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(71) Anmelder: **Tran, Toan-Dat**  
**76131 Karlsruhe (DE)**

**(72) Erfinder: Tran, Toan-Dat**  
**76131 Karlsruhe (DE)**

**(54) Schwimmschuhe für Taucher oder Schwimmer**

(57) Swim-shoes for diver or swimmer have apparently the main characteristic features of normal shoes with an upwards lengthened shoe - instep (5) in the form of a swim-blade (6) with scientifically moulded profile of flow. This swim-blade (6) is oscillatory at will through the foot-joint (F8). All swim-styles are possible with that.

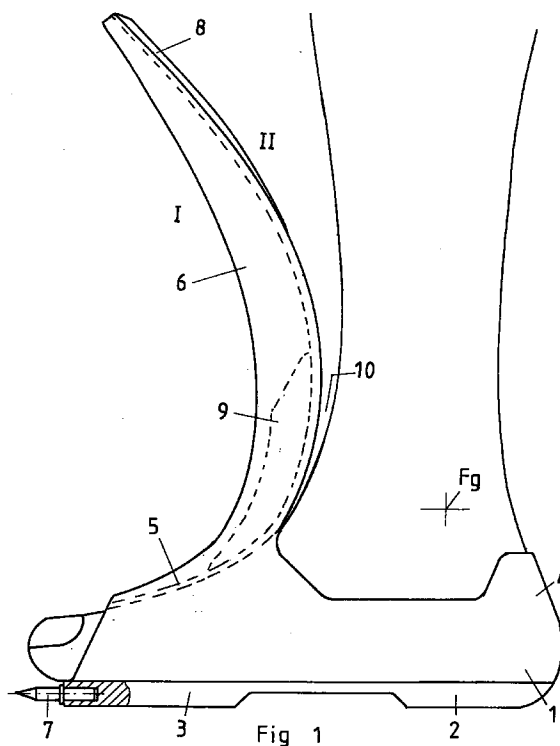


Fig 1

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## Description

Flippers for the human feet as appliance for diving or swimming are exclusively conceived for the water-medium. On the mainland the diver with worn flippers can hardly move. It is recommended to go backwards. The stumble is mostly not to be avoided.

Flipper according to DE-OS 3438808 has a joint for placing the blade in the form of carrying wing of big stretch. These carrying wings have a symmetrical cross-section and are swinging adjusted with torsion-springs. The introduced flipper from DE-PS 2009381 under the sole enlarges the propelling surface of the feet. The detachable blade according to EP-0572853 is a classic construction of flippers. These are eventually prolonged along the shin of the shank and are firmly fixed with belt. The flippers according to DE-GM 1928422 have a trough-like or spoon-like section-forming pointed downwards. A pressure wave as additional propulsion is generated by every upstroke.

The diver with these flippers can badly go forwards on the land. The proposition of this present invention consists of designing new shoes for the swimmers and the divers so that the going on the land may be made easy. Moreover it is important to mention that the ascending of stairs in water or on land with worn shoes is even possible.

The proposition in accordance with this invention is solved by the treats of the claim.

These swim-shoes have at first the general shape of shoes with shoe-instep, shoe-heel and sole. The shoe-instep here is extended unwards in vaulted and stable prolongation. The longitudinal vault can be random any one. The epicycloid would be most appropriate. The vault of cross-sections for the swim-blade (6) is profitably as half ellipse to shape.

This has a double effect. On one hand the side shorter axis contribute to the rigidity against bending. The swim-blade (6) is in the transition zone (10) additionally reinforced by a rib (9). On the backside (II) of the swim-blade (6) a three-cornered rib (8) a flow facilitating configuration is assigned for stiffening this swim-blade (6) in the upper zone. Following are the detailed explanations of the invention guided by figures according to the upset and the effect.

Figure 1 shows the construction principle of the swim-shoes made from technical rubber. The shoes have parts made from different kinds of rubber which are vulcanized together.

