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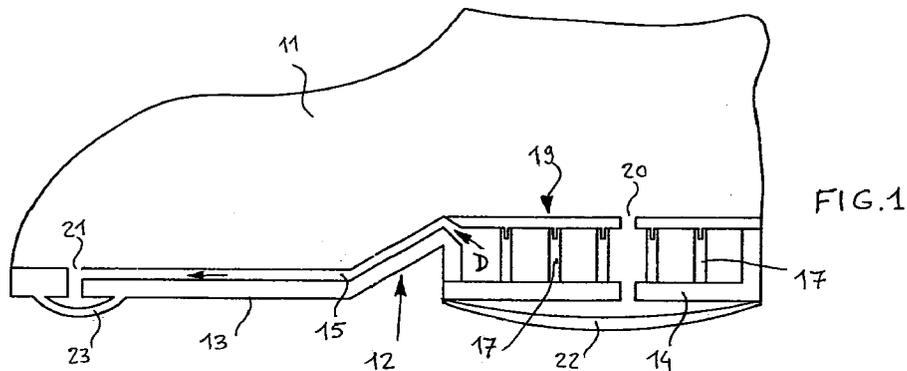
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(54) Footwear of various kind with foot ventilation

(57) Footwear of various kind adapted to provide for the inner foot ventilation during the deambulatory movement thereof, so as to permit it to perspire and to be maintained at satisfactory hygienic conditions.

Different embodiments of the footwear in accordance to the invention are provided, which footwear is associated to ventilation means (20, 15, 21; 27, 25, 15; 28, 33, 31, 30, 32) provided at the level of the heelpiece

(14) and the front portion of the sole (13) of each footwear, in order to determine an air circulation in a single direction (D), which air is compressed with the aid of the resilient material of the heelpiece (14), whose inlet and outlet are situated respectively at the level of the heelpiece (14) and the resting zone of the foot body and the relative toes.



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Description

The invention relates to a footwear of various kind, so structured as to determine the inner foot ventilation during the deambulatory movement thereof, in order that to permit it to perspire and therefore to be maintained at satisfactory hygienical conditions.

At the present time, the footwears of various kind like shoes, boots and the like are generally shaped to house feet of different forms and sizes and to be adapted thereon, so as to permit an easy deambulation without deformations and fatiguings thereof, and they are often not suitable to permit an effective perspiration of the sweats and odours produced during the continuous feet deambulatory movements, and originated by the shape of footwears which enclose almost entirely each foot, by avoiding an air circulation inside them. There are been employed and are now employed several tricks to solve the problem of the feet perspiration, consisting of providing some kinds of footwears with particular ventilation holes, so as to determine a continuous air circulation inside each footwear, thereby maintaining the foot at satisfactory hygienical conditions, and also consisting of manufacturing specific insoles made of suitable sweat absorbing material, in case provided with adequate through holes to make the absorption easier, which insoles are so dimensioned as to be accommodated and housed inside the respective footwears, by laying them on the underfoot element of the associated footwear, thereby permitting the foot to be laid onto such underfoot element, and which are also so shaped as to facilitate the deambulatory movements of the same foot. However, the above described tricks for improving air circulation inside the differently used footwears have the drawbacks that, in the case of perforated footwears, they restrict the use only to kinds of footwears employed during the spring and summer seasons, while for obvious reasons they are not utilizable during the colder seasons and the snowy ones too, so that such tricks cannot be used for footwears for general uses, as it would be on the contrary desirable, while in the case of the insoles it has been found in practice that they do not solve in a satisfactory manner the problem of the effective foot perspiration, in that such insoles are kept always at a scarcely ventilated and almost closed toward outside ambient, and moreover have a limited sweat absorbing capacity so that it is needed to proceed frequently to the replacement thereof, for maintaining the foot in a satisfactory hygienic condition.

The present invention has the object to eliminate the above specified drawbacks and limits, by means of a new type of footwear for general use, which is constructed for providing a continuous foot ventilation during the deambulatory movements thereof, thereby ensuring an effective perspiration and maintaining at dried and satisfactory hygienic conditions thereof.

