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(54) Footwear with gasket

(57) Footwear comprising an upper (11), an insole (19) and an outsole (21) in which the upper (11) is comprised of an outer material layer (13) and a waterproof functional layer (15) that covers the outer material (13) at least partially on its inside, and having an upper end region on the sole side that is comprised of an outer material layer end region (23) and a functional layer end region (25), said functional layer end region (25) having a projection (27) extending beyond the outer material layer end region (23). A spacer strip (29) is connected on one side to the outer material layer end and on the other side to the end of the functional layer end projection (27), such that it covers the projection (27). Said functional layer end region (25) and said spacer strip (29) are located at and attached to the underside of the insole (19) by lasting adhesive (25). A gasket (37) is adhered to the underside of the insole (19) and of the spacer strip (29) in a manner which results in a waterproof zone at least in the area of the spacer strip (29). Said outsole (21) adhered is attached to the underside of said gasket (37) by an adhesive.

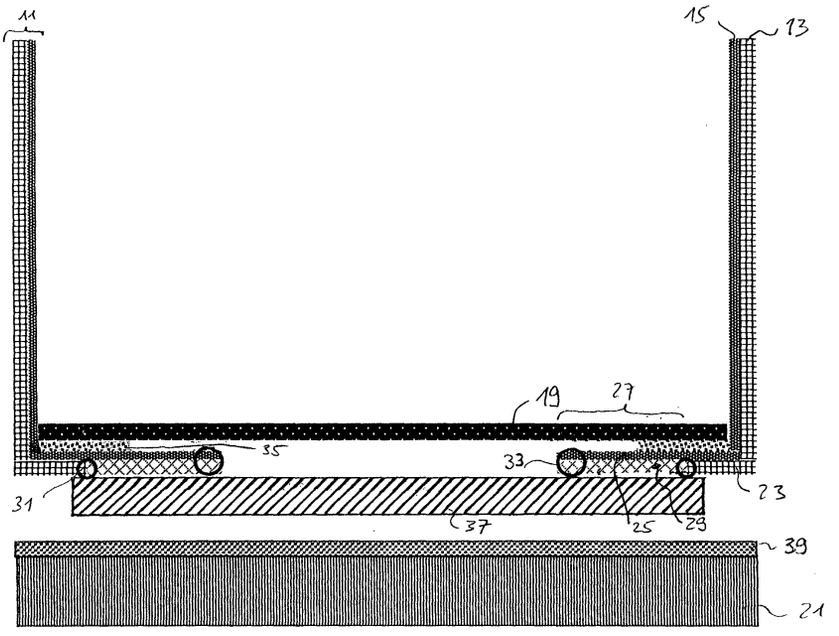

Fig. 1

EP 1 195 100 A1

Description

FIELD OF INVENTION

[0001] This invention relates to waterproof breathable footwear, and it's method of production. More particularly it relates to footwear that is water proof, but is water vapor permeable, and is desired to be close fitting as would be required for dress, casual and other similar footwear applications. The invention concerns footwear with an upper, provided at least partially with a durably waterproof and preferably water vapor-permeable layer, which is hereinafter refered to as "functional layer", and with an outsole, especially a glued-on outsole, and the use of a spacer strip and a gasket for sealing.

Background

[0002] There are shoes whose shoe upper is waterproof and water vapor-permeable, owing to covering with a waterproof breathable functional layer. This type of shoe upper remains breathable, despite it's waterproofness. Special efforts are required to ensure permanent waterproofness in the region between the end of the upper on the sole side and the sole structure.

[0003] To achieve this, sock-like inserts, also called booties in technical circles, have been used between the upper and sole structure, on the one hand, and an inner lining, on the other. The use of booties is quite costly in manufacture, if the booties are to correspond to some extent to the corresponding shoe shape and achieve the desired fit.

[0004] Another known method consists of sealing the bottom of the footwear and the insole and the lower region of the upper, covered with the functional layer and optionally stitched to an insole, with outsole material of a molded-on outsole. However, it cannot be prevented that water will reach the end of the upper on the sole side and thus the end of the functional layer on the sole side, generally on the water-conducting outer material of the upper via capillary effects, and will reach via bridges, especially in the form of textile fibers on the cut edge of the end of the upper on the sole side, the generally very strongly water-absorbing inner liner situated on the inside of the functional layer.

[0005] This problem has been overcome in a sole structure known from EP 0 298 360 B1, in which the functional layer has a projection with respect to the outer material in the region of the end of the upper on the sole side, which is covered with a spacer strip from one side on the outer material and the other side on the functional layer, and is firmly stitched to the insole. The projection of the functional layer is sealed by the outsole material, which, during injection molding, in which it is liquid, penetrates the spacer strip. The spacer strip represents a barrier to water which has penetrated to below the region of the end of the upper on the sole side covered by the outsole, especially when a monofilament spacer strip is involved, so that such water cannot penetrate to the cut edge of the functional layer on the sole side and thus not reach the inner lining of the footwear.

[0006] The spacer strip solution has proven successful. Since sealing of the end region of the functional layer on the sole side, in this case, presumes molding-on of an outsole, this known method is restricted to shoes with molded-on outsoles and cannot be used for shoes with glued-on outsoles. Therefore, it is not available for shoes of more elegant style.

[0007] Shoe designs are known, in which the functional layer also has a projection beyond the outer material in the end region on the sole side, in which, however, no spacer strip is present. In this case, the outsole material is molded directly onto the functional layer in the region of the projection. This method is also suited only for footwear with molded-on outsoles.

[0008] Shoe designs are known, in which the functional layer also has a projection beyond the outer material in the end region on the sole side, and in which the sole may be attached by cementing. In these designs, however, no spacer strip is present. In this case, the outer material and the functional layer are lasted to an insole board and the water proof seal is made with the use of a gasket or sealant. These constructions require expensive manufacuture in that, in a first step, the functional layer is lasted to the insole board and, in a second step, the outer material is lasted to the functional layer, by way of a lasting machine. This two-step process required in the lasting machine provides a bottleneck in the footwear manufacturing process and greatly enhances the manufacturing costs. On the other hand, in order to have a reliable lasting attachment of the outer material, a substantial amount of outer material needs to be lasted to the underside of the insole. In particular with thicker outer materials as compared to the thickness of the functional layer, heavy corrugations or wrinkles are formed in the lasting area of the outer material. It is obvious that those corrugations or wrinkles appear particularly at the toe-tip end and the heel end of the footwear where the bending radii of the sole contour are particularly small. The wrinkles or corrugations have the disadvantage that it is extremely difficult to seal those wrinkled areas even with a gasket. Obviously, the corrugations or wrinkles are smaller the smaller the lasting overlap of the outer material is. On the other hand, reducing the lasting overlap of the outer material reduces the stability of the lasting attachment and, accordingly, the durability of the footwear.

