

(43) Date of A Publication 12.12.2001

(21) Application No 0013836.2

(22) Date of Filing 08.06.2000

(71) Applicant(s)  
**John William Stagg**  
2 Lyndale Avenue, Stoke Bishop, BRISTOL, BS9 1BS,  
United Kingdom

(72) Inventor(s)  
**John William Stagg**

(74) Agent and/or Address for Service  
**John William Stagg**  
2 Lyndale Avenue, Stoke Bishop, BRISTOL, BS9 1BS,  
United Kingdom

(51) INT CL<sup>7</sup>  
**G10D 3/16**

(52) UK CL (Edition S )  
**G5J JSP**

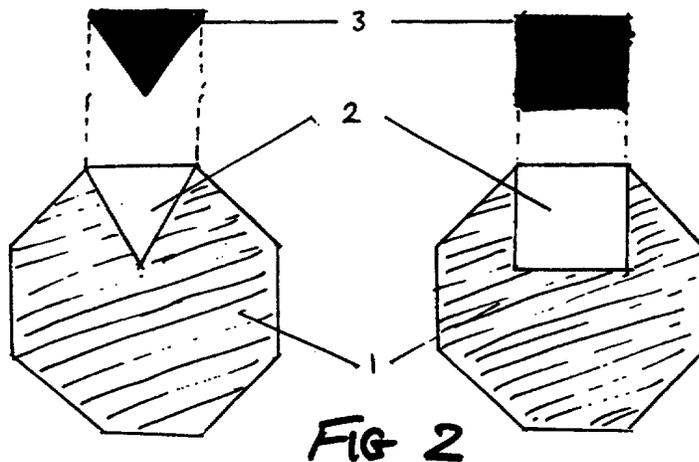
(56) Documents Cited  
**US 4754681 A US 4015501 A**

(58) Field of Search  
UK CL (Edition R ) **G5J JSP**  
INT CL<sup>7</sup> **G10D 3/16**  
**ONLINE: EPODOC, WPI, JAPIO**

(54) Abstract Title  
**Reinforced wooden bow for stringed instruments**

(57) A wooden bow stick of conventional design has one or more recesses or channels 2 cut into it along its length. A similarly curved reinforcing bar(s) 3 of identical section to the recess/channel, made of strong composite material eg carbon fibre set in a resin matrix, is/are inserted and bonded into the channel(s). The reinforcing bar(s), having inherently greater stiffness properties than the original wood, add to the overall stiffness of the completed stick.

Since the bar(s) comprise only a small proportion of the total mass/volume of the bow stick, its wooden "look" is retained and although the composite material has a slightly higher specific gravity than the base wood, any weight gain is marginal. The finished dimensions of the completed stick need not be altered by the insertion of the bars, but judicious re-sizing of the stick could eliminate any weight gain without major effect on stiffness.