This ventilated footwear is made with the constructive characteristics hereinafter described, with particular reference to the attached patent claims.

The invention will be understood better from the following description, given solely by way of not limiting example and with reference to the accompanying drawings, wherein :

- Fig. 1 shows schematically in a cut front view a ventilated footwear in accordance to the invention, in a first embodiment thereof ;
- Fig. 2 shows a partial plan view of the footwear of Fig. 1 ;
- Fig. 3 shows schematically a cut side view of a ventilated footwear in accordance to the invention, in a second embodiment thereof ;
- Fig. 4 shows schematically a plan view of the footwear of Fig. 3 ;
- Fig. 5 shows a front view of the footwear of Fig. 4, cuts along the line A-A ;
- Fig. 6 shows a front view of the footwear of Fig. 4, cuts along the line B-B ;
- Fig. 7 shows schematically a plan view of a ventilated footwear in accordance to the invention, in a third embodiment thereof ;
- Fig. 8 shows a front view of the footwear of Fig. 7, cuts along the line C-C.

In the Figures referred to there are illustrated different possible embodiments of a ventilated footwear in accordance to the invention, which may be constituted by a shoe, a boot and the like, and is shaped in such a way as to provide an inner ventilation of the foot introduced therein in the course of the deambulatory movements of such foot, in order to permit a continuous perspiration thereof which maintains it therefore at satisfactory hygienic conditions.

In particular, in the Figs. 1 and 2 it is noted that such footwear is substantially constituted as usual by a vamp 11 and a sole 12, joined to the vamp in a per se known manner and laying onto the soil, which sole is divided in a front portion 13 to rest the foot body and the relative toes thereon, and a back portion or heelpiece 14 to rest the foot heel thereon. Such sole 12 is made of material of conventional type and advantageously of rubber or elastomeric material of other kind having elasticity and yielding characteristics, preferably integrally molded with commonly known working techniques.

In accordance to the main characteristic of the invention, the sole is provided with at least an inner air circulation duct, marked with the reference numeral 15, which extends almost for the entire length of the sole front portion 13, from the zone in which the foot toes and the associated foot body are resting on the same sole, up to the level of the heelpiece 14. In particular, it is noted that such heelpiece 14 is made as usual with a reticulated structure composed namely of a set of vertical ribs 16, parallel and adequately spaced from each other as well as oriented transversally with respect to the extent of the sole 13, and by one or more vertical ribs 17 parallel and spaced from each other and intersecting almost orthogonally the preceding ribs, in such

a way as to be oriented for the sole extent and to form together with such preceding ribs correspondent recessed zones which, unlike the hitherto known solutions in which they were separated thereamong, in this case are put into communication by means of a plurality of notches or perforations 18 provided on the ribs referred to.

In this way, inside the heelpiece 14 it is formed a single inner chamber intercommunicating through the notches or perforations 18, which chamber is then covered by the undersole element 19 which is applied as usual on the sole for the entire extent thereof, such inner chamber in addition being communicating at its upper side with the footwear inside through at least a through hole 20, provided through the undersole element 20 at a position correspondent to the zone in which the heel is resting onto the same undersole element. In turn, such inner chamber communicates with an end of the inner duct 15, the other end of which communicates through at least a through hole 21 provided through such undersole element 19 with the above resting zone of the foot toes and the associated foot body part.

The present footwear is also constituted by at least a resilient membrane 22 applied below the heelpiece 14 and so dimensioned as to be adapted to it for the entire size thereof, as well as to enclose sealingly the inner chamber of the same heelpiece, and by at least another resilient membrane 23 applied below the sole front portion 13, at the level of the through hole 21, by enclosing sealingly the same hole for the entire size thereof, so as to delimit an inner chamber, such membranes being made of rubber or other suitable flexible and yieldable elastomeric material.

In this way, during the foot deambulatory movements the push action exerted by the foot heel against the undersole element arranged on the zone of heelpiece 14 produces a compression of air, which enters the footwear on this zone, thanks to the resiliently yieldable material of such heelpiece, which air therefore passes through the through hole 20 thereby entering firstly the tightly closeable inner chamber of said heelpiece, where its pressure is further increased also by the pumping action caused by any temporary deformation of the membrane 22 and the heelpiece resilient material, and thereafter, by passing through the inner duct 15 and the through hole 21 in the circulation direction D, such compressed air enters the footwear again at the level of the resting zone of the foot toes and body part, from which it is finally discharged outside also by means of the pumping action produced by any temporary deformation of the membrane 23. Consequently, the foot body and toes are submitted to a continuous circulation of the so compressed air, thereby permitting a steady perspiration thereof which maintains them always at satisfactory hygienic conditions, which circumstance involves also the advantage to determine a smaller absorption of foot sweat by the undersole element or any insole applied thereon, with a reduction or

almost complete elimination of odours and a longer duration of footwears and any insoles.

Moreover, in order to improve further the foot hygienic conditions, there may be employed suitable deodorant materials, perfumes, flavours etc., which are introduced into the heelpiece inner chamber and conveyed with the flow of compressed air inside the footwear, and thus sprayed against the foot body and toes during the deambulatory movements thereof. Besides, in the so obtained footwear the resilient membranes 22 and 23 may be also eliminated, in this case by shaping the heelpiece 14 and the sole front portion 13 directly with flat form, by obtaining always the air pumping effect and the consequent circulation thereof in the above mentioned way, thanks to the resilient material of such heelpiece which is temporarily deformed during the foot deambulatory movements, which material may be realized with a greater elasticity by utilizing for instance softer rubber compounds. Likewise, each footwear of this kind may be provided also with at least a respective non-return valve (not shown), associated to the through holes 20 and 21, to permit air to pass in the above indicated circulation direction D and prevent it from passing in the opposite direction thereof.

These kinds of footwears, owing to the presence of the air circulation system through the sole, require that this latter be realized with a sufficient thickness so that to ensure a satisfactory operation for long periods of time thereof, therefore avoiding premature consumptions of the same sole which would involve the interruption of such system and the loss of the desired air pumping effect.

By examining now the Figs. 3-6 wherein a second embodiment of the present ventilated footwear is shown, whose component parts identical to the previously described ones are marked with the same reference numerals, it is noted that in this case the air circulation duct 15 of such footwear isn't more provided on the sole front portion 13, which therefore is made in a conventional manner, but it is provided on the lower surface of a separated insole 24 shaped in such a way as to be adapted on the entire sole upper surface and fixed adequately thereto, preferably by means of glueing, and subsequently covered by the correspondent undersole element, said duct being extended almost centrally for a portion of the length of such separated insole 24 and joined at its one end to a lengthened hollow 25 also provided on the insole lower surface, at the level of heelpiece 14 of the underlying footwear, and communicating with the relative inner chamber of such heelpiece, as well as provided with at least a through hole 27 correspondent with an additional through hole (not shown) provided on the overlying undersole element and foresees for the external air inlet into the system formed by the heelpiece inner chamber, the lengthened hollow 25 and the duct 15. In turn, the other end of the duct 15 is joined to at least a through hole 28 provided through the insole 24, at the zone of the foot front body and toes, and coincident with a further

through hole (not shown) provided through the overlying undersole element. In this way, as previously, also in this case the thrust exerted by the foot heel during the deambulatory movements of the same causes a circulation of compressed air through the system lengthened hollow 25-inner chamber of heelpiece 14-duct 15 toward the foot front body and toes, so as to achieve the same effects and advantages described above. This kind of insole lends itself to be advantageously employed in combination with footwears of reduced thickness which, even if consumed on periods of time shorter than the thicker ones, do not determine the interruption of the air circulation system, thereby ensuring always the pumping effect thereof and therefore an effective ventilation action inside the footwears.

