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(71) Applicant: **Inda Nano Industrial Corp.**
Tortola (VG)

(72) Inventors:
- **Chen, Davis**
  Ku-Shan Dist Kaohsiung City (TW)
- **Chang, Chia-Hsien**
  Chien-Chin Dist. Kaohsiung City (TW)

(74) Representative: **Godwin, Edgar James**
Marks & Clerk
90 Long Acre
London WC2E 9RA (GB)

(54) Blade member for a hockey stick

(57) A blade member (2) adapted to be connected to a shaft (31) of a hockey stick (3) or the like includes an elongated hollow blade body (21), a flexible damping portion (22), and an interface portion (23). The elongated hollow blade body (21) defines a receiving cavity (24), and is made of a fiber reinforced resin composite. The flexible damping portion (22) is disposed within the elongated hollow blade body (21), and is made of cork. The interface portion (23) is disposed between the elongated hollow blade body (21) and the flexible damping portion (22).

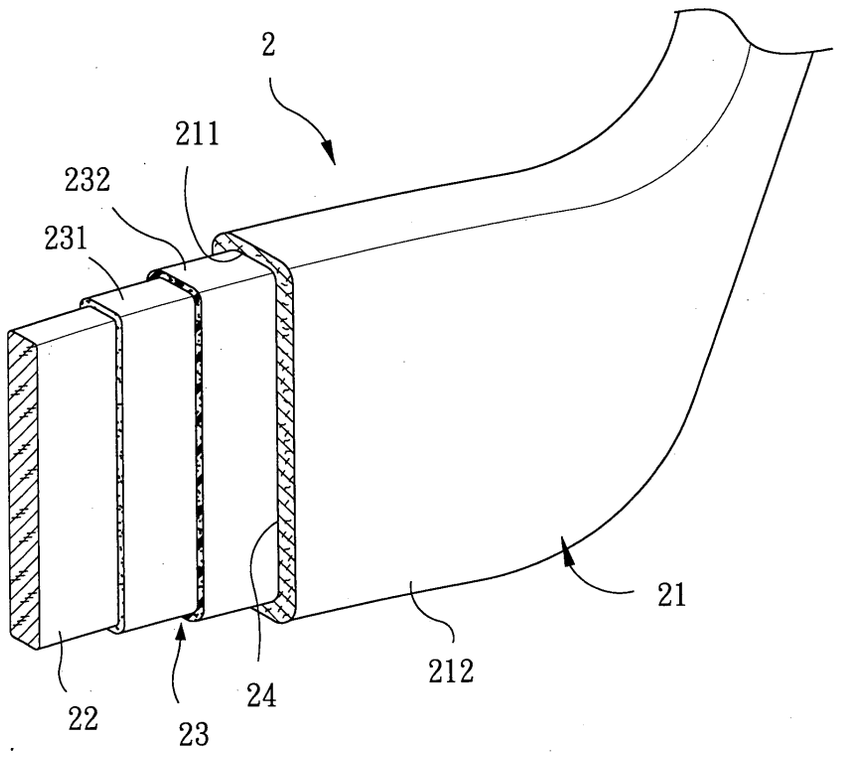

FIG. 3

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Description

[0001] The invention relates to a blade member, more particularly to a blade member to be connected to a shaft of a hockey stick or the like.

[0002] Referring to Figure 1, a conventional blade member 1 is shown to include a hollow shell 11 made of carbon fibers, and a silica gel 12 filled within the hollow shell 11. The silica gel 12 serves to absorb impact momentum transferred from the hollow shell 11. However, since the silica gel 12 has a relatively high density, the overall weight of the blade member 1 is increased. Therefore, it is relatively inconvenient to use a hockey stick fitted with the blade member 1.

[0003] U.S. Patent No. 5,407,195 discloses a blade construction including a blade body, which has a first face member, a second face member opposite to the first face member, and a core cavity member sandwiched between the first and second face members. The first and second face members are made of fiber reinforced plastic materials. The core cavity member includes rib bridge members and elongated pockets. The rib bridge members are made of fiber reinforced plastic materials. Each of the pockets is separated from an adjacent one by a corresponding one of the rib bridge members. The pockets may be filled with a light foam material, such as polyurethane, for maintaining a fiber component in the rib bridge members in a transverse configuration during curing. The impact resistance of the face members can be increased via the use of the fiber reinforced plastic materials, and the light foam material can absorb the impact transferred from the face members. However, the configuration of the first and second face members integrated with the core cavity member is relatively complicated. Therefore, it is relatively difficult to mold the aforesaid blade construction.

[0004] It is desirable to provide a blade member for a hockey stick with a good balance of properties, such as high structural strength, good impact absorption, good swing to impact feeling, light weight, etc. Additionally, easy processing of the blade member is an important consideration for manufacturers.

[0005] The object of the present invention is to provide a blade member to be connected to a shaft of a hockey stick or the like, which can provide good balance of the properties described above.

[0006] Accordingly, the blade member of this invention includes an elongated hollow blade body, a flexible damping portion, and an interface portion. The elongated hollow blade body defines a receiving cavity, and is made of a fiber reinforced resin composite. The flexible damping portion is disposed within the elongated hollow blade body, and is made of cork. The interface portion is disposed between the elongated hollow blade body and the flexible damping portion.

[0007] Other features and advantages of the present invention will become apparent in the following detailed description of the preferred embodiments with reference to the accompanying drawings, of which:

Figure 1 is a sectional view of a conventional blade member for a hockey stick;

Figure 2 is a perspective view of the first preferred embodiment of a blade member according to this invention;

Figure 3 is a fragmentary partly cutaway perspective view of the first preferred embodiment;

Figure 4 is a sectional view of the first preferred embodiment;

Figure 5 illustrates results of a test for comparing the damping effects of the blade member of the first preferred embodiment and the conventional blade member; and

Figure 6 is a fragmentary sectional view of the second preferred embodiment of a blade member according to this invention.

[0008] Referring to Figure 2, the first preferred embodiment of a blade member 2 according to this invention is shown to be connected to a shaft 31 of a hockey stick 3 at a lower end portion 33 of the shaft 31.

[0009] Referring to Figures 3 and 4, the blade member 2 includes an elongated hollow blade body 21, a flexible damping portion 22, and an interface portion 23. The elongated hollow blade body 21 has an inner surface 211 defining a receiving cavity 24, and an outer surface 212 opposite to the inner surface 211. The elongated hollow blade body 21 is made of a fiber reinforced resin composite.

[0010] The flexible damping portion 22 is disposed within the receiving cavity 24 of the elongated hollow blade body 21, and is made of cork. The interface portion 23 is disposed between the elongated hollow blade body 21 and the flexible damping portion 22, and includes a first interface layer 231 and a second interface layer 232. The first interface layer 231 of the interface portion 23 is proximate to the flexible damping portion 22, and is made of a viscoelastic adhesive material. The second interface layer 232 of the interface portion 23 is proximate to the elongated hollow blade body 21, and is made of a polymer composite having high toughness. Preferably, the polymer composite is a composition of fibers and resin.

[0011] In use, a hockey puck (not shown) strikes the outer surface 212 of the elongated hollow blade body 21, which is made of fiber reinforced resin composite. Since the fiber reinforced resin composite has properties of high structural rigidity and strength, the elongated hollow blade body 21 can resist the high impact imposed by the hockey puck so as to sustain the structural integrity of the blade member 2. The flexible damping portion 22 is made of cork, which is a flexible material, and which has a damping effect. Therefore, the high impact transferred through the elongated hollow blade body 21 can be absorbed by the flexible damping portion 22 effectively so as to reduce the vibration of the blade mem-

ber 2. Furthermore, the first interface layer 231 of the interface portion 23 also has the vibration absorbing effect so as to further enhance the damping effect.

[0012] The results of a test for comparing the damping effect of the blade member 2 of this invention and a conventional blade member composed of wood sheet and glass fiber adhered on the wood sheet are illustrated on Figure 5, in which X scale indicates the time for vibration reduction (sec) and Y scale indicates the vibration response (g/N) . The maximum vibration of the conventional blade member is 5.25 g/N, whereas the maximum vibration of the blade member of this invention is 2.65 g/N. The vibration value of the blade member of this invention is about half of that of the conventional blade member at any analysis time. Furthermore, the blade member of this invention stops vibrating after 3 seconds. However, the conventional blade member stops vibrating after 8 seconds, which is much longer than that of the blade member of this invention.

[0013] Additionally, since cork is a relatively light material, the overall weight of the blade member of this invention can be reduced by 15-40% as compared to that of the conventional blade member.

[0014] Referring to Figure 6, the second preferred embodiment of the blade member of this invention is shown to be substantially identical to the first preferred embodiment in construction, except that the blade member 2 further includes an impact absorbing member 25 which is composed of a plurality of impact absorbing units 25' having similar configurations. The impact absorbing units 25' are embedded in the flexible damping portion 22 in a spaced manner so as to further enhance the damping effect. Alternatively, the impact absorbing member 25 can be formed as a unitary impact absorbing unit 25' or as a plurality of impact absorbing unit 25' having different configurations. In this preferred embodiment, the impact absorbing member 25 is made of rubber. Alternatively, other suitable materials, such as a porous material, engineering plastic, wood, foaming material (like foam), medium density fiberboard, paper, cotton, cloth, and the like, can be used when making the impact absorbing member 25.

Claims

1. A blade member (2) adapted to be connected to a shaft (31) of a hockey stick (3), said blade member (2) **characterized by**:

   an elongated hollow blade body (21) defining a receiving cavity (24) and being made of a fiber reinforced resin composite;
   a flexible damping portion (22) disposed within said elongated hollow blade body (21) and being made of cork; and
   an interface portion (23) disposed between said elongated hollow blade body (21) and said flexible damping portion (22).

2. The blade member (2) as claimed in Claim 1, **characterized in that** said interface portion (23) includes a first interface layer (231) proximate to said flexible damping portion (22) and being made of viscoelastic adhesive material, and a second interface layer (232) proximate to said elongated hollow blade body (21) and being made of a polymer composite having high toughness.

3. The blade member (2) as claimed in Claim 2, **characterized in that** said polymer composite is a composition of fibers and resin.

4. The blade member (2) as claimed in Claim 1, further **characterized by** an impact absorbing member (25) embedded in said flexible damping portion (22).

5. The blade member (2) as claimed in Claim 4, **characterized in that** said impact absorbing member (25) is made of a material selected from a group consisting of porous material, rubber, engineering plastic, wood, foaming material, medium density fiberboard, paper, cotton and cloth.

6. The blade member (2) as claimed in Claim 5, **characterized in that** said foaming material is foam.

7. The blade member (2) as claimed in Claim 4, **characterized in that** said impact absorbing member (25) includes a plurality of impact absorbing units (25').

8. The blade member (2) as claimed in Claim 7, **characterized in that** each of said impact absorbing units (25') is made of a material independently selected from a group consisting of porous material, rubber, engineering plastic, wood, foaming material, medium density fiberboard, paper, cotton and cloth.

9. The blade member (2) as claimed in Claim 8, **characterized in that** said foaming material is foam.

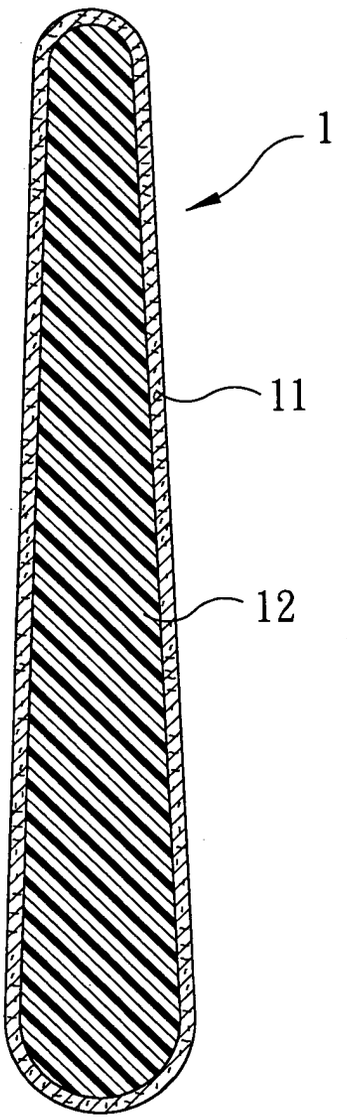


FIG. 1
PRIOR ART

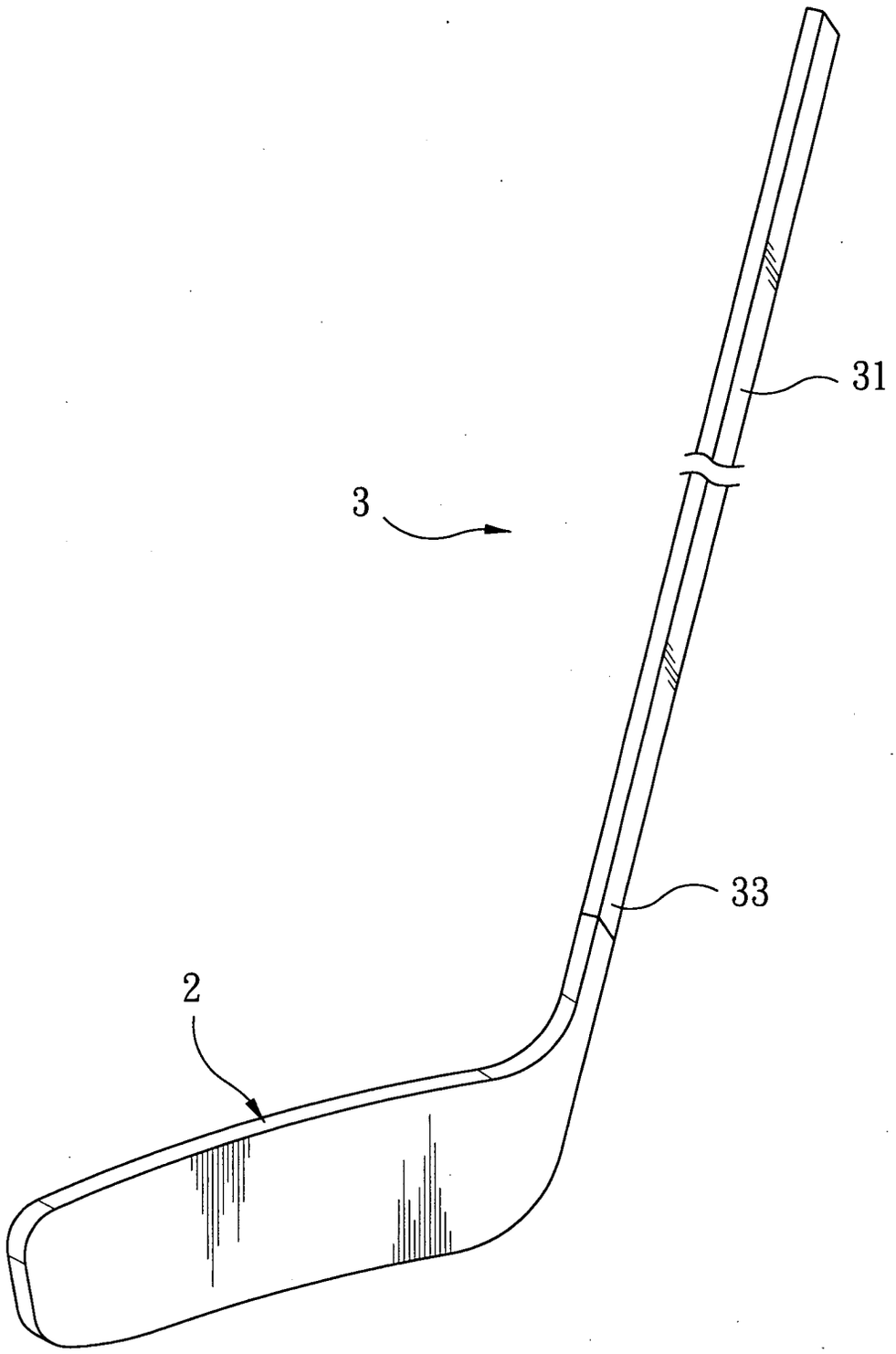


FIG. 2

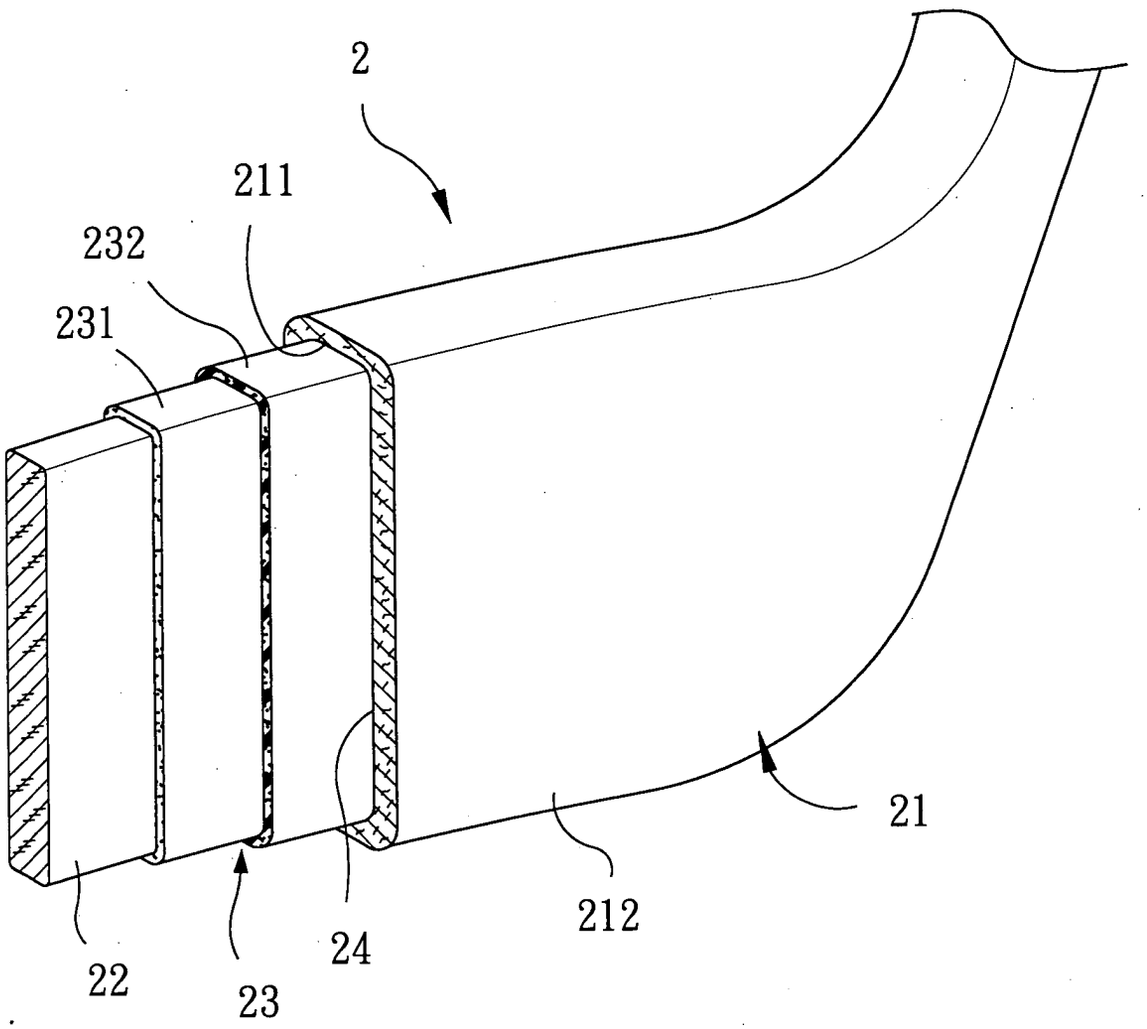


FIG. 3

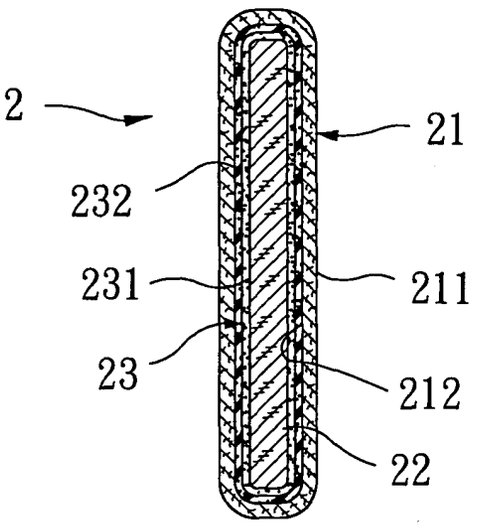


FIG. 4

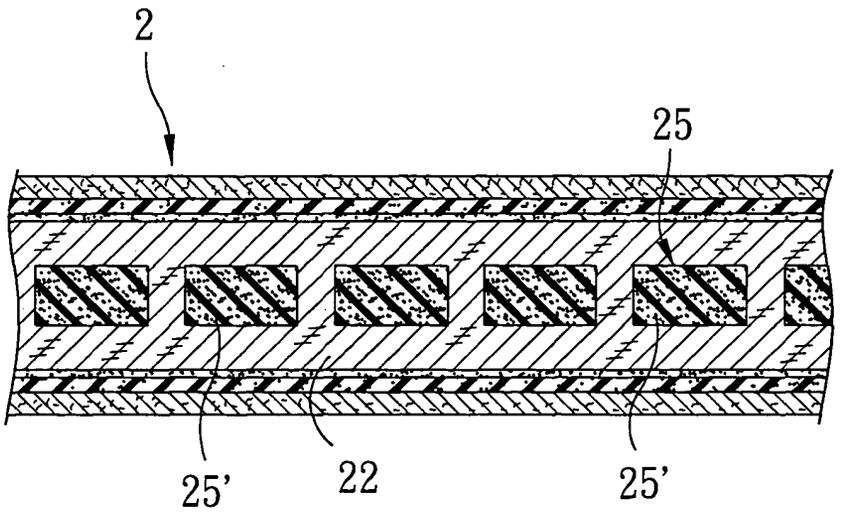
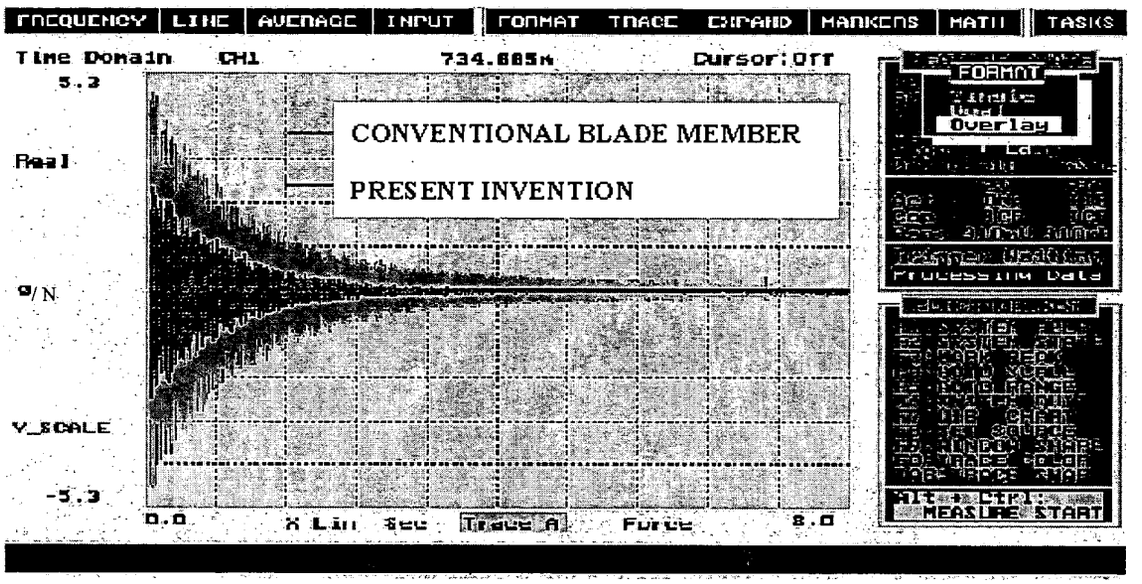


FIG. 6


FREQUENCY
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AVERAGE
INPUT
FORMAT
TRACE
EXPAND
MARKERS
MATH
TASKS
Time Domain
CH1
734.885m
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5.2
Real
V_SCALE
-5.3
0.0
X Lin Sec
Trace A
Force
8.0
CONVENTIONAL BLADE MEMBER
PRESENT INVENTION
FORMAT
Overlay
MEASURE START

FIG. 5

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 04 25 0896

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	23 July 2004	Williams, M

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