In the shoe-sole (2,3) there are moulded-on parts made of harder and more resistant to wear rubbers. The shoe-heel (1), the shoe-leg (4) and the shoe-instep (5) are made of soft rubber. The harder vaulted swim-blade (6) is moulded-on on the shoe-instep (5). The left and the right shoe are generally symmetrical like the normal shoes, but are not alike. This type is for instance thought up for the rescue-swimmer who have to wear the shoes during stand-by operation. In case of emergency the

rescue-swimmer would use a vehicle. The upwards pointed swim-blade (6) allows a lot of movableness. The treading on the brakepedal by car driving is no more a impediment. These swim-shoes are equipped with a sharp point under the shoe-sole (3) when the occasion arises. At high sea the rescue-swimmer could defend himself against the attack of sharks while he would have to keep his hands free. The deep-diver could stand on the sea-bottom with these swim-shoes and move forwards. He would earn on this way some more movableness by his dangerous work in water.

Figure 2 shows a variant of swim-shoes without shoe-heel and point according to the invention. The elastic shoe-leg (14) fixes additionally the shoes. This cheaper version is for instance made from one kind of rubber with about 75 shore A hardness in one-piece vulcanized and has a symmetrical shoe-design. The right and the left shoe are alike. The elasticity of the rubber allows largely the ductility of the shoe-instep (5). The diver or the swimmer can ascend directly the under water found ladder after a diving round. The rescue-swimmer could run right away with worn swim-shoes during a operation. Some seconds time is sometimes very precious for the survival of a drowning person.

Figure 3 shows the cheapest variant of the swim-shoe according to the present invention made from soft plastic. The portion of softening agent in plastic is so dosed that the elasticity and the ductility are still warranted. The shoe-leg (14) is made from technical rubber with molded-on tetragonal holes (14a) which might fasten provisionally in the hook (15) of the shoes. The same shoe is appropriate for the right and the left foot. The detail-drawing X indicates that the injection-dies could be composed of two parts.

Figure 4 shows the cross-sections of the swim-blade (6) on different level and of the shoe-instep (5). At the upper part of the swim-blade (6) the cross-section A-A shows the flattened half-ellipse with the rib (8) on the backside (II). Lower the cross-section B-B shows the deepened half-ellipse with likewise a rib (8) on the backside. When the swim-blade (6) moves according to the direction R against the fluid, the water flows in and is deflected by the shorter axis (11, 11a) into the middle. The water collides there, it means, the velocity of flow is steadily reduced into the middle there until practically zero at one spot. In the middle of inside (I) the velocity of flow is very little, so the pressure is maximum. The following water is restrained and flows away from the swim-blade (6). The shape of the cross-section C-C has a initially little rib (9) in the middle of the inside (I). D-D is the cross-section of the swim-blade (6) at the transition zone (10) between the foot and the human shank. The deformation is there as result of the transverse force (Fs) maximum. Therefore the inside rib (9) is shaped specially big. This rib has two elliptic side-contours (9a) which can deflect the water sideways. Then the water collides in two separate pouchs. The cross-sections E-E and F-F obtain the similar effect after

deformation in the human foot. The impact pressure takes rise on this way in the inside (I) of the swim-blade (6). The diver receives a certain transverse force ( $F_s$ ) by each paddling. By beginning far back on the contrary the water is deflected sideways by the oblique borderings (8a) of the outside rib (8) on the backside (II). The impact pressure on this side is much smaller, since the velocity of flow is bigger.

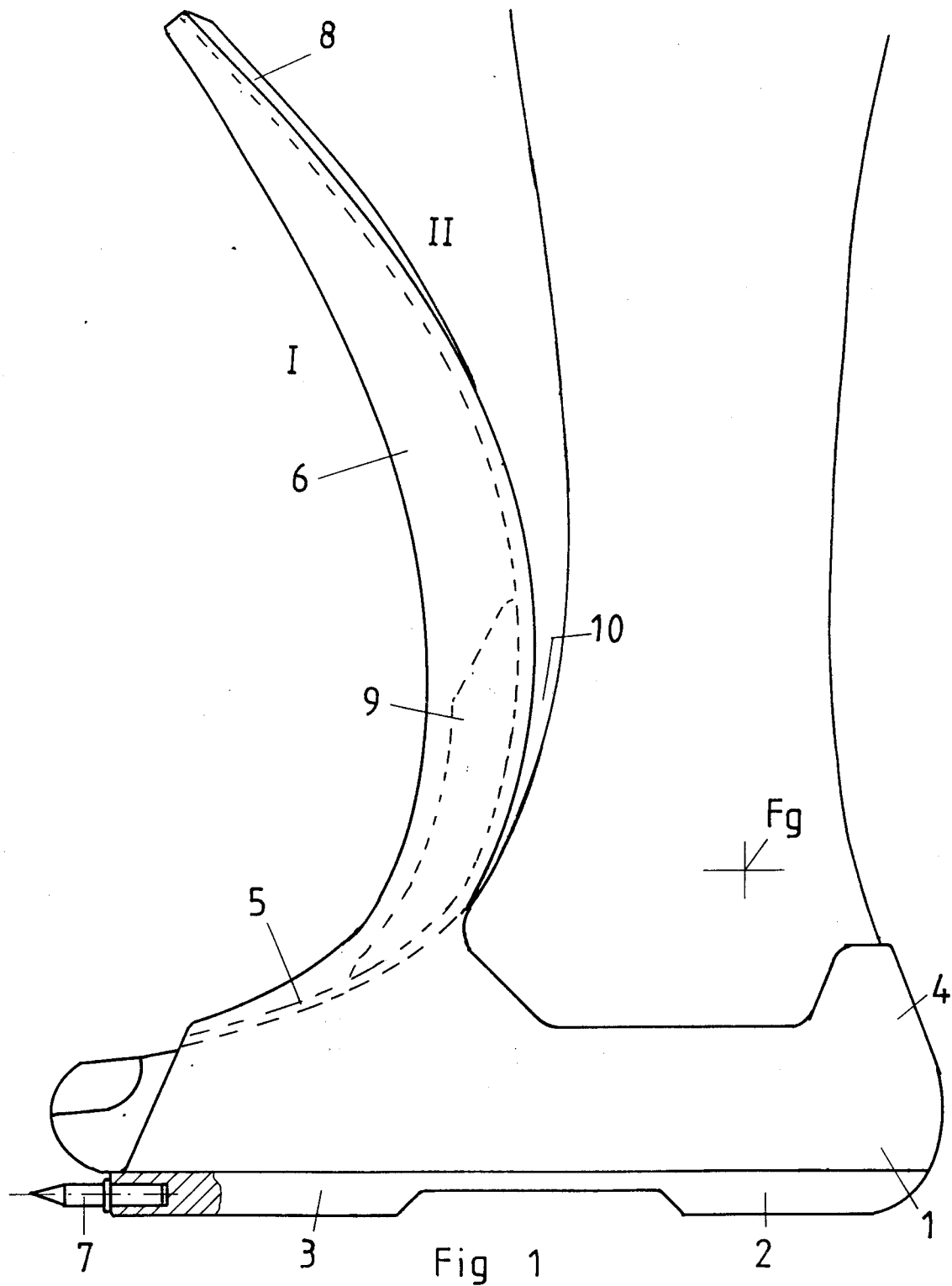
Figure 5 shows the position of the lower limbs at the beginning in frog style. The swimmer moves the swim-shoes in the opposite swimming direction by stretching out the legs. The transverse force ( $F_s$ ) arises as reaction of the water on the inside (I) of the propulsive swim-blade (6). The diver or the swimmer is driven forwards in the swimming direction by ( $F_s$ ). The pressure build-up on the inside (I) is optimized through the design of the cross-section D-D with great rigidity against bending in the transition zone (10).

Figure 6 shows the position of the lower limbs in crawl style. The swimmer obtains by every descending stroke of the leg a propulsive transverse force ( $F_s$ ), whose orientation is much influenceable by the position of the feet through the foot-joint ( $F_g$ ).

Figure 7 shows the straight treadle of a diver with the swim-shoes in deep sea. The beginning far back occurs in circle like by biking. The friction loss against the flowing is here minimized. The diver could also swing the both legs simultaneously as in dolphin style.

## Claims

1. Swim-shoes for diver or swimmer with the usual shape of shoes (Fig. 1) made of elastic rubber or thermo-elastic plastic with out-sole (3), shoe-leg (4 , 14) and shoe-instep (5), with a directly from the upper shoe-instep (5) as upward prolongation und through the foot-joint ( $F_g$ ) oscillatory of the developed longways vaulted swim-blade (6), whose cross-section has primarily the form of a half-ellipse, at which the swim-blade (6) presents a rib-like elevation (9) in the middle field on the inside (I), and on the outside (II) in field of the free edge of the swim-blade (6) one rib-like elevation with two straight side-contours (8a) tangential to the out-side half-ellipse is applied.
2. The swim-shoes after claim 1 are characterized in that the out-sole (3) bears a horizontally jutting out point (7) (Fig. 1).



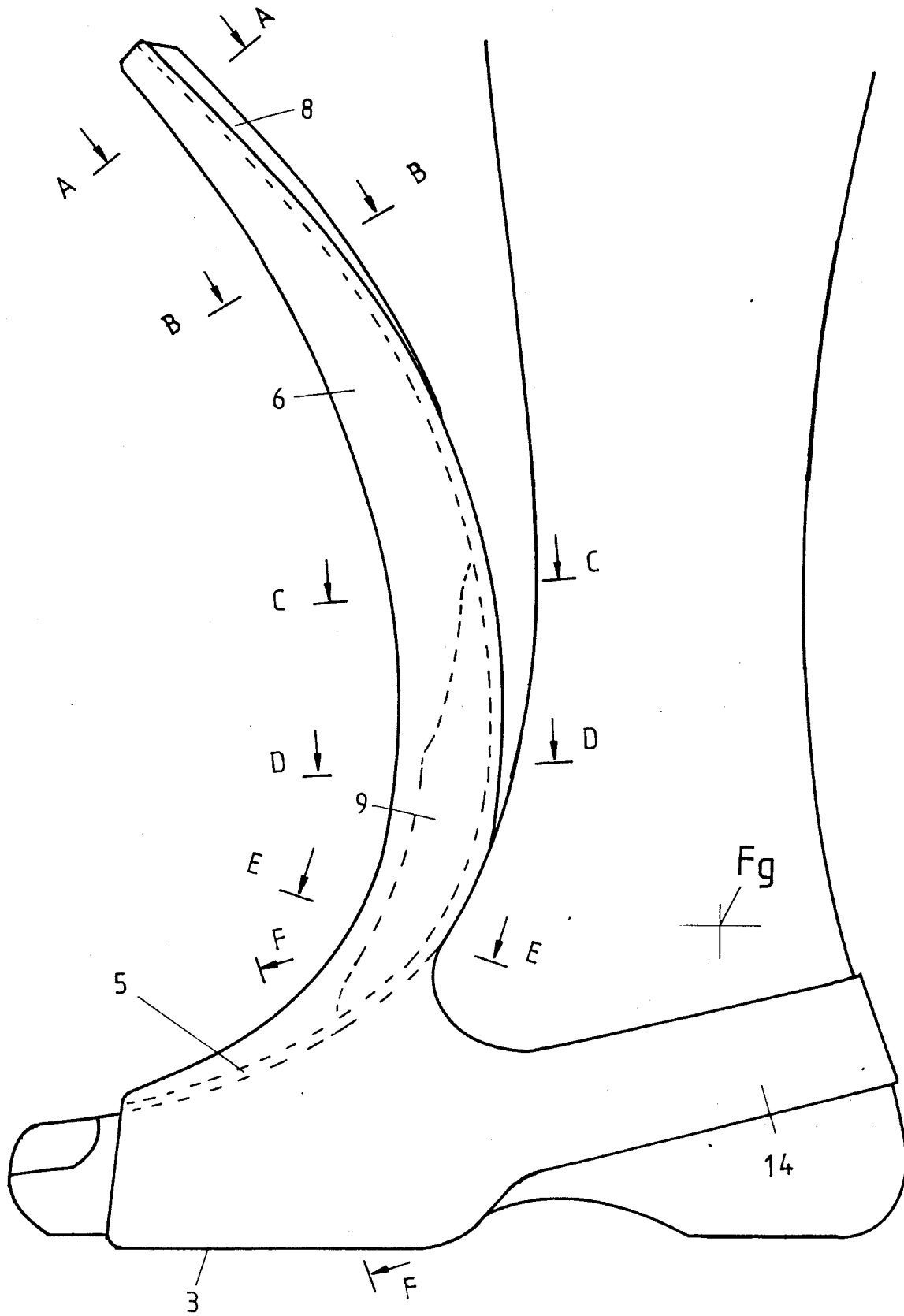