In Figs. 7 and 8 it is now illustrated a third embodiment of the invention, in which it is noted that the foot and toes ventilation is obtained in this case by utilizing a separated insole 29 again, shaped in a manner different than the preceding one and such that to be adapted onto all the upper surface of the sole of a footwear of conventional type, and to be laid removably thereon, such insole being provided as usual with a plurality of through holes 30 distributed for the entire surface thereof and, according to the innovative characteristic of the invention, a set of ducts 31 extended in the longitudinal direction of the insole, preferably parallel and slightly spaced from each other, and hollowed on the insole lower surface as well as crossed by corresponding sets of through holes 30 of this latter, one end of which ducts may communicate or not communicate with and enlarged and common hollow 32, also provided on the lower surface of said insole and extended transversally thereto, in correspondence of the foot front body and toes, which hollow is crossed by an associated set of through holes 30 of the insole, and the other end of which terminates near the heelpiece. Such ducts may be also associated with correspondent ducts (not shown) provided on the sole upper surface. The back portion of the insole 29 resting on the heelpiece is additionally provided with at least a through hole 33 having adequate size, correspondent with an identical hole (not shown) provided on the underlying sole, adapted to permit the air conveyed through the ducts 31 to enter and leave it during the foot deambulatory movements, with consequent ventilation of the same foot.

This insole is advantageously combined with thinner footwears, however under achievement of a milder ventilation action owing to the air dispersed through the different through holes 30 of the same insole.

Claims

1. Footwear of various kind with foot ventilation, constituted substantially by a vamp and a sole joined to the vamp in a per se known manner and made preferably of rubber or other suitable resilient material of per se known type, divided in a front portion for resting the foot body and the relative toes thereon,

and a back portion or heelpiece for resting the foot heel thereon, said sole being in case covered by a correspondent undersole element, characterized by ventilation means (20, 15, 21 ; 27, 25, 15, 28 ; 33, 31, 30, 32) provided at the level of said heelpiece (14) and said sole front portion (13) and adapted to determine an air circulation, with the aid of the resilient material of said heelpiece (14), in a single circulation direction (D) with the inlet through said heelpiece (14) and outlet thereof at the level of the resting zone of the foot body and the relative toes.

2. Footwear according to claim 1, characterized in that said ventilation means comprise at least a duct (15) provided inside and extended almost for the entire length of said sole front portion (13), which in turn is covered together with said heelpiece (14) by a correspondent undersole element (19) fixed in a per se known manner thereto, said duct (15) being communicating at its ends respectively with said resting zone of the foot body and the relative toes, through at least a through hole (21) provided through said undersole element (19) and at least an intercommunicating inner chamber of said heelpiece (14), made by providing a plurality of notches or perforations (18) in the possible vertical ribs (16, 17) forming the reticulated structure of said heelpiece (14), said inner chamber being communicating outside through at least a through hole (20) provided through said undersole element (19).
3. Footwear according to claim 2, characterized in that it comprises possible resilient means (membranes 22, 23) applied tightly below said sole (12) at the level of the inner chamber of said heelpiece (14) and said through hole (21) respectively.
4. Footwear according to claim 2, characterized in that it comprises at least a possible non-return valve, associated to the respective through holes (20, 21) to permit air to pass in the single direction (D) and prevent it from passing in the opposite direction thereof.
5. Footwear according to claim 1, characterized in that said ventilation means comprise at least a duct (15) hollowed in the lower surface of a separated insole (24), shaped in such a way as to be adapted on the entire upper surface of the sole (12) of a footwear and fixed adequately thereto, preferably by means of glueing, and subsequently covered by said undersole element (19), said duct (15) being extended almost centrally for a portion of the length of said separated insole (24) and joined at its one end to at least a lengthened hollow (25) provided on the lower surface of said insole (24) and communicating with said inner chamber of said heelpiece (14), as well as provided with at least a through hole

(27), and at its other end to at least a through hole (28) provided through said insole (24) on the resting zone of the foot body and the relative toes, said through holes (27, 28) being communicating with the footwear inside through correspondent through holes provided through said undersole element (19). 5

