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(54) **Waterproof footwear and manufacturing method**

Wasserdichtes Schuhwerk und Herstellungsverfahren

Chaussure imperméable et méthode de fabrication

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(73) Proprietor: **Calzaturificio Orion S.p.A.**
35023 Bagnoli Di Sopra (PD) (IT)

(72) Inventor: **Meneghin, Graziano**
35021 Agna-Padova (IT)

(74) Representative: **Petruzzello, Aldo et al**
Racheli & C. S.p.A
Viale San Michele del Carso, 4
20144 Milano (IT)

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Description

[0001] The present invention refers to the manufacture of waterproof footwear, particularly waterproof and vapour-permeable (breathable) footwear.

[0002] Waterproof, vapour-permeable footwear, that is to say footwear able to protect the foot from the entry of water, though allowing regular evaporation of perspiration meet with widespread public favour at present. To obtain the desired characteristic of watertightness and vapour-permeability, a layer or sheet of material impervious to water and pervious to vapour, that is, vapour-permeable, per se known and available on the market, is generally incorporated. The sheet is generally incorporated into the footwear as a lining or part of the lining of the upper. Footwear of this type generally have a vapour-permeable upper and a waterproof sole injection-moulded so as to be joined to the insole and to the upper.

[0003] The known footwear are made with one or more seams to join together the upper and the lining and possibly the insole. Problems arise at these seams as far as watertightness is concerned because the stitching forms a break in the continuity of the waterproof, vapour-permeable membrane and water can enter the inside of the footwear through the stitching holes. The problem is particularly serious if the upper is made of leather (as is desirable on other counts) in that the sheet of leather, even if it does not allow direct passage of water through the leather, easily conveys the water impinging thereon by capillarity in the direction in which the sheet extends, up to the edges thereof, from which the water can pass inside the footwear, possibly through the stitching holes.

[0004] Attempts have been made to remedy the problem in various ways. European patent EP 0 298 360, for instance, teaches a footwear provided with a lining with a waterproof, vapour-permeable layer and an injection moulded sole, wherein the edge of the upper is positioned at a distance with respect to the edge of the lining; the edge of the upper is stitched to one side of a porous tape, the other side of which is stitched to the lining. During injection moulding the material of the sole passes through the holes in the porous tape and forms a waterproof layer between the stitching involving the upper, which could allow moisture to pass, and the stitching involving the lining, and thus the inside of the footwear.

[0005] DE 40 04 674 refers to a footwear comprising an upper, a lining with a waterproof, vapour-permeable membrane, an insole and a sole of plastic material formed integrally at least with the upper and with the insole, where the bottom edge of the upper is joined to one end of a vertical non-porous tape, whose second end is joined to the lining and to the insole.

[0006] Said systems have the drawback, however, of being relatively complex and costly.

[0007] An object of the present invention is to overcome the problems of the prior art.

[0008] Another object is to make a footwear of the type with a waterproof, vapour-permeable lining, in which the

outside water cannot pass in any way to the inside of the footwear through the components thereof, and to achieve this with an economically advantageous system that is easy to apply.

[0009] The objects have been achieved with a footwear as stated in claim 1 and a method as stated in claim 3.

[0010] The invention achieves the above objects, in particular allowing fully waterproof footwear to be made at limited cost.

[0011] The invention will be described, by way of a non-restrictive example, with reference to the attached drawings, in which:

Figure 1 is a part-sectional axonometric view of a footwear according to the present invention;
Figure 2 is a bottom view of the upper-lining-insole-tape assembly of the footwear of Figure 1, stitched together;

Figure 3 is a cross sectional view of the footwear complete with the sole of plastic material;
Figure 4 is an enlarged view of the detail circled in Figure 3.

[0012] With reference to the figures, a shoe or footwear according to the invention is designated as a whole with reference numeral 10 and comprises at least an upper 12, a lining 14, an insole 16, a sole 18 of plastic material formed directly on the other elements, and a non-porous tape 20.

[0013] The upper 12 is made of sheet material, of any type suited to the purpose, for example leather, and is cut so as to have its bottom edge 22 ending at a distance, that is more outward, with respect to the edge of the lining, as shown in the figures.