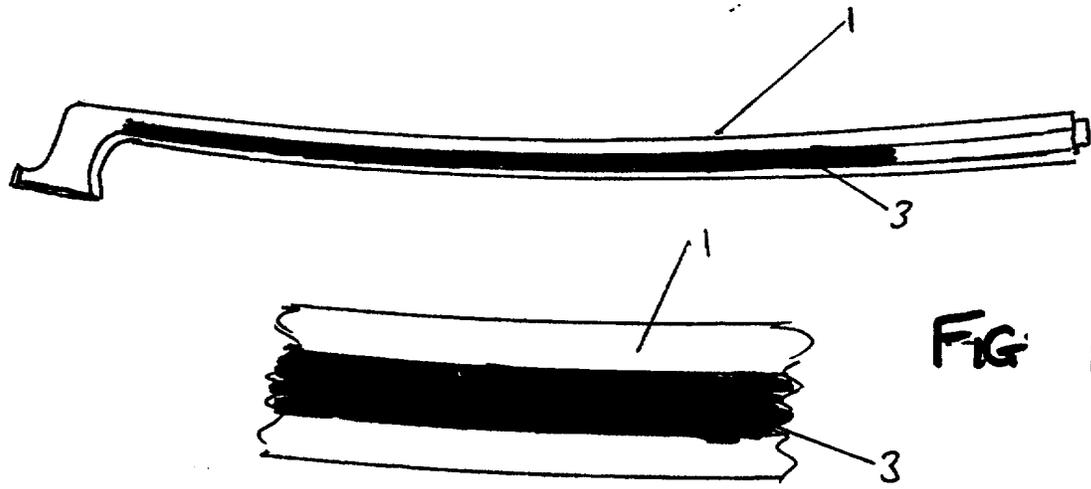


FIG 1

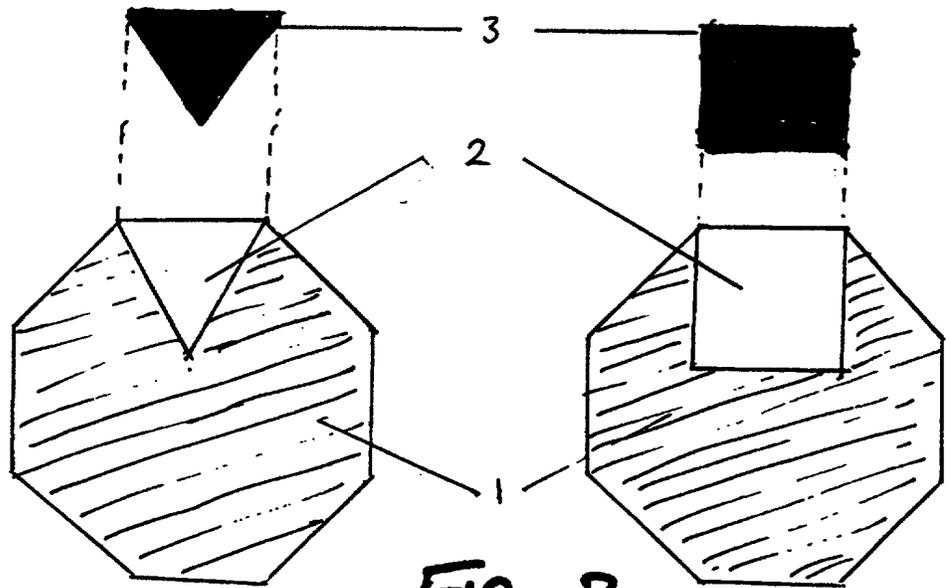


FIG 2

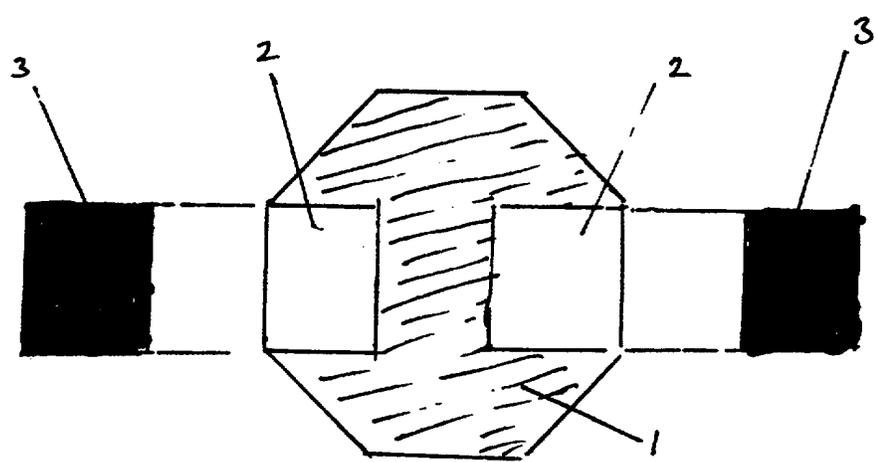


FIG 3

## REINFORCED WOODEN BOW STICK FOR STRINGED INSTRUMENTS

This invention relates to a wooden bow stick for stringed instruments, of traditional conventional design, that has been reinforced by the insertion of one or more suitably shaped and curved bars of composite material eg carbon fibre in a resin matrix.

Bows for stringed instruments are familiar and well known. They are traditionally made of wood, usually from one of a few specific species of exotic hardwood which is sawn and planed to a required taper and permanently bent to a prescribed camber or curvature. They are required to have certain weight and stiffness characteristics desired by stringed instrument players. Their visual qualities are also quite important in gaining acceptance.