6. Footwear according to claim 1, characterized in that said ventilation means comprise a set of ducts (31) arranged preferably parallel and slightly spaced from each other and hollowed on the lower surface of a separated insole (29), provided with a plurality of through holes (30) distributed for the entire surface thereof and so shaped as to be adapted onto all the upper surface of the sole (12) of a footwear and laid removably thereon, said ducts (31) being extended in the longitudinal direction of said insole (29) and communicating or not communicating at their one end with an enlarged common hollow (32), provided on the lower surface of said insole (29) transversally thereto at the level of the resting zone of the foot body and the relative toes, and at their other end near said heelpiece (14), said insole (29) being provided with at least a trough hole (33) having suitable size at the level of its back portion, resting on the footwear heelpiece (14), which hole is coincident with another hole provided on the underlying sole, to permit the air conveyed through said ducts (31) to enter and leave it. 10 15 20 25 30

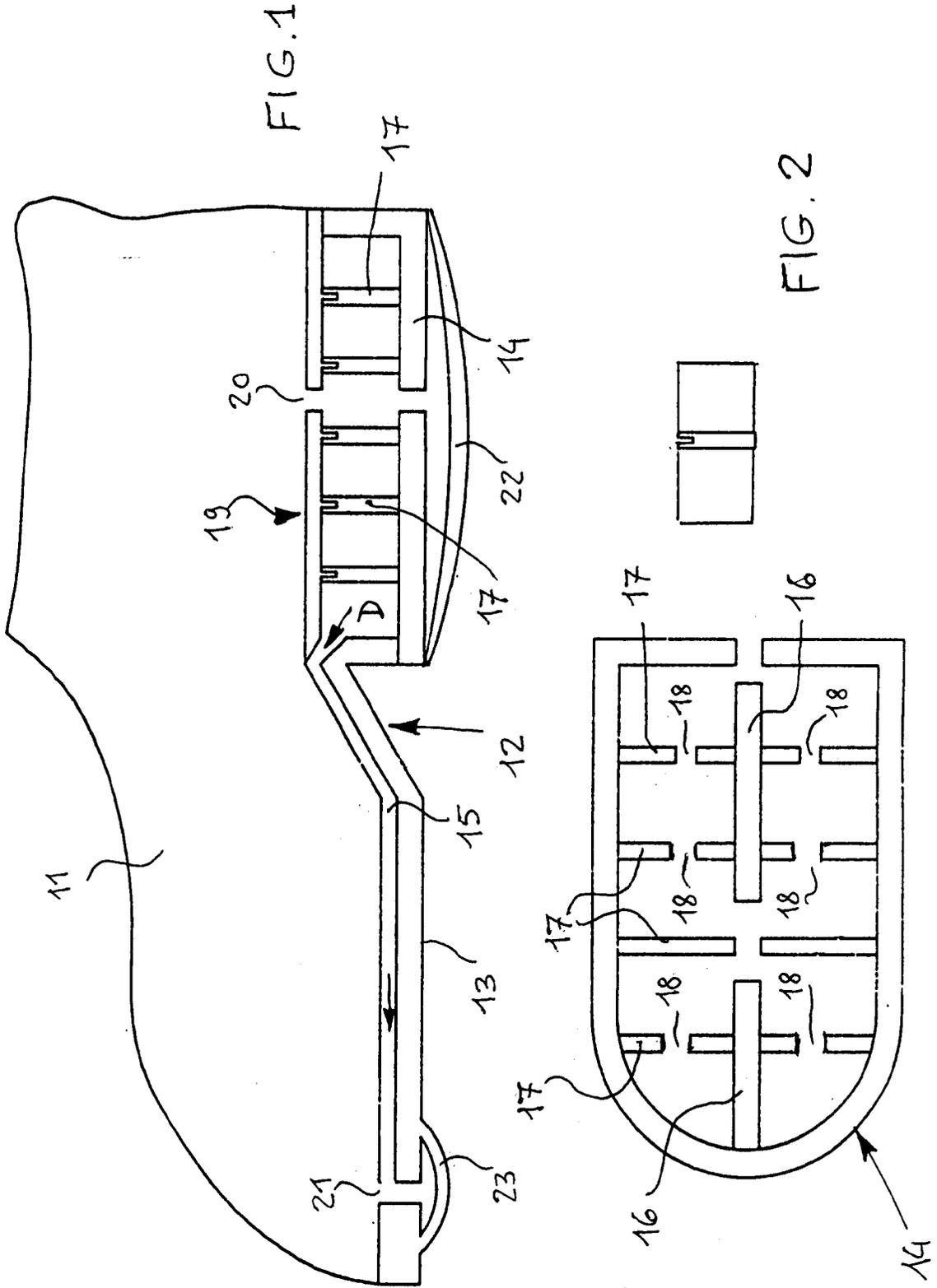
7. Footwear according to the preceding claims, characterized in that said heelpiece (14) may be made of high elasticity material, for example by utilizing softer rubber compounds. 35