[0009] The described invention overcomes these problems and still allows durably waterproof seals to be formed with the use of a gasket followed by conventional application of the outsole including but not limited to either glueing on or molding on techniques of the outsole.

Summary of the Invention

[0010] With this invention, footwear is made available

in which the upper end region on the sole side can be made permanently waterproof irrespective of the typ of outsole.

[0011] In its broadest aspect, the invention is footwear comprising an upper, an insole and an outsole in which:

the upper comprises an outer material layer having an outer side and an inner side, and a waterproof functional layer which is contiguous with at least a portion of the outer material layer inner side, and having an upper end region on the sole side that comprises an outer material layer end region and a functional layer end region, said functional layer end region having a projection extending beyond the outer material layer end region;
a spacer strip connected on one side to the outer material layer end region and on the other side to the end of the functional layer end projection, such that it is contiguous with the projection;
said functional layer end region and said spacer strip are located at the underside of the insole and the functional layer end region is attached to the underside of the insole by lasting adhesive;
a gasket adhered to the underside of at least a part of the spacer strip in a manner which results in a waterproof sealing zone at the functional layer at least in a part of the spacer strip; and
said outsole overlaps the underside of said gasket.

Detailed Description of the Invention

[0012] Footwear according to the invention has an upper, an insole material, a spacer strip, and an outsole, in which the upper is constructed with an outer material and with a waterproof functional layer which is contigous with at least a portion of the outer material on its inside, and has an upper end region on the sole side with an outer material layer end region and a functional layer end region. The functional layer end region has a projection that extends beyond the outer material layer end region. A spacer strip is located between the outer material layer end region and the end of the functional layer end region. Said functional layer end region, said spacer strip and possibly said outer material layer end region are folded around the outer perimeter of the insole so as to overlap the underside of the insole and are attached to the underside of the insole by a lasting adhesive. A sealing zone is provided along the inner perimeter of the upper end region and comprises a part of the functional layer end projection which at least partially overlaps the spacer strip. The gasket covers at least the sealing zone and possibly also the insole and/or the entire spacer strip and possibly also the outer material layer end region. The presence of the spacer strip allows a durably water proof seal to be formed between the functional layer end region and the gasket, while it also allows a reliable attachment of the outer material layer end region to the insole without lasting the outer material layer end region to the underside of the insole and the functional layer, respectively. By doing so, the relatively large lasting overlap of the outer material layer over the underside of the insole is avoided. Consequently, the corrugations or wrinkles are substantially reduced or no longer present at all. The outsole can be any type of outsole, for example a molded-on outsole or conventional glued-on outsole. With a conventional glued-on outsole, it is preferred to have the upper end region extending at least a short distance in parallel to the underside of the insole. On the other hand, in particular with molded-on outsoles or glued-on shell-like outsoles the upper end region may end perpendicular to the bearing surface of the outsole, i.e. without being folded to the underside of the insole. The outsole is attached to the underside of the gasket and/or the insole and/or the outer material layer end region and/or a filler material.

[0013] The spacer strip has to be permeable for the gasket adhesive or the molten gasket material (in the broadest meaning the term "gasket material" should include the gasket adhesive as well as the meltable gasket material). Preferably, the spacer strip is an open mesh material formed from thermoplastic mesh materials, or a textile material or of any other materials. It could take any form including, staples, large loop or long stitches, or similar structures. The key attributes are to allow sufficient flow of the gasket material to allow a durably waterproof seal to be formed and to allow the transfer or sharing of load between the outer material and the functional layer. A net or mesh of monofil fibers is particularily prefered. One suitable form of the spacer strip is a mesh obtainable from Gebr. Jaeger GmbH.

[0014] A gasket is applied to cover the sealing zone, and optionally the entire insole area which is not covered by the functional layer end region, and to form a waterproof seal to the functional layer end region (sealing zone) through the spacer strip and to create durable waterproofness. The outsole is then joined to the upper end region. In cases where said insole area is not covered by the gasket material a waterproof outsole and alternatively a waterproof insole is used to complete the waterproofing of the shoe. The insole and the outsole, respectively, can be made of a waterproof material. Alternatively, its surfaces facing in the completed shoe towards the other of outsole and insole, respectively, of the shoe can completely or partially, i.e. in the relevant portions thereof for ensuring waterproofness of the shoe, be covered with a functional layer. It is also possible to use a waterproof adhesive for attaching a non-waterproof outsole to ensure waterproofness of the shoe.

[0015] In a preferred embodiment a gasket is provided that consists of or comprises a solid polymer resin on at least the side facing the sealing zone. The gasket is heated, e.g. by microwave radiation or in an IR flash activator (infrared heater) or heat tunnel, such that the side with the polymer resin becomes tacky or molten. The gasket is then placed over the spacer strip. The gas-

ket in the desired location is then placed into a press with the shoe so that the gasket attaches itself to the functional layer projection.

[0016] The gasket can comprise a multitude of backer materials that are coated with a polymer resin coating (gasket adhesive) preferably having a lower melting point than the backer. The backer may, for example, comprise a felt, woven or other type of textile material or a higher melting polymer. The backer should not flow during the pressing step, but the polymer resin (gasket adhesive) should flow to be able to provide a waterproof barrier. The backer should have some level of puncture resistance such that it does not get damaged during the pressing step. The polymer resin softens and flows during the pressing step and forms a seal to the functional layer projection by penetrating the spacer strip. The purpose of this step is to make the resin flow through the spacer strip and seal to the functional layer projection. The resin preferably also flows to some extent between the functional layer and the upper material layer end region to form a seal therebetween and additionally to attach the outer material to the functional layer. Subsequently, the footwear is removed from the press. If the gasket covers the entire insole area as defined above or if the insole is waterproof, the footwear is now waterproof because the waterproof gasket (possibly in combination with the waterproof insole) seals off the bottom of the footwear. The outsole is applied over this construction and attached to any of the underside of the gasket, the insole, the outer material layer end region and a filler material. If, however, the construction of the shoe without the outsole is not yet waterproof, it is necessary to attach a waterproof outsole to the underside of at least the gasket.