These exotic timbers, however, are in short supply, expensive and unpredictable in quality. Current wastage rates vary from 80% to 95% of sticks cut from raw mainly due to timber faults or unsatisfactory weight/stiffness. At present it is commercially unviable to grow and harvest these timbers on a sustainable basis, due to their slow growth rates and specialist nature.

According to the present invention there is provided a method of improving and regulating the desirable characteristics of a wooden bow stick by reinforcing it with inserted shaped and curved bar(s) of composite material eg carbon fibre, kevlar or similar in a resin matrix. These bars can be inserted singly, in pairs or more in various configurations into suitably shaped recesses/channels in the original wooden stick and bonded in place with a suitable adhesive.

Representing only a small percentage of the whole mass/volume of the original wooden stick, but possessing proportionally much greater stiffness/strength, the reinforcement bars do not greatly detract from the visual qualities of the wood but do beneficially enhance the desired playing characteristics of the finished item. There is also the additional benefit of a substantial reduction in wastage of wooden sticks so reinforced.

A specific embodiment of the invention will now be described by way of example with reference to the accompanying drawings in which :-

Figure 1 shows the side view of a bow stick with a typical camber and an enlarged area, illustrating both the relative size of a typical reinforcement bar and its similar camber to that of the stick.

Figure 2 shows enlarged typical cross-sections through a bow stick with a single reinforcement of two different sections.

Figure 3 shows an enlarged typical cross-section with a pair of reinforcements of suitable section.

Referring to the drawing the reinforced bow stick comprises a conventional/traditional curved and tapered wooden bow stick 1 which has been recessed with either single or multiple channels of varying shapes 2 in a variety of possible positions around the cross-section, accompanied by the insertion into these channel(s) of reinforcing bar(s) 3 of matching shape and curvature. The reinforcing bars are made of strong composite material eg carbon fibre set in a resin matrix.

The channels in the wooden stick can be produced using standard engineering techniques (eg milling, slitting saw, routing) with the stick immobilised in a suitable holding jig.

The reinforcing bars can be machined from solid pre-cast and cured material, drawn semi-cured material which is further cured in a mould of the correct camber and shape, or material cast complete in a curved mould.

Calculations show that typical carbon-fibre/resin composites have a bending stiffness some five times that obtained from pernambuco wood. Their respective specific gravities are 1.3 – 1.4 and 1.0 – 1.1.

By way of illustration, therefore, a reinforcing bar of approximately 25% by volume of the original stick, has the effect of doubling the stiffness of the finished item. It follows that wood originally rejected for lack of stiffness, or low density could now have quite acceptable characteristics with the addition of reinforcing bars.

With no alteration in physical dimensions, for a typical violin bow stick of 40 grammes in weight, the addition of a 20% by volume reinforcing bar (excluding head and handle), increases stiffness by some 80% whilst adding approximately 1-2 grammes to the weight. Judicious re-sizing of the stick could eliminate any weight gain altogether without major effect on the improvement in stiffness.

**CLAIMS**

1 A reinforced stringed instrument bow stick, comprising a conventional wooden stick recessed in any position to accept a similarly shaped and curved reinforcing bar made of composite material in a resin matrix eg carbon fibre.

2 A reinforced stringed instrument bow stick as claimed in Claim 1 wherein the reinforcement is a single bar of composite material.

3 A reinforced stringed instrument bow stick as claimed in Claim 1 wherein the reinforcement is a pair or more of bars of composite material.

4 A reinforced stringed instrument bow stick as claimed in any preceding claim wherein the reinforcement bar(s) are square or rectangular in section.

5 A reinforced stringed instrument bow stick as claimed in Claim 1, Claim 2 or Claim 3 wherein the reinforcement bar(s) are triangular in section.

6 A reinforced stringed instrument bow stick as claimed in Claim 1, Claim 2 or Claim 3 wherein the reinforcement bar(s) are of any other shape in section.



INVESTOR IN PEOPLE

Application No: GB 0013836.2  
Claims searched: 1-6

Examiner: David Summerhayes  
Date of search: 7 August 2000

4

**Patents Act 1977  
Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.R): G5J (JSP)

Int Cl (Ed.7): G10D 3/16

Other: Online: EPODOC, WPI, JAPIO

**Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
A	US 4754681 (MAIGRET)	
A	US 4015501 (SCHALLER)	

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.