8. Footwear according to the preceding claims, characterized in that possible deodorant materials, perfumes, flavours etc.. may be introduced inside said heelpiece (14). 40

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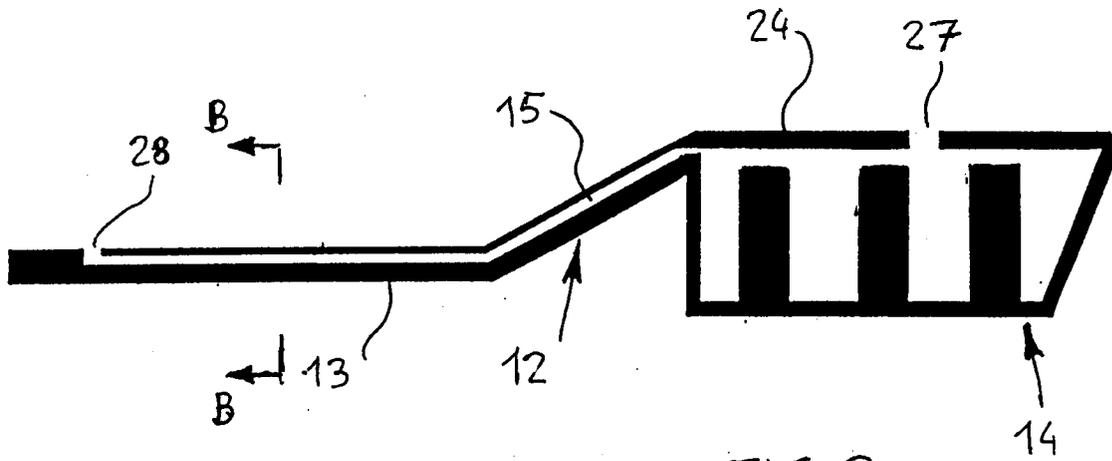


