

(19)



Europäisches Patentamt

European Patent Office

Office européen des brevets



(11)

EP 0 890 375 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
13.01.1999 Bulletin 1999/02

(51) Int. Cl.⁶: **A63B 31/11**

(21) Application number: 98112531.3

(22) Date of filing: 07.07.1998

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE**
Designated Extension States:
AL LT LV MK RO SI

(72) Inventor: **Garofalo, Giovanni**
16035 Rapallo (GE) (IT)

(74) Representative:
Porsia, Attilio, Dr.
c/o Succ. Ing. Fischetti & Weber
Via Caffaro 3/2
16124 Genova (IT)

(30) Priority: 11.07.1997 IT GE970060

(71) Applicant: **HTM SPORT S.p.A.**
I-16035 Rapallo (Genova) (IT)

(54) **Composite fibre-reinforced resin blade for swimming fins**

(57) Composite fibre-reinforced resin blade for swimming fins, comprising a fibre-reinforced resin panel (1) which is covered on both sides with two sheets of thermoplastic material.

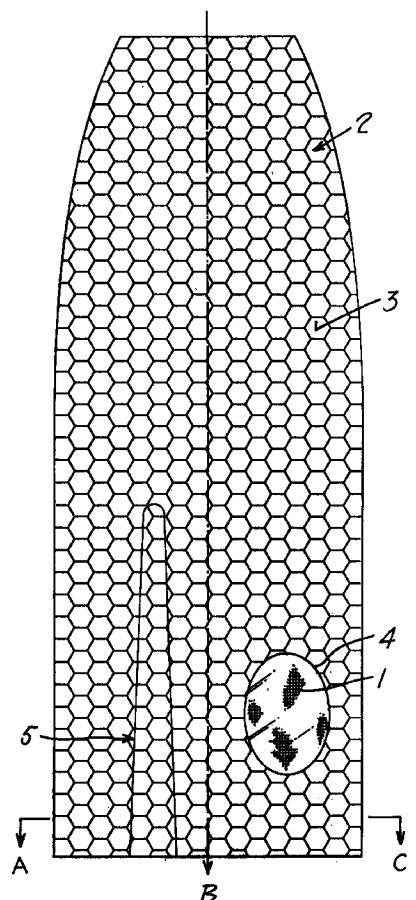


Fig. 1

EP 0 890 375 A1

Description

The present invention relates to swimming fin blades, and in particular to swimming fin blades of the type described for example in French patent No. 2,332,038.

The said blades are predominantly, although not exclusively, used in the manufacture of fins on account of the many advantages they offer in terms of lightness, propulsion and mechanical strength compared with more commercial fins.

The fins in which these blades are used essentially consist of a blade and a shaped shoe portion connected together mechanically by fitting the rear end of the blade into suitable housings in the sole of the shoe portion and fixing these two parts together by means of a screw coupling. The blade can be made using various materials which have to be very hard, mechanically strong, resistant to corrosion and lightweight; that is why panels of glass fibre or carbon fibre bonded with a matrix of thermosetting resin (for example epoxy resin) are used for these blades. The shoe portion, on the other hand, is usually made of rubber or elastomeric material.

In order to satisfy market requirements, decorative motifs or brand or sponsorship names which will not wear off over time as a result of abrasion need to be applied to fins in general and to competition fins in particular.

A first object of the present invention is therefore to produce a composite blade for swimming fins which is designed to be decorated in a simple but abrasion-resistant manner.

It is known to form self-shaping longitudinal channels in the blades of swimming fins in order to channel the flow of water during the fin stroke so that the mass of water glides over the blade more easily (see for example European patent No. 160,261). This type of channelling is, however, impossible on a fibre-reinforced resin panel.

A second object of the present invention is therefore also to produce longitudinal channels in the blade in order to increase its flexibility.