[0017] The gasket adhesive need not be thermoplastic and could be a curing material that is capable of flow, but solidifies on curing, but thermoplastic materials are the preferred method of application. The adhesive can be polyurethane, polyethylene, silicone, epoxy, acrylic, latex, or thermoplastic elastomers or rubbers, provided they can form a seal to the projection and are flexible enough for this application.

[0018] The sealing function, which was achieved in ordinary footwear of the aforementioned type with the outsole material, can be produced in the footwear according to the invention by heating or infra red (IR) flash activating the gasket material and flowing it through the spacer strip and bonding to the projection of the functional layer end region on the other surface side of the spacer strip, and leads to reliable waterproofness in the final shoe. The adhesive or sealant that is part of the gasket is preferably a PU or thermoplastic urethane that is infra red (IR) flash activated or heated to be flowable, but can be any variety of materials that will function as adhesives and sealants.

[0019] The waterproofness of the sole structure of waterproof footwear can thus be achieved in extremely simple fashion and with extremely simple process steps. The method according to the invention therefore leads to lower manufacturing costs for waterproof shoes.

[0020] Bonding and sealing of the gasket to form a seal is particularly intimate, if the activated (molten) material of the gasket is pressed mechanically against the sole using a pressing device like a sole press that is preferably suitable for this purpose and available from USM, International. Similar equipment is available from other footwear equipment manufacturers and is well known in the industry.

[0021] In one embodiment of the invention, the outer material layer end region extends essentially perpendicular to the bearing surface of the outsole (subsequently, also referred to as vertical extension) and the functional layer end region protrudes beyond the outer material end region parallel to the bearing surface. In another embodiment of the invention the outer material end region extends essentially parallel to the bearing surface of the outsole (subsequently, also referred to as horizontal extension) and the functional layer end region protrudes beyond the outer material end region in the direction toward the center of the outsole. The first embodiment is particularly suited for shell-like outsoles that have an edge that protrudes perpendicularly to the bearing surface of the outsole. The latter embodiment is particularly suitable for shoes with flat, plate-like outsoles, as are used in more elegant shoes, for example.

[0022] The procedure is as follows in a method according to the invention to produce footwear according to the invention: An upper is created, which is constructed with an outer material having an outer side and an inner side, and with a waterproof functional layer which is contiguous with at least a portion of the outer material inner side, and is provided with an upper end region on the sole side. The functional layer is provided with a functional layer end region on the sole side, in which the functional layer end region has a projection that extends beyond the outer material end region. A spacer strip is attached between the outer material layer end region and the end of the functional layer end region. The functional layer end region with the spacer strip is attached to the insole material by lasting. A sealing zone is defined in the outsole peripheral direction between the outer material layer end region and the functional layer end region, which leads to waterproofness around the sealing zone and the perimeter of the insole when the gasket is fastened to the functional layer end region through the spacer strip in the sealing zone. If the gasket material covers the entire insole material, the shoe is waterproof at this point. If the gasket chosen is of a nature that it is waterproof and non wicking, and can form a waterproof seal with the sole during the cementing of the sole, then it may not be necessary to cover the entire insole material. It can be sufficient to seal the sealing zone around the entire periphery of the shoe, and then to form a durably waterproof seal to a waterproof outsole through the use of outsole cement and the use of a waterproof outsole. If the gasket is in the form of a ring that only

covers the sealing zone, waterproofness will be achieved when the soling adhesive is applied and forms a seal between the gasket and the outsole. A series of staples or large loop stitches could also serve as the spacer strip described above if they are spanning the same region and allow load sharing with the upper. Typical temperatures for application of the gasket will be between 60 and 140°C, preferably between 80 and 120°C.

[0023] Production of shoes according to the invention becomes particularly simple and economical due to the use of commercially available gaskets and outsole adhesives that are easily applied for sealing and sole attachment. In one embodiment the gasket is pre-applied within the outsole. Thereby, the manufacturing of the shoe can be facilitated.

[0024] Activation temperatures for such outsole adhesives typically lie in the range from about 60 to 90°C.

[0025] A functional layer that is not only water-impermeable, but also water vapor-permeable, is particularly preferred. This permits production of waterproof shoes that remain breathable, despite waterproofness.

[0026] The functional layer, optionally including the seams provided on the functional layer, is considered "waterproof", if it guarantees a water penetration pressure of at least 0.13 bar. The functional layer material preferably guarantees a water penetration pressure of more than 1 bar. The water penetration pressure is measured according to a test method, in which distilled water is applied at 20 + 2°C to a sample of 100 cm2 of the functional layer with increasing pressure. The pressure rise of the water is 60 + 1 cm H2O per minute. The water penetration pressure corresponds to the pressure at which water first appears on the other side of the sample. Details of the procedure are stipulated in ISO Standard 0811 from the year 1981.

[0027] A functional layer is considered "water vapor-permeable" when it has a water vapor permeability number Ret of less than 150 m2 . Pa . W-1. The water vapor permeability is tested according to the Hohenstein skin model. This test method is described in DIN EN 31092 (02/94) and ISO 11092 (19/33).

[0028] Whether a shoe is waterproof can be tested, for example, with a centrifuge arrangement of the type described in US-A-5 329 807. A centrifuge arrangement described there has four pivotable mounting baskets to hold footwear. Two or four shoes or boots can be tested simultaneously with it. Centrifugal forces that are produced by rapid centrifuging of the footwear are utilized in this centrifuge arrangement to find water-untight sites of the footwear. Water is filled into the interior of the footwear before centrifuging. An absorbent material, like blotting paper or a paper towel, is arranged on the outside of the footwear. The centrifugal forces exert a pressure on the water filled into the footwear, which causes the water to reach the absorbent material, if the footwear is not water tight.

[0029] Water is initially filled into the footwear in this type of waterproofness test. In footwear with an outer material that does not have sufficient intrinsic rigidity, rigid material is arranged in the internal space of the upper for stabilization, in order to prevent collapse of the upper during centrifuging. Blotting paper or a paper towel, on which the footwear being tested is placed, is situated in the corresponding mounting basket. The centrifuge is then rotated for a specified period. The centrifuge is then stopped and the blotting paper or paper towel examined to see if it is moist. If it is moist, the tested footwear did not pass the waterproofness test. If it is dry, the tested footwear passed the test and is classified as waterproof.

[0030] The pressure that the water exerts during centrifuging depends on the effective shoe surface (sole inside surface), which depends on shoe size, the weight of the amount of water filled into the footwear, the effect of centrifuge radius and the centrifuge speed.

[0031] Appropriate materials for the waterproof, water vapor-permeable functional layer include polyurethane, polypropylene and polyester, including polyether-ester and its laminates, as described in documents US-A-4,725,418 and US-A-4,493,870. However, expanded microporous polytetrafluoroethylene (ePTFE) is particularly preferred, as described in documents US-A-3,953,566 and US-A-4,187,390, and expanded polytetrafluoroethylene that is provided with hydrophilic impregnation agents and/or hydrophilic layers; see, for example, document US-A-4,194,041. Microporous functional layer is understood to mean a functional layer whose average pore size lies between about 0.2 μm and about 0.3 μm.

[0032] The pore size can be measured with the Coulter porometer (tradename), which is produced by Coulter Electronics, Inc., Hialeah, Florida, USA.

[0033] The Coulter porometer is a measurement device that provides automatic measurement of pore size distribution in porous media, in which the liquid displacement method (described in ASTM Standard E 1298-89) is used.

[0034] The Coulter porometer determines the pore size distribution of a sample by an increasing air pressure directed on the sample and by measurement of the resulting flow. This pore size distribution is a gauge of the degree of uniformity of the pores of the sample (i.e., a narrow pore size distribution means that there is a slight difference between the smallest pore size and the largest pore size). It is determined by dividing the maximum pore size by the minimum pore size.

[0035] The Coulter porometer also calculates the pore size for average flow. By definition, half of the flow through the porous sample occurs through pores whose pore size lies above or below this pore size for average flow.

[0036] If ePTFE is used as functional layer, the gasket adhesive can penetrate the pores of this functional layer during the application process, which leads to mechanical anchoring of the gasket adhesive in this functional

layer. The functional layer, consisting of ePTFE, can be provided with a thin polyurethane (PU) layer on the side with which it comes in contact with the gasket adhesive during the sealing process. When PU gasket adhesive is used in conjunction with such a functional layer, not only mechanical bonding, but also chemical bonding may occur between the PU gasket adhesive and the PU layer on the functional layer. This leads to a particularly intimate gluing between the functional layer and the gasket, so that particularly permanent waterproofness is guaranteed.

[0037] Leather or a textile fabric are suitable as outer material. Textile fabrics can be, for example, woven, knitted, mesh fabrics, nonwovens or felt. These textile fabrics can be produced from natural fibers, for example, from cotton or viscose, from synthetic fibers, for example, from polyesters, polyamides, polypropylenes or polyolefins, or from mixtures of such materials.

[0038] A liner material can be arranged on the inside of the functional layer, if desired. The same materials just mentioned for the outer material are suitable as liner material, which usually is joined to the functional layer, forming a functional layer laminate. The functional layer laminate can also have more than two layers, in which a textile backing can be found on the side of the functional layer facing away from the liner layer. It is required that the gasket adhesive penetrates such textile backing, if present.

[0039] The outsole of the footwear according to the invention can consist of waterproof material, like rubber or plastic, for example, polyurethane, or from non-waterproof material, like leather assuming the non-waterproof material is provided with rubber or plastic coating that waterproofs the area contacting and sealing region and the entire side facing the insole. If the gasket covers the entire bottom of the insole (or if the insole is waterproof), then it is not necessary for the outsole to be waterproof, or have a waterproofing construction..

[0040] The insole material of the footwear according to the invention can consist of any woven, non-woven, fiberboard, or mesh material that is appropriate as an insole material. The preferred type of insole material is a non-woven type, and it is available from Texon as TL28FL, or is available from Bontex as a product named BONPEL-350.

[0041] The invention, as well as additional tasks and advantages, are now further explained with reference to embodiments. In the drawings, partly in a schematized cross sectional view and partly in a perspective sectional view:

Fig. 1 shows in a cross sectional view a first embodiment of a shoe according to the invention with insole, horizontal upper end region and horizontal spacer strip;

Fig. 2 shows in a cross sectional view a second embodiment of a shoe according to the invention with insole, vertical outer material end region, horizontal functional layer end region and horizontal spacer strip;

Fig. 3 shows a perspective sectional view of the first embodiment, still without gasket and outsole;

Fig. 4 shows a view as in Fig. 3, but with gasket and outsole; and

Fig. 5 shows a partially cutaway perspective view of an entire shoe according to the first embodiment.

[0042] The terms vertical and horizontal are used below to describe the position of individual shoe components. This refers to the depictions in the figures. This corresponds to the idea that shoes, in most cases, are found with their outsole on a horizontal floor or other type of horizontal base; however, these descriptions should not be viewed as limiting the invention.

[0043] Fig. 1 shows, in a strongly schematized cross sectional view, a first embodiment of a shoe according to the invention with an upper 11, which is constructed with an outer material layer 13 and a functional layer 15 that is contiguous with its inside. The functional layer 15 can be a functional layer laminate comprising the functional layer 15 and a liner layer 17 (see Fig. 3) on its inside. The functional layer 15 can also be provided with a textile backing (not shown), facing outer material 13. There may be embodiments of these constructions, in which the functional layer and the liner and/or backing material are separate material layers.

[0044] Fig. 1 also shows an insole 19 and a plate-like, prefabricated outsole 21, which may be constructed from leather, rubber, plastic or some combination thereof. The outer material layer 13 and the functional layer 15 have a horizontally ending (i.e., parallel to the bearing surface of outsole 21) outer material layer end region 23 and functional layer end region 25. The functional layer end region 25 has a projection 27 relative to outer material layer end region 23. The projection 27 is spanned by a spacer strip 29. A first side of the spacer strip 29 is stitched to the end of outer material layer end region 23 by means of a first seam 31. A second side of spacer strip 29 is stitched to the lower end of the functional layer end region 25 by means of a second seam 33.

[0045] The functional layer end region 25 along with the spacer strip 29 and the outer material layer end region 23 are lasted to the insole 19 by a lasting adhesive 35.

[0046] A gasket 37 that provides waterproofness in the final shoe is applied across the area bounded by the outer material layer end region 23 of the shoe. The gasket adhesive is melted, for example, by heating, or IR activation, so that the gasket adhesive penetrates spacer strip 29 and penetrates into the region of the projection 27 and forms a waterproof seal to the functional lay-

er end region 25. Preferably, the gasket adhesive also penetrates to some extent in the area between the functional layer end region 25 and the outer material layer end region 23 so as to additionally bond those layers together. In the final step, outsole adhesive 39 is applied to the outsole 21 and/or to the gasket 37. After drying the adhesives are IR flash activated and bonded during the sole attachment process. The gasket 37 is preferably sized and applied to such an extent and in such amount that it also seals the cut edge of functional layer 15 on the end of functional layer end region 25. The region of insole 19 bordering the functional layer end region 25 is then preferably also sealed.