FIG. 3

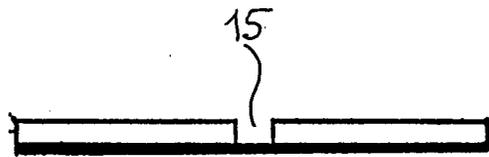


FIG. 5

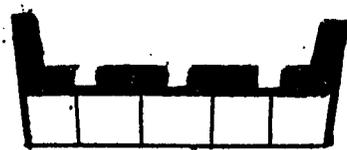


FIG. 6

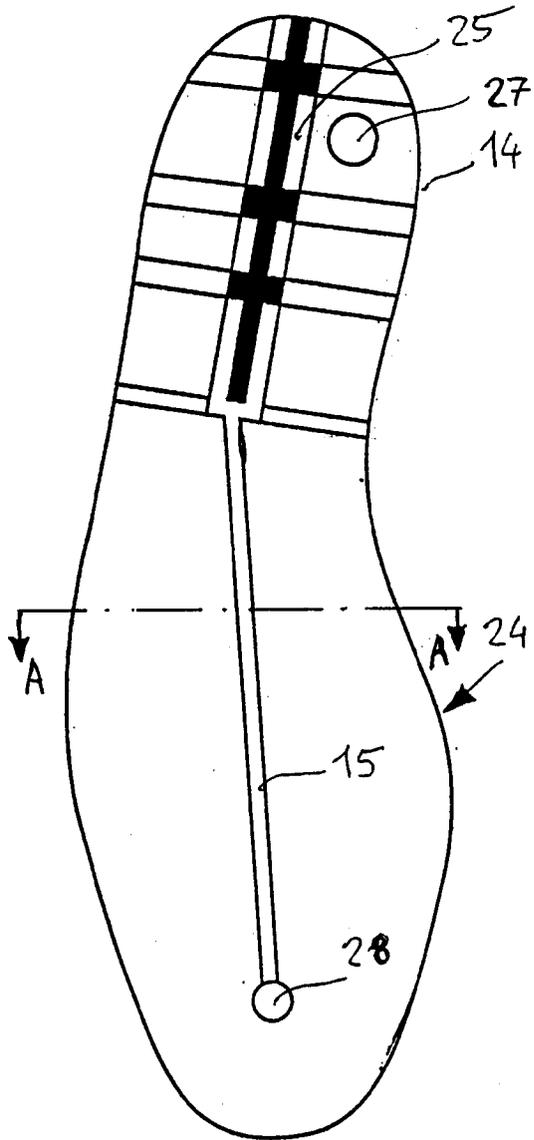


FIG. 4

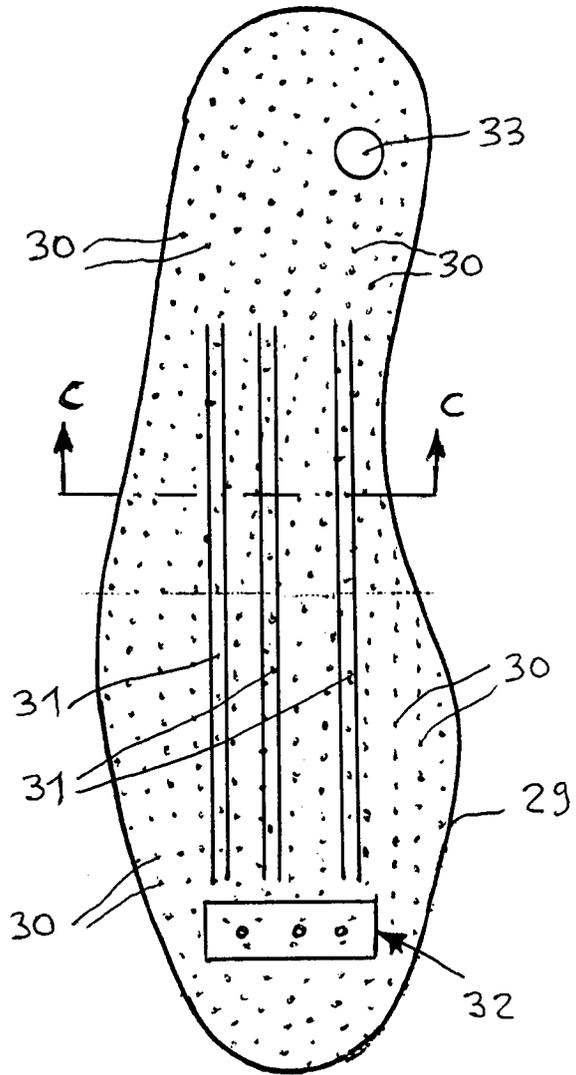


FIG. 7



FIG. 8



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EUROPEAN SEARCH REPORT

Application Number
EP 95 83 0188

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)
X	US-A-5 138 775 (HUI-CHENG CHU) * the whole document * ---	1-7	A43B7/06
X	US-A-4 071 963 (SADAO FUKUOKA) * the whole document * ---	1-3	
X	EP-A-0 594 518 (J.-M. HECKEL) * the whole document * ---	1	
X	EP-A-0 319 968 (CHU CHIKONG) * the whole document * ---	1	
X	DE-A-20 30 560 (R.-P. ANDROSIGLIO) * the whole document * ---	1	
X	WO-A-89 10073 (Z. KUZMIC) * the whole document * ---	1	
A	FR-A-2 635 444 (BIDEGAIN) -----	1,8	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			A43B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 13 October 1995	Examiner Declerck, J
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