According to the present invention, the first object is achieved by means of a blade consisting of a panel made of glass fibre or carbon fibre bonded with a matrix of thermosetting resin, which panel is covered on both sides with sheets of thermoplastic material. Before being applied to the surfaces of the panel, these sheets can be decorated using silk-screen printing or flexography techniques. One of the properties of thermoplastic materials is that they are transparent, which means that they can be decorated on the side that will be applied directly to the panel, so that the decorative motifs will be visible yet still protected from abrasion. Furthermore, this method also enables the structure of the panel sandwiched between the sheets to show through. If the decorative motifs cover the whole surface of the above-mentioned sheets, it is possible to make transparent

windows in the latter in order to show the underlying panel. An additional feature is that the abovementioned sheets have good mechanical properties and are resistant to abrasion.

According to the present invention, the second object is achieved by cutting grooves into the section of blade, these grooves being produced by removing portions of a given width and length from the panel in a direction longitudinal to the said panel, starting from the front end of the section of blade. The flexibility of the blade is ensured by the fact that, in those panel portions comprising the grooves, the sheets of thermoplastic material are bonded together by means of hot press moulding so as to form longitudinal channels in which the water can flow more easily. Furthermore, during the moulding stage, those portions of the two sheets that lie within the grooves can be given a semicircular channel shape, for example by means of thermoforming using suitable mould cavities.

In order to offer a better understanding of the present invention, a brief description will be given below with reference to the appended drawings which illustrate a practical embodiment of the composite fibre-reinforced resin blade for swimming fins according to the invention.

Figure 1 illustrates a diagrammatic plan view of a blade forming the subject of the present invention, in which the left-hand side shows the blade with a groove and the right-hand side shows the blade without a groove.

Figure 2 illustrates a cross-section of a first embodiment of the blade, taken on the plane denoted B-C in Figure 1.

Figure 3 illustrates a cross-section of a second embodiment of the blade, taken on the plane denoted A-B in Figure 1.

Figure 4 is a cross-section, similar to that in Figure 3, illustrating a further variant of the invention.

As may be seen in Figures 1 and 2, the composite fibre-reinforced resin blade according to the present invention comprises a panel 1 made of glass fibre or carbon fibre bonded with a matrix of thermosetting resins (such as, for example, epoxy resins), which give the blade improved mechanical characteristics and make it abrasion-resistant. Two sheets of thermoplastic material 2 are applied to this panel - which constitutes the inner part of the blade forming the subject of the present invention - one on the bottom surface of the panel and one on the top surface. The sheets 2 are applied to the panel using any process suitable for the purpose, for example by means of hot press moulding, and decorative motifs 3 can then be printed on the sheets using silk-screen printing or flexography techniques. In the case of transparent sheets 2, the decorative motifs 3 can be printed either on the external side or on the internal side of these sheets. If the decorative motifs are

printed on the internal side of the sheets, they will be protected from abrasion. Moreover, in cases where the abovementioned decorative motifs cover the entire surface of the thermoplastic sheet, it is possible to leave part of the latter undecorated, forming a transparent window 4 - which is shown in Figure 1 as having an ellipsoidal section - so as to allow the internal panel to show through. As shown on the left-hand side of Figure 1, a groove 5 which extends inwards from the front end of the blade over a given length and width has been cut into the panel 1. The abovementioned groove 5 is covered with the sheets of thermoplastic material 2 which are bonded together, as denoted by the reference 202 in Figure 3, by means of hot press moulding. In order to improve the channelling of the flow of water over the blade, during the hot press moulding stage the parts 202 can be given a semicircular channel shape 202' in the region of the groove, for example by means of presses fitted with suitable mould cavities, as illustrated in Figure 4.

Claims

1. Composite fibre-reinforced resin blade for swimming fins, characterized in that it comprises a fibre-reinforced resin panel (1) which is covered on both sides with two sheets of thermoplastic material (2).
2. Blade according to Claim 1, in which these sheets (2) of thermoplastic material are applied to the panel (1) by means of hot press moulding.
3. Blade according to the preceding claims, in which these sheets (2) have decorative motifs (3) and/or writing on their external and/or internal surfaces.
4. Composite fibre-reinforced resin blade according to the preceding claims, characterized in that it has longitudinal grooves (5) which are covered with the sheets of thermoplastic material (2).

45

50

55

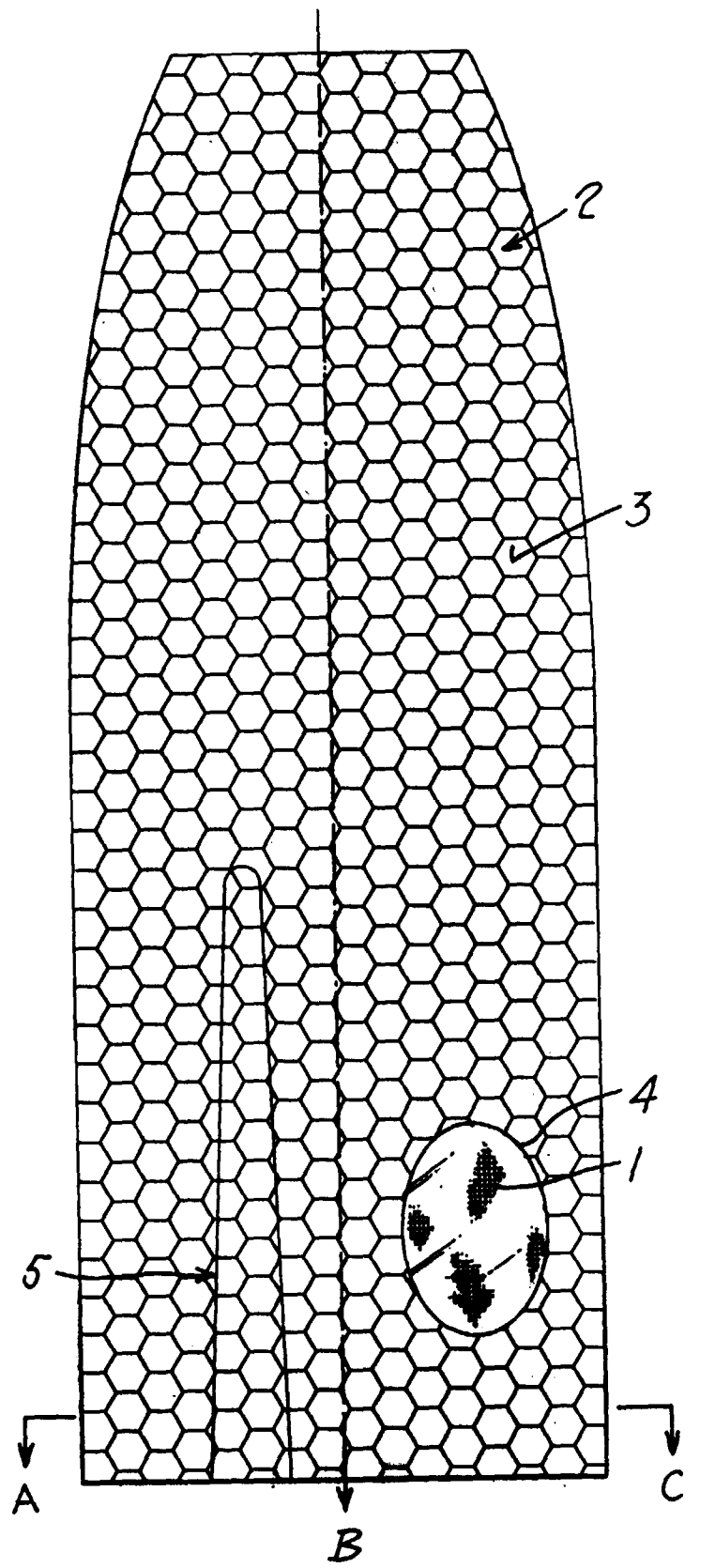
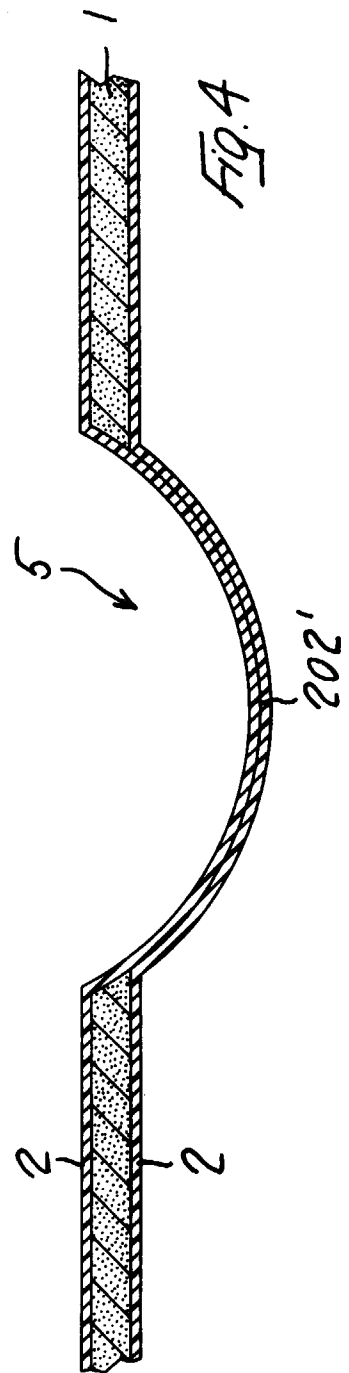
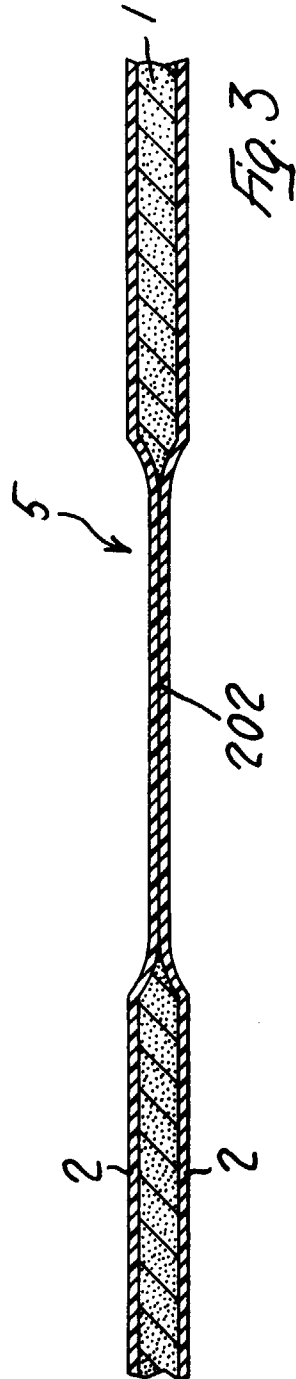
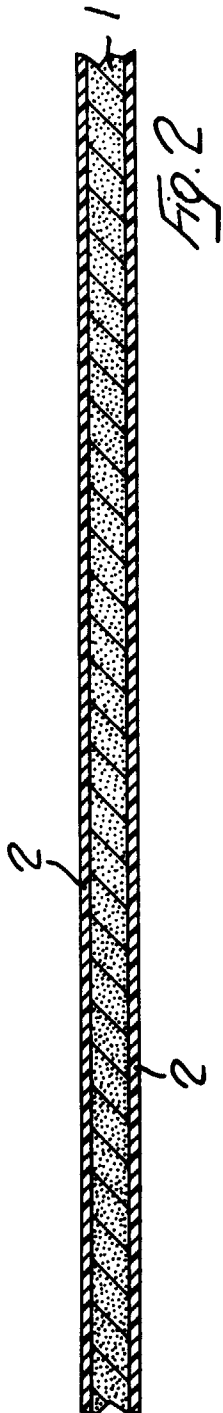


Fig. 1





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 98 11 2531

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.6)
Y	EP 0 640 361 A (TECHNISUB S.P.A) 1 March 1995 * column 9, line 4 - line 13; claims 1,5,7; figures *	1-4	A63B31/11
Y	FR 2 329 307 A (CAVALERO) 27 May 1977 * claims; figures *	1-4	
A	FR 2 689 404 A (TABATA CO. LTD.) 8 October 1993 * claims 1,4; figures *	1,4	
A,D	EP 0 160 261 A (AMF MARES S.P.A.) 6 November 1985 * abstract; figures *	1,4	
A	EP 0 436 927 A (TECHNISUB S.P.A) 17 July 1991 * abstract; figures *	1	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			A63B
Place of search		Date of completion of the search	Examiner
THE HAGUE		19 October 1998	Jones, T
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			

EPO FORM 1503 03 82 (P04C01)