[0047] Water or other liquid that has penetrated along the water- or liquid-conducting outer material 13 to the lower end of outer material layer end region 23 cannot reach the inside of functional layer 15 and thus the inside lining 17 (see Fig. 3) of the shoe, because of this sealing with gasket 37.

[0048] Outsole adhesive 39, which can be an ordinary outsole adhesive in the form of an aqueous or solvent adhesive, e.g. Helmitin C2426 or Upaco 2441, or hot melt adhesive, is preferably applied to the entire inside of outsole 21 or not if the outsole is breathable. Outsole adhesive 39 is also applied to the outside of outer material 13 that possibly comes in contact with the outsole 21.

[0049] For better depiction and clarity in Fig. 1, the spacings between the individual components of the shoes structure are shown larger than they are in reality. Also it is not true on scale so that the dimensional relationships of the elements shown therein need not necessarily correspond with that in real products. The same also applies for all other embodiments depicted in the figures.

[0050] Fig. 2 shows a second embodiment of a shoe according to the invention that largely agrees with the first embodiment depicted in Fig. 1, but deviates from the first embodiment to the extent that only the functional layer end region 25 ends horizontally in the second embodiment, but the outer material layer end region 23 ends vertically in the second embodiment, i.e., perpendicular to the bearing surface of outsole 21. The projection 27 of functional layer end region 25 and, essentially, also the spacer strip 29 run horizontally. Fig. 2 also shows a shell-like, prefabricated outsole 21 which may be constructed of any materials such as rubber, leathers, plastic or some combinations. The outsole 21 includes a shell edge 22 which projects vertically, i.e. parallel to the outer material 13. The inside of the shell edge 22 is also provided with outsole adhesive 39 for bonding to the outer side of the outer material layer end region 23. Otherwise, agreement exists with the first embodiment, so that with respect to additional aspects of the second embodiment, the comments made above concerning the first embodiment are referred to.

[0051] Fig. 1 and 2 show a manufacturing state of the shoe of the first and second embodiment before the outsole 21 is pressed towards insole 19, in order to glue it to insole 19.

[0052] Fig. 3 is similar to the first embodiment, however without the gasket and the outsole. In particular, this Figure shows a last 41 over which the upper 11 is positioned. The functional layer end region 25 is already lasted to the insole 19.

[0053] Fig. 4 is somewhat similar to Fig. 3 having the gasket 37 and the outsole 21 already attached to the underside of the insole 19 and the spacer strip 29 and the outer material layer end region 23. In this embodiment, the gasket 37 extends essentially across the complete width of the insole 19 and outsole 21, respectively. The central area between insole 19 and gasket 37 is, in this embodiment, filled with filler material 43, in order to provide a planar underside for attachement of the gasket 37 and outsole 21. The filler material 43 is attached to the insole 19 with any ordinary adhesive. Instead of having filler material 43 between insole 19 and gasket (or outsole), the respective portion of the insole 19 can have a greater thickness. The filler material can be a fleece material, like PES fleece, sole material or any other type of material. Also, air chambers 45 are present in the outsole of this embodiment. Alternatively, the gasket 37 can be applied to the insole 19 essentially without any filling material in between.

[0054] In Fig. 4, the waterproofing function of the shoe according to the invention is illustrated. Water penetrates the non-waterproof outer material 13 of the shoe. The waterproof functional layer 15 blocks water from penetrating to the inside of the shoe. Instead, the water flows along the outer material 13, as depicted by arrow 80 untils it reaches the seam 31. In the shoe of Figure 4, the gasket 37 is applied over essentially the complete width of the insole 19. Correspondingly, the gasket material has essentially soaked the complete spacer strip 29 and reaches into contact with the functional layer 15. Correspondingly, a sealing zone which extends essentially along the complete perimeter of the end of the outer material layer end region 23 is formed. This sealing zone stops any water from flowing around the functional layer 15 to the inner liner 17. Correspondingly, the sealing zone effectively blocks penetrating water to the inside of the shoe.

[0055] Fig. 5 shows in a perspective view an entire shoe, in which a part is cut away, in order to show the side of the shoe, on which the section according to Fig. 4 is situated.

Claims

1. Footwear comprising an upper (11), an insole (19) and an outsole (21) in which:

the upper (11) comprises an outer material layer (13) having an outer side and an inner side, and a waterproof functional layer (15) which is

contiguous with at least a portion of the outer material layer inner side, and having an upper end region on the sole side that comprises an outer material layer end region (23) and a functional layer end region (25), said functional layer end region (25) having a projection (27) extending beyond the outer material layer end region (23);
a spacer strip (29) is connected on one side to the outer material layer end region (23) and on the other side to the end of the functional layer end projection (27), such that it is contiguous with the projection (27);
said functional layer end region (25) and said spacer strip (29) are located at the underside of the insole (19) and the functional layer end region (25) is attached to the underside of the insole (19) by lasting adhesive (35);
a gasket (37) is adhered to the underside of at least a part of the spacer strip (29) in a manner which results in a waterproof sealing zone at the functional layer at least in a part of the spacer strip; and
said outsole (21) overlaps the underside of said gasket (37).

2. Footwear of claim 1, wherein the gasket (37) extends over the entire width of the insole (19) and provides a waterproof zone over the entire width of the insole (19).

3. Footwear of claim 1, wherein the gasket (37) covers the spacer strip (29) but not the entire width of the insole (19).

4. Footwear of claim 1, wherein the outsole (21) is of a non-waterproof material and is covered with a functional layer on at least a part of its surface facing to the underside of the insole (19).

5. Footwear of claim 1, wherein the insole (19) is of a non-waterproof material and is covered with a functional layer on at least a part of its surface facing to the underside of the outsole (21).

6. Footwear according to claim 1 in which the spacer strip (29) is stitched to the outer material layer end region (23) and to the functional layer end region (25).

7. Footwear according to claim 1 in which the functional layer (15) is waterproof and water vapor-permeable.

8. Footwear according to claim 5, wherein the functional layer comprises expanded porous polytetrafluoroethylene.

9. Footwear according to claim 1, wherein the spacer strip (29) is formed of a net of monofil fibers.

10. Method for producing footwear which comprises:

providing footwear that has an upper (11) and insole (19);
said upper (11) comprised of an outer material layer (13) having an outer side and an inner side, and a waterproof functional layer (15) which is contiguous with at least a portion of the outer material layer inner side, and having an upper end region on the sole side that is comprised of an outer material layer end region (23) and a functional layer end region (25), said functional layer end region (25) having a projection (27) extending beyond the outer material layer end region (23),
attaching a spacer strip (29) to the outer material layer end region (23) and to the end of the projection (27) on the functional layer (15),
lasting the functional layer end region (25) along with the spacer strip (29) to the insole (19) by a lasting adhesive (35),
applying a gasket (37) to the underside of at least a part of the spacer strip (29) in a manner which results in a waterproof sealing zone at the functional layer at least in a part of the spacer strip area, and
applying an outsole (21) overlaping the gasket (37).

11. Method according to claim 10, wherein the step of attaching the spacer strip (29) to the outer material layer end region (23) and to the end of the projection (27) of the functional layer (15) includes the sewing of the spacer strip (29) to the outer material layer end region (23) and to the end of the projection (27) of the functional layer (15).

12. Method according to claim 10, wherein the step of applying the gasket (37) to the underside of at least part of the spacer strip (29) includes activating of gasket material and using such activated gasket material as an adhesive.

13. Method according to claim 10, wherein the step of applying the gasket (37) to the underside of at least part of the spacer strip (27) includes the pressing of the gasket (37) towards the insole (19).

14. Method according to claim 10, wherein the pressing is performed so as to bring gasket material through the spacer strip (29) in contact with the projection (27) of the functional layer (15).

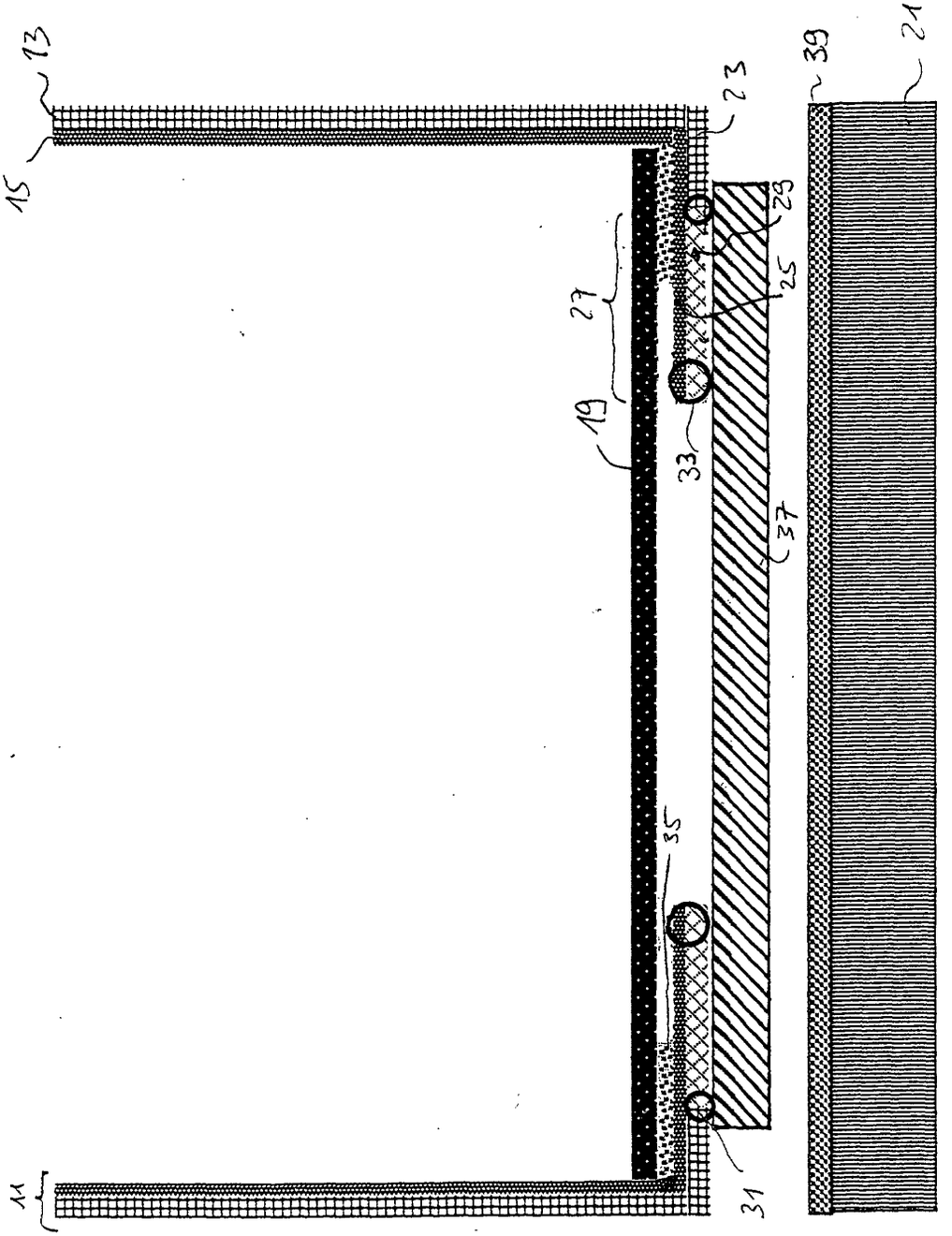