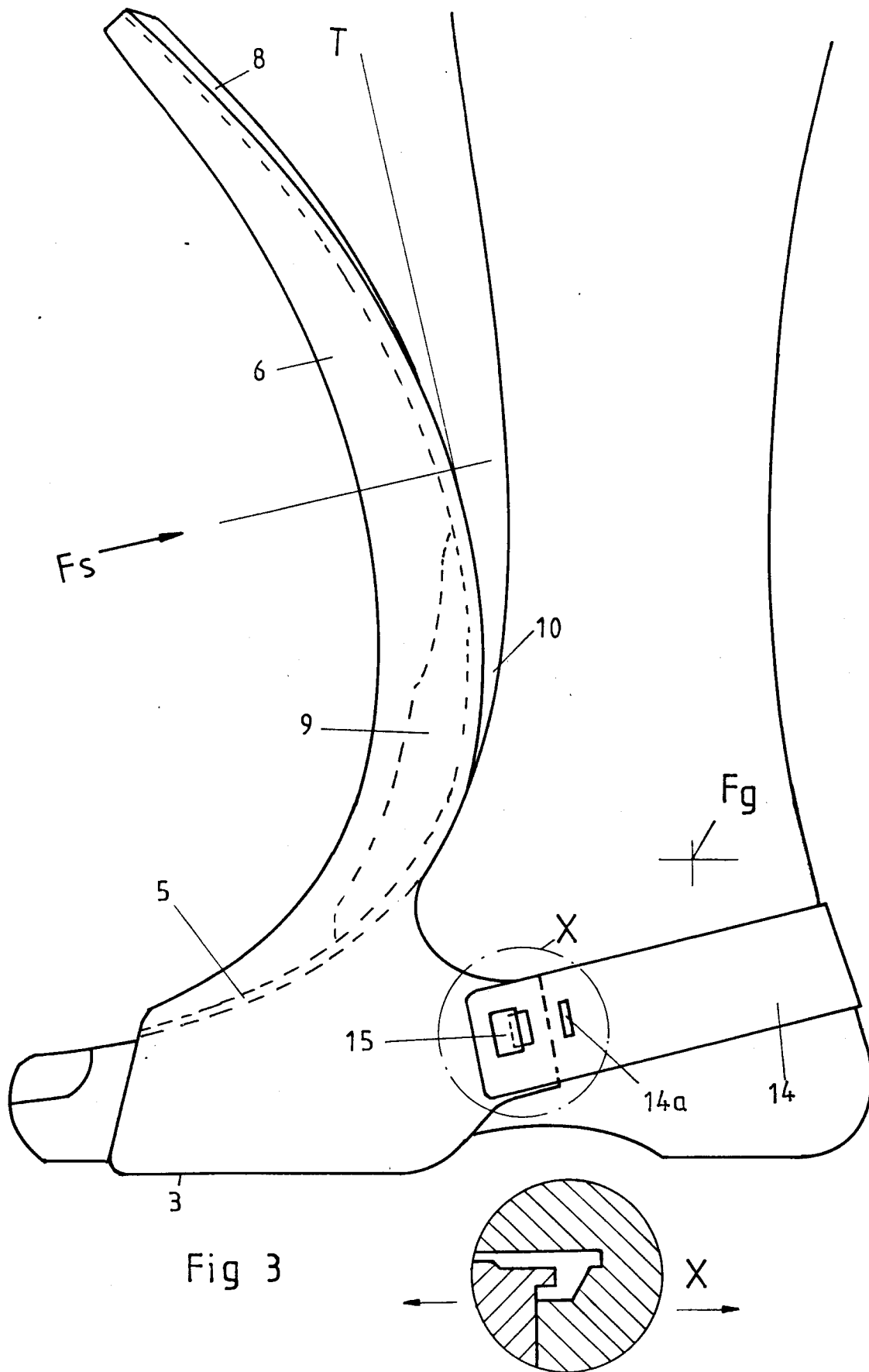


