



CLOTHING VENTