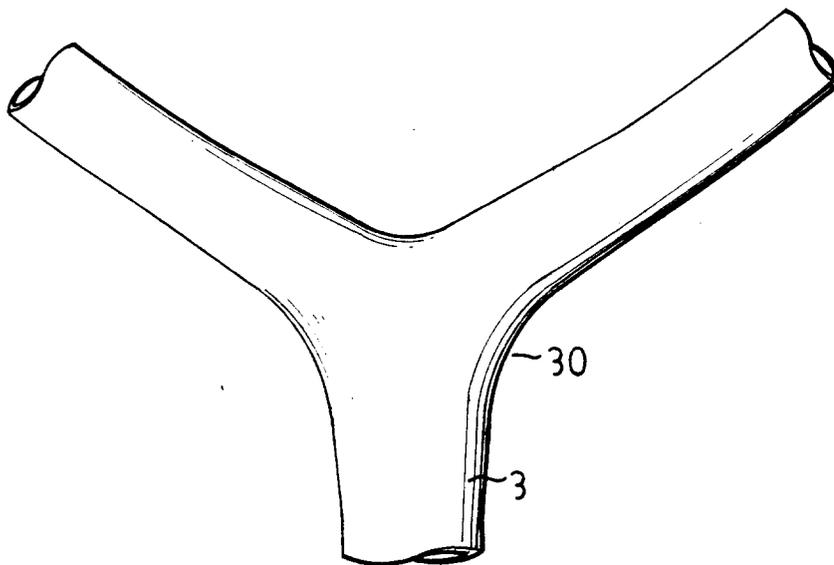


FIG. 2

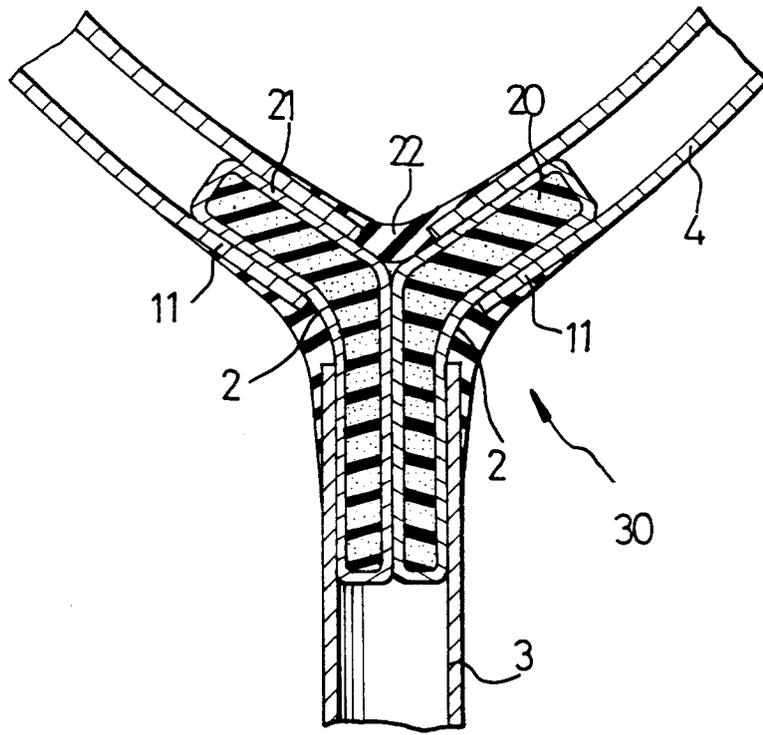


FIG. 3

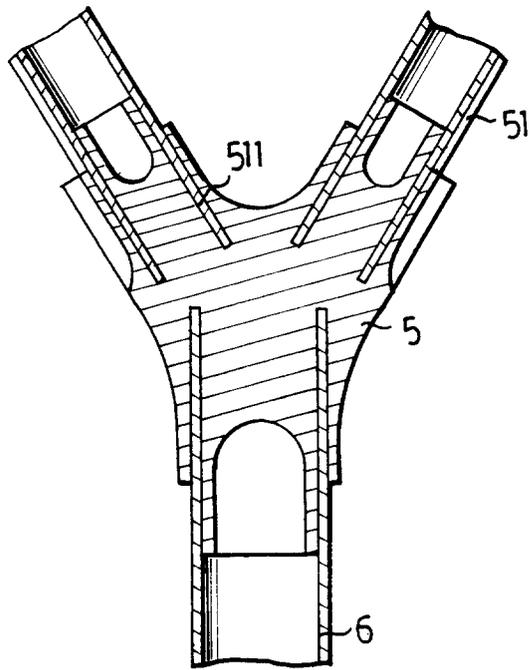


FIG. 4
PRIOR ART



DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	GB-A-2 151 492 (YONEX K.K.) * column 2, line 95 - column 3, line 55; claims 1-8; figures 1-6 *	1-10	A63B49/02 A63B49/12
A	GB-A-1 223 834 (ROBINSON) * page 1, line 60 - page 2, line 29; figures 1-4 *	1-10	
A	US-A-3 083 968 (TAKAHASHI) * column 2, line 57 - column 3, line 13 * * column 4, line 21 - line 51; claim 1 *	1-10	
A	US-A-4 360 202 (KUN-NAN LO) * abstract; claim 1; figures 1,4 *	1-10	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			A63B
The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 18 MARCH 1993	Examiner MICHELS N.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			