Fig 2



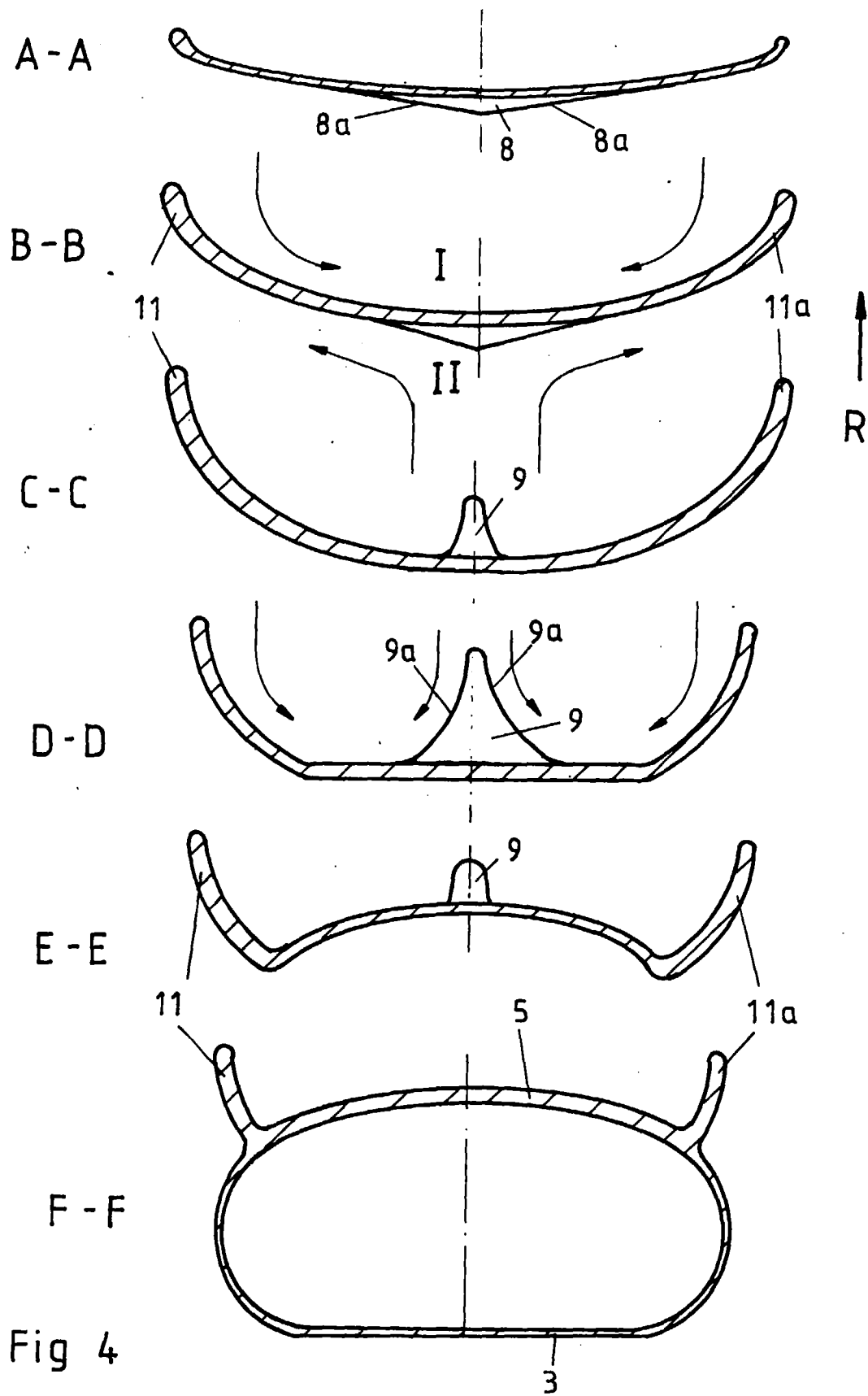
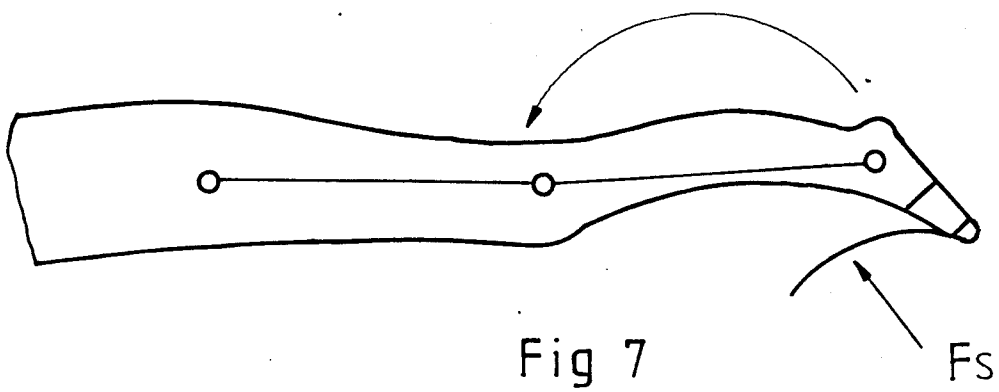
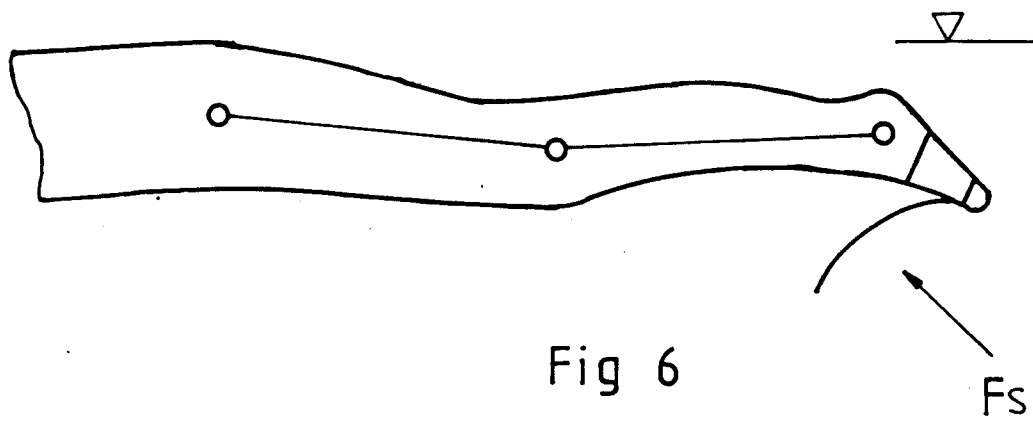
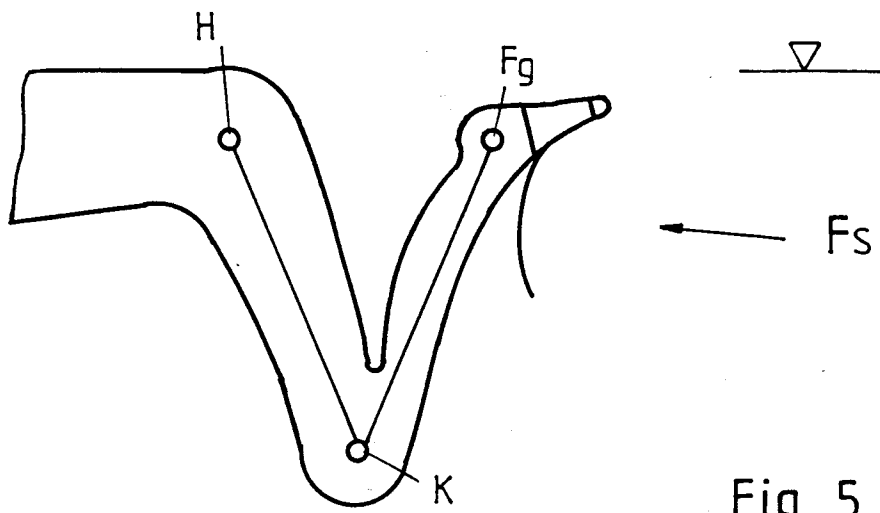


Fig 4





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# EUROPEAN SEARCH REPORT

Application Number  
EP 97 11 1911

| 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)                    |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | EP 0 063 666 A (MEDITERRANEE JET CORSE SOCIETE) 3 November 1982<br>* page 4, line 26 - page 6, line 7;<br>figures 1,3,4,6 *                           | 1                                                          | A63B31/11                                                       |
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| The present search report has been drawn up for all claims                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                       |                                                            |                                                                 |
| Place of search<br><b>MUNICH</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                       | Date of completion of the search<br><b>16 October 1997</b> | Examiner<br><b>Curzi, D</b>                                     |
| <div>CATEGORY OF CITED DOCUMENTS</div> <div> X : particularly relevant if taken alone<br/> Y : particularly relevant if combined with another document of the same category<br/> A : technological background<br/> O : non-written disclosure<br/> P : intermediate document<br/> T : theory or principle underlying the invention<br/> E : earlier patent document, but published on, or after the filing date<br/> D : document cited in the application<br/> L : document cited for other reasons<br/> &amp; : member of the same patent family, corresponding document </div> |                                                                                                                                                       |                                                            |                                                                 |

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