Fig. 1

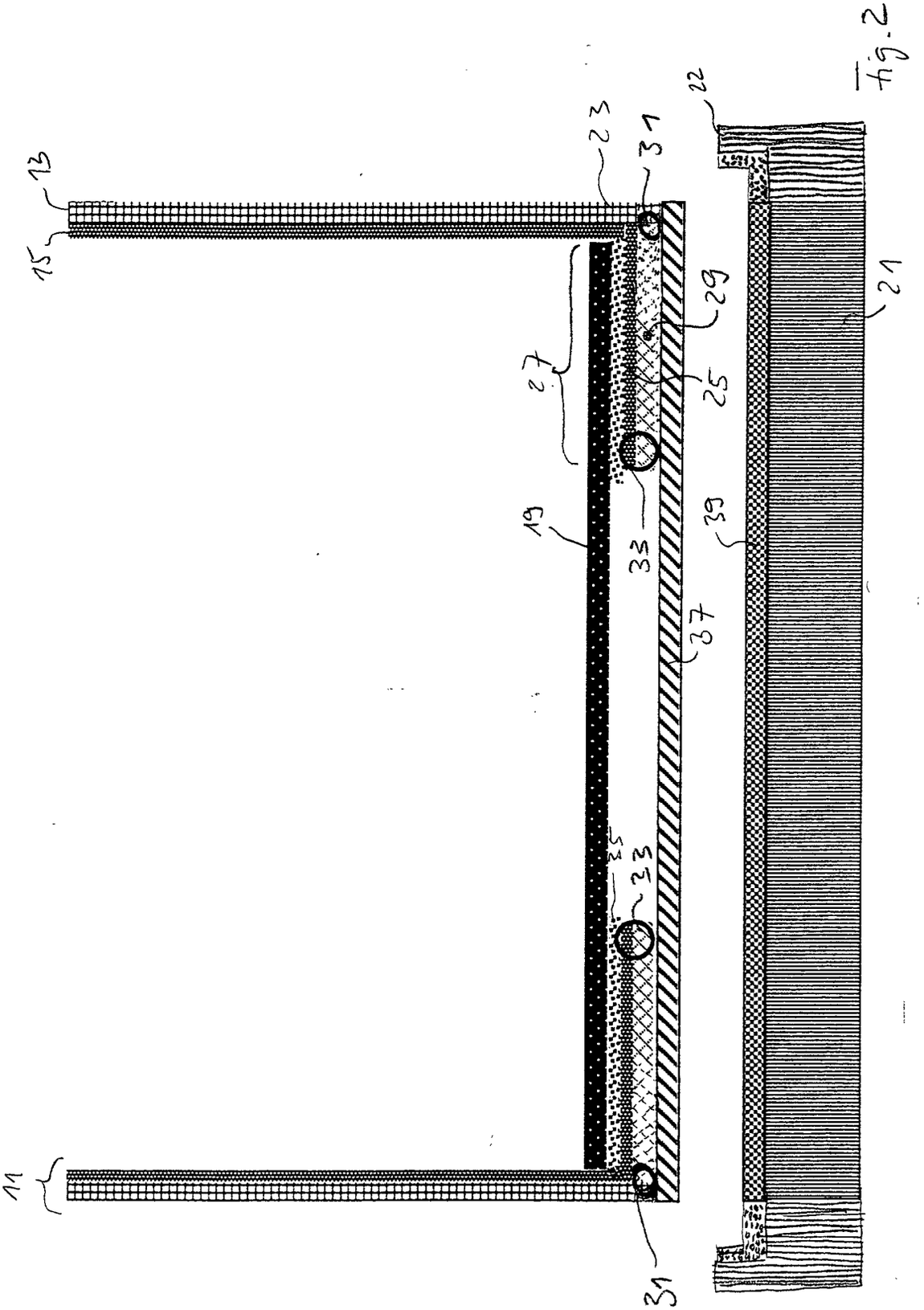

Fig. 2

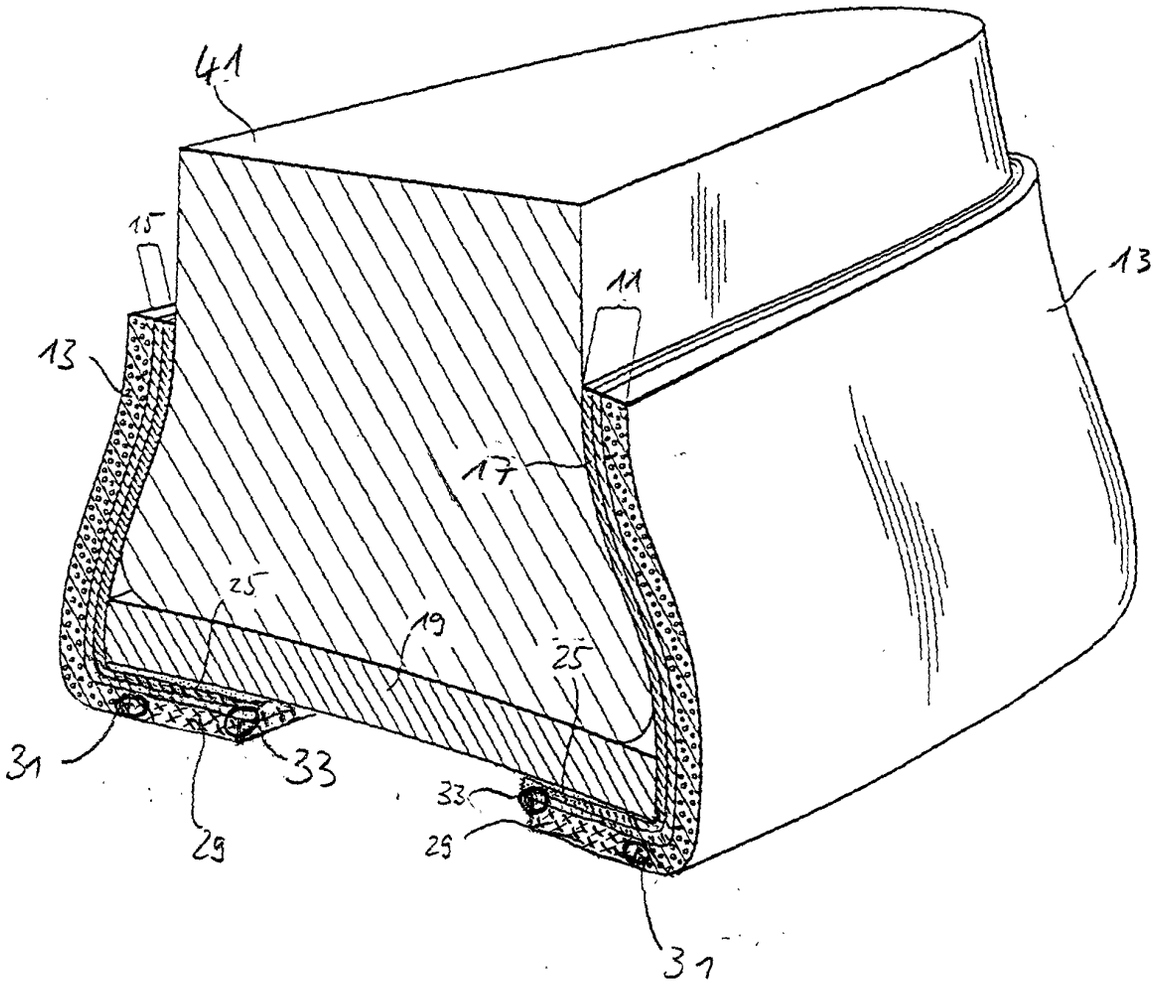

Fig. 3

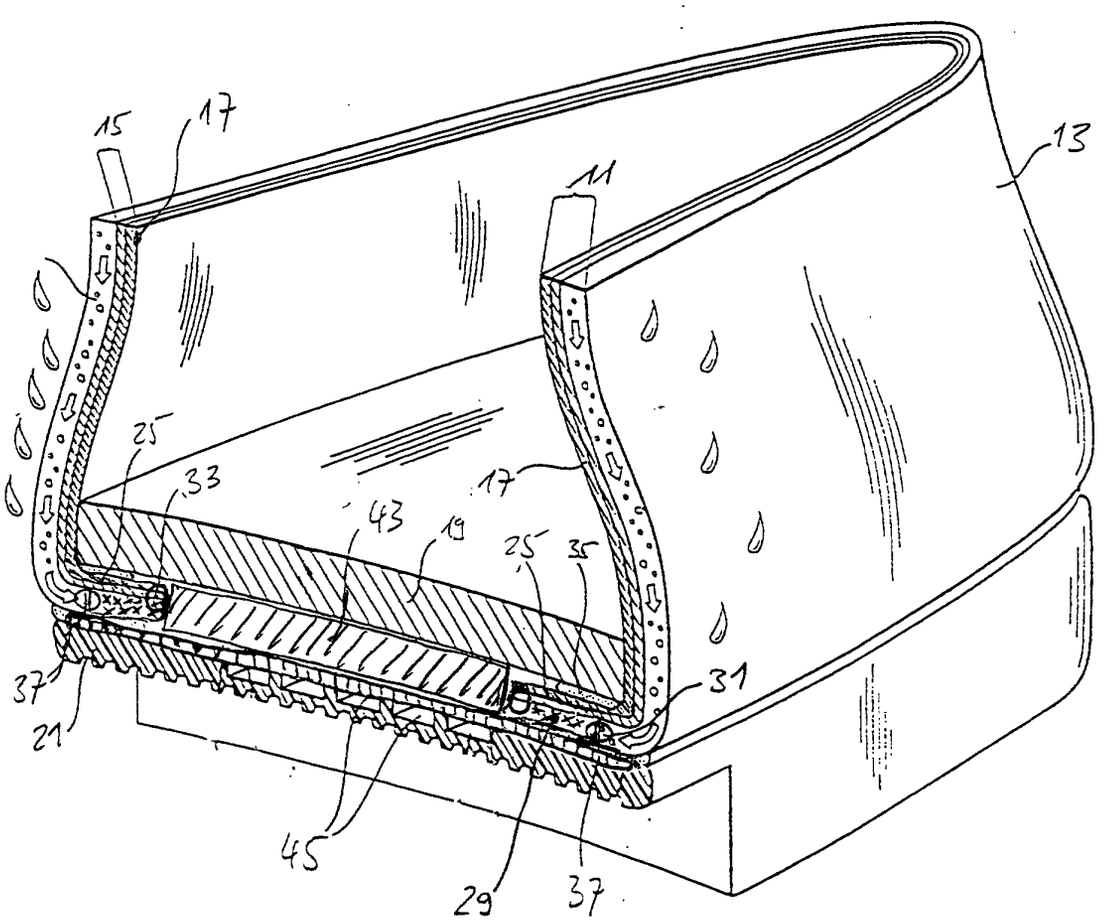

Fig. 4

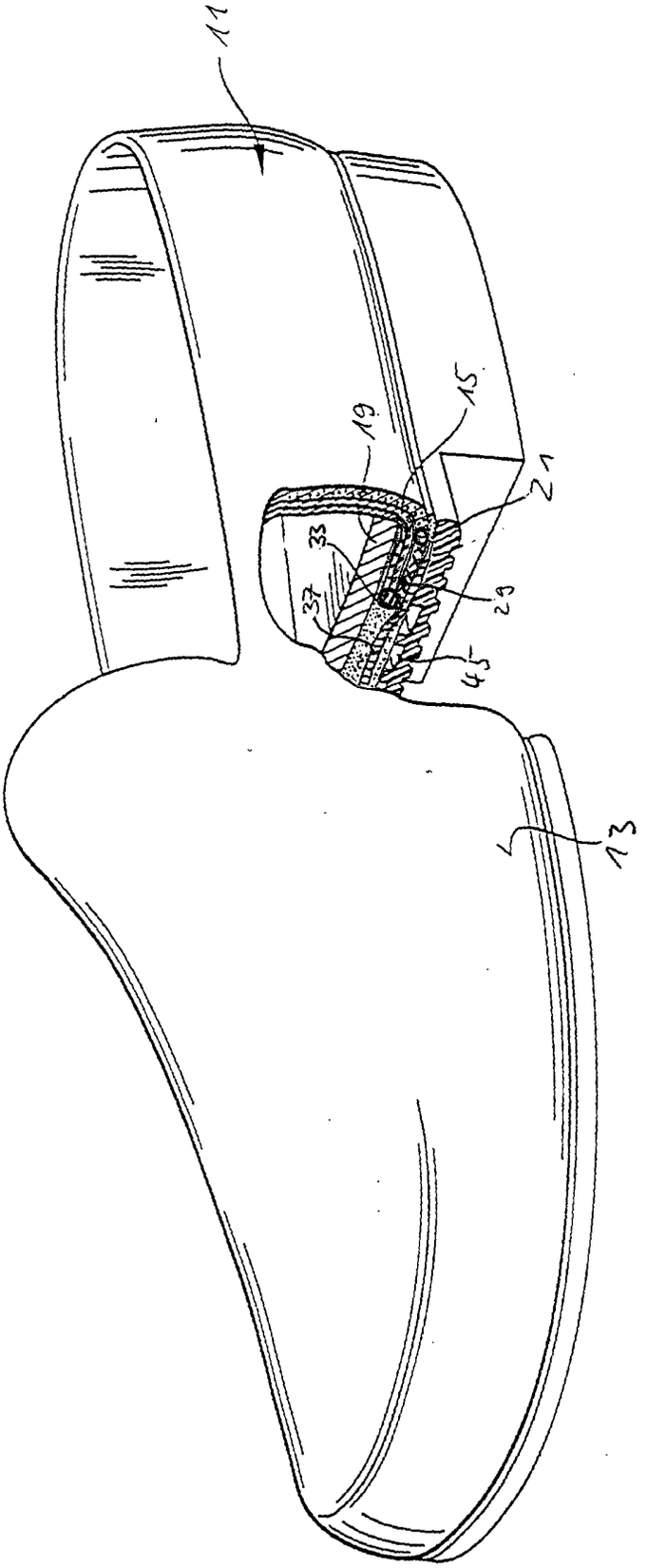

Fig. 5

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 00 83 0660

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A43B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	6 March 2001	DECLERCK, J

CATEGORY OF CITED DOCUMENTS

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