[0014] The lining 14 comprises a layer or membrane 24 of waterproof and vapour permeable, or breathable, material and preferably further comprises one or more complementary layers or sheets 26 (only one is illustrated in the figures) with thermal, aesthetic and shock-absorbing functions, as is usual. The bottom edge of the lining 14 is cut so as to be "longer" than the upper, so that it can be turned in along the bottom part of the footwear.

[0015] The insole 16 is made of conventional sheet material for insoles, for example needled fabric, and is cut so as to have an outline which defines a smaller area than the entire bottom inside area of the footwear.

[0016] The tape or band 20 is made of non-porous material, for example U.A. 014 from Uno Art, and has a layer of heat-reactive or thermo-reacting adhesive (per se known) on one side, precisely the side 21 facing upward, toward the lining, in the figures. The tape 20 is sewn, with a longitudinal margin or edge 28 thereof, to the bottom edge of the upper; said seam is designated by 30 in Figure 4. The seam is of the reversed or rolled type. The other longitudinal edge, 29, of the tape 20 is sewn together with the bottom edge of the lining 14 and the edge of the insole 16. The sewing or seam is preferably of the

pinching or chain-stitch Strobel type and is designated by reference numeral 32. The side 21 of the tape in the finished footwear is adherent to a strip of lining near the bottom edge thereof.

[0017] The sole 18 is made of waterproof elastomeric material formed directly integral with the upper, the insole and the tape, by means of any per se known forming method, such as injection moulding, extrusion or other.

[0018] The footwear manufacturing method will now be described.

[0019] In the first place, the upper 12 and the lining 14 are made or provided, cut so that the bottom peripheral edge of the lining extends a certain distance beyond the peripheral bottom edge of the upper, as well as the non-porous tape or band 20. The upper can be of any known sheet material suited to the use, for example leather. The lining comprises, in a per se known manner, a sheet or membrane of waterproof and vapour-permeable material, designated by 24, and preferably one or more further sheets coupled thereto, to perform other functions, for example to give better thermal insulation or greater comfort, or even for aesthetic purposes. The tape 20 is preferably made of a closely woven fabric of synthetic thread, coated on at least one side with a layer of glue that is heat-activated. The tape is thus non-porous. An adhesive not incorporated into the non-porous tape could also be used.

[0020] The bottom edge of the outer upper is joined to the tape by stitching; a rolled seam is preferably used, as denoted by 30 in the figures. The stitching 30 involves only the tape and the upper, not the lining. The side of the tape coated with adhesive faces toward the lining of the footwear. The tape, the lining and the edge of the insole are then joined together by stitching, preferably by a Strobel or chain sewing referenced 32.

[0021] The plastic material sole 18 is then hot moulded onto the assembly consisting of the insole, lining, upper and tape, so as to be in contact and engaged with the insole, tape and upper. Hot moulding of the sole causes activation of the adhesive on the tape, which adheres against the opposite surface of the lining, thus forming a peripheral seal against possible entry of moisture along the seam 30, along the entire perimeter of the bottom part of the shoe. Alternatively, the adhesive of the tape could be activated with a separate operation preliminary to forming of the sole.

Claims

1. Footwear comprising an upper (12), a lining (14) with a waterproof, vapour-permeable membrane (20), an insole (16), a sole (18) of plastic material formed integrally at least with said upper (12) and with said insole (16) and a non-porous tape (20), **characterized in that:**

- the bottom peripheral edge of the lining (14)

extends beyond the bottom peripheral edge (22) of the upper (12), which is more outward with respect to the bottom peripheral edge of the lining (14) and is stitched to one side of the non-porous tape (20);

- the bottom edge of the lining (14) is turned in with respect to the bottom peripheral edge (22) of the upper (12) and is sewn to the insole (16) along the periphery thereof;

- the tape (20) of non-porous material is horizontal and positioned between the sole (18) and the turned in bottom peripheral edge of the lining (14), it has one edge (28) folded at right angle and joined to the upper (12) by means of a reversed or rolled seam (30) and the other edge (29) joined to the lining (14) and to the insole (16) by means of a second seam (32) and it is stitched at least to the lining (14) along the entire perimeter of the footwear (10), so as to form a seal against entry into the footwear of any moisture seeping through the first seam (30), the non-porous tape (20) being coated with heat-reacting adhesive on at least the side (21) facing toward the lining (14).

2. A shoe according to claim 1 wherein the second seam (32) is a Strobel-chain stitching seam.

3. A method of manufacturing waterproof, vapour-permeable footwear comprising an upper (12), a lining (14) with a waterproof, vapour-permeable membrane (24), an insole (16), a sole (18) formed directly in contact with at least the upper (12) and the insole (16), **characterized in that** it comprises the stages of:

- preparing the upper (12) and the lining (14) so that the bottom edge of the upper (12) is more outward with respect to the bottom edge of the lining (14) and the bottom edge of the lining (14) is turned in with respect to the bottom peripheral edge of the upper (12) along the entire perimeter,

- preparing a tape (20) of non-porous material, - joining an edge of the tape (20) to the bottom edge of the upper (12) by means of a rolled seam (30),

- folding at right angle the tape (20) to place it horizontally and joining its other edge to the lining (14) and/or to the insole (16) by means of a second seam (32) spaced apart from the first seam (30),

- joining said tape (20) and said lining (14) and/or said insole (16) by watertight adhesion along the entire perimeter of the lining (14) and/or of the insole (16),

- hot forming the sole (18).

4. A method according to claim 3 wherein the tape (20) is coated on at least one side with heat-reacting adhesive and the stage of joining by adhesion takes place during hot forming of the sole (18).
5. A method according to claim 3 wherein the second seam (32) is a pinched or Strobel-chain type seam.

Patentansprüche

1. Schuhwerk, das ein Oberleder (12), ein Futter (14) mit einer wasserfesten, atmungsaktiven Membran (20), eine Einlegesohle (16), eine Sohle (18) aus Kunststoffmaterial, die mindestens mit dem genannten Oberleder (12) und der genannten Einlegesohle (16) einteilig ist, und ein nicht poröses Band (20) umfasst,
- dadurch gekennzeichnet, dass:**

- die untere Randkante des Futters (14) sich über die untere Randkante (22) des Oberleders (12) erstreckt, die sich im Verhältnis zur unteren Randkante des Futters (14) weiter nach außen erstreckt und an einer Seite des nicht porösen Bands (20) angenäht ist;
- die untere Kante des Futters (14) im Verhältnis zur unteren Randkante (22) des Oberleders (12) nach innen gedreht ist und mit der Einlegesohle (16) entlang deren Rand vernäht ist;
- das Band (20) aus nicht porösem Material waagrecht verläuft und zwischen der Sohle (18) und der nach innen gedrehten Randkante des Futters (14) angeordnet ist, dass es eine Kante (28) aufweist, die im rechten Winkel gefaltet und mit dem Oberleder (12) mit Hilfe einer umgekehrten oder gerollten Naht (30) verbunden ist, und die andere Kante (29) mit dem Futter (14) und der Einlegesohle (16) mit Hilfe einer zweiten Naht (32) verbunden ist, und dass es mindestens mit dem Futter (14) entlang dem gesamten Umfang des Schuhwerks (10) vernäht ist, so dass eine Versiegelung gegen das Eindringen von Feuchtigkeit in das Schuhwerk gebildet wird, welche durch die erste Naht (30) dringt, wobei das nicht poröse Band (20) mindestens an der Seite (21) mit wärmereaktivem Klebstoff beschichtet ist, die dem Futter (14) gegenüberliegt.

2. Ein Schuh gemäß Anspruch 1, wobei die zweite Naht (32) eine Strobelketten-Stepnaht ist.
3. Eine Methode zur Herstellung von wasserfestem, atmungsaktivem Schuhwerk, das ein Oberleder (12), ein Futter (14) mit einer wasserfesten, atmungsaktiven Membran (24), eine Einlegesohle (16), eine Sohle (18), die direkt in Kontakt mit mindestens dem

Oberleder (12) und der Einlegesohle (16) geformt ist, umfasst, **dadurch gekennzeichnet, dass** sie folgende Arbeitsgänge umfasst:

- die Vorbereitung des Oberleders (12) und des Futters (14), so dass die untere Kante des Oberleders (12) weiter außen im Verhältnis zu der unteren Kante des Futters (14) liegt und die untere Kante des Futters (14) im Verhältnis zu der unteren Randkante des Oberleders entlang dem gesamten Umfang nach innen gedreht ist;
- die Vorbereitung eines Bands (20) aus nicht porösem Material;
- die Verbindung einer Kante des Bands (20) mit der unteren Kante des Oberleders (12) mit Hilfe einer gerollten Naht (30);
- das Falten des Bands (20) im rechten Winkel, um es waagrecht anzuordnen und die Verbindung seiner anderen Kante mit dem Futter (14) und/oder der Einlegesohle (16) mit Hilfe einer zweiten Naht (32), die von der ersten Naht (30) entfernt liegt;
- die Verbindung des genannten Bands (20) mit dem genannten Futter (14) und/oder der genannten Einlegesohle (16) durch wasserfestes Verkleben entlang dem gesamten Umfang des Futters (14) und/oder der Einlegesohle (16).
- Warmformung der Sohle (18).

4. Eine Methode gemäß Anspruch 3, wobei das Band (20) an mindestens einer Seite mit wärmereaktivem Klebstoff beschichtet ist und der Arbeitsgang der Verbindung durch Verkleben während der Warmverformung der Sohle (18) stattfindet.

5. Eine Methode gemäß Anspruch 3, wobei die zweite Naht (32) eine Kneifnaht oder eine Strobelkettennaht ist.

Revendications

1. Chaussure comprenant une empeigne (12), une doublure (14) avec une membrane perméable à la vapeur et étanche (20), une première (16), une semelle d'usure (18) intégralement réalisée en matière plastique au moins avec ladite empeigne (12) et ladite première (16) et une bande non poreuse (20), **caractérisée en ce que :**

- le bord périphérique inférieur de la doublure (14) s'étend au-delà du bord périphérique inférieur (22) de l'empeigne (12), qui est plus à l'extérieur par rapport au bord périphérique inférieur de la doublure (14) et qui est piqué sur un côté de la bande non poreuse (20) ;
- le bord inférieur de la doublure (14) est tourné vers l'intérieur par rapport au bord périphérique

inférieur (22) de l'empeigne (12) et est cousu sur la première (16) le long de sa périphérie ;
 - la bande (20) en matière non poreuse est horizontale et placée entre la semelle d'usure (18) et le bord périphérique inférieur tourné vers l'intérieur de la doublure (14), elle présente un bord (28) replié à angle droit et relié à l'empeigne (12) au moyen d'une couture retournée ou relevée (30) et l'autre bord (29) relié à la doublure (14) et à la première (16) au moyen d'une deuxième couture (32) et est piqué au moins sur la doublure (14) tout le long du périmètre de la chaussure (10), de façon à former une fermeture hermétique contre la pénétration à l'intérieur de la chaussure de toute moisissure suintant à travers la première couture (30), la bande non poreuse (20) étant recouverte d'un adhésif réagissant à la chaleur sur au moins le côté (21) faisant face à la doublure (14).

2. Chaussure selon la revendication 1, où la deuxième couture (32) est une couture en points de chaîne Strobel.

3. Méthode de fabrication d'une chaussure perméable à la vapeur et étanche comprenant une empeigne (12), une doublure (14) avec une membrane perméable à la vapeur et étanche (24), une première (16), une semelle d'usure (18) directement réalisée en contact avec au moins l'empeigne (12) et la première (16), **caractérisée en ce qu'elle** comprend les phases de :

- préparation de l'empeigne (12) et de la doublure (14) de sorte que le bord inférieur de l'empeigne (12) est plus à l'extérieur par rapport au bord inférieur de la doublure (14) et que le bord inférieur de la doublure (14) est tourné vers l'intérieur par rapport au bord périphérique inférieur de l'empeigne (12) tout le long de son périmètre,
- préparation d'une bande (20) réalisée dans une matière non poreuse,
- raccord d'un bord de la bande (20) au bord inférieur de l'empeigne (12) au moyen d'une couture relevée (30),
- pliage à angle droit de la bande (20) pour la placer horizontalement et raccord de son autre bord à la doublure (14) et/ou à la première (16) au moyen d'une deuxième couture (32) placée loin de la première couture (30),
- raccord de ladite bande (20) à ladite doublure (14) et/ou à ladite première (16) par adhésion étanche tout le long du périmètre de la doublure (14) et/ou de la première (16),
- formage à chaud de la semelle d'usure (18).

4. Méthode selon la revendication 3, où la bande (20) est revêtue sur au moins un côté d'un adhésif réa-

gissant à la chaleur et la phase de raccord par adhésion a lieu pendant le formage à chaud de la semelle d'usure (18).

5. Méthode selon la revendication 3, où la deuxième couture (32) est une couture de type à chaîne Strobel ou pincée.

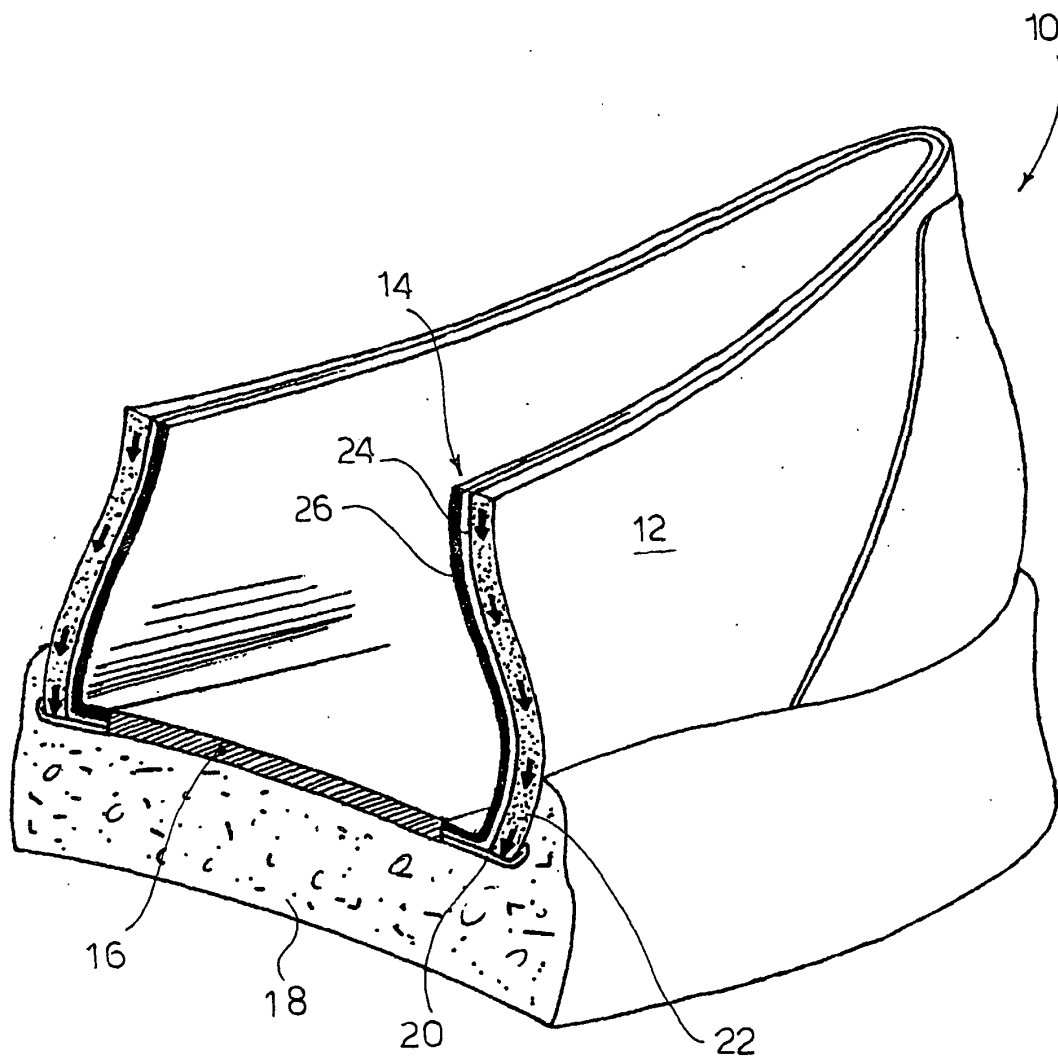


FIG. 1

FIG. 2

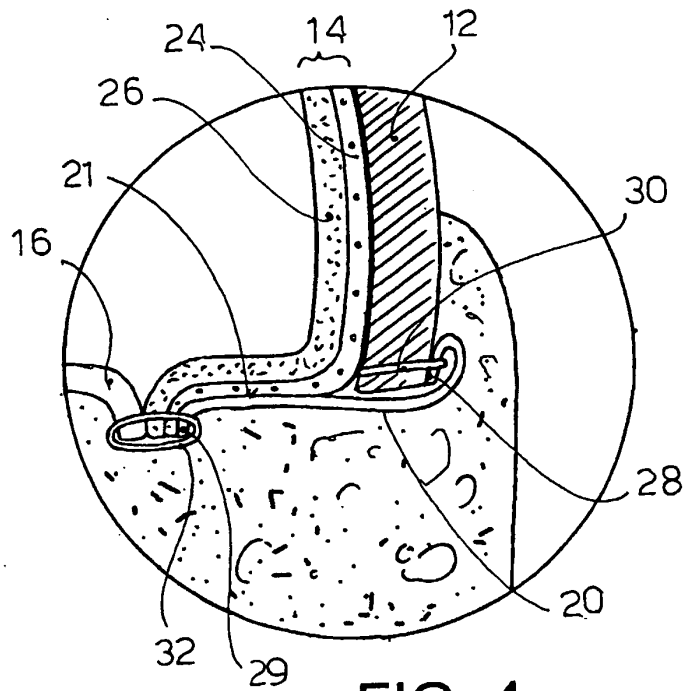
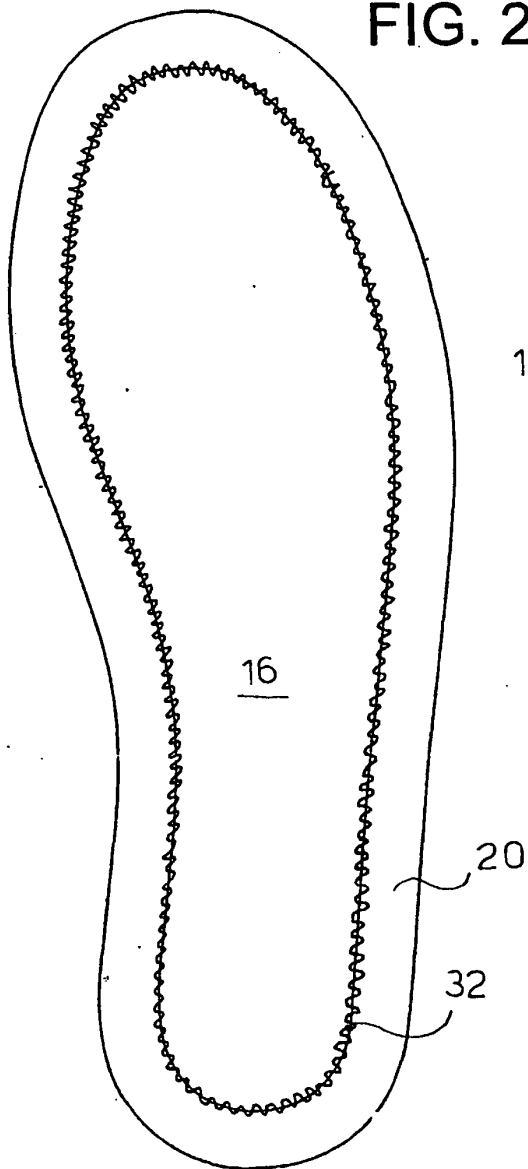


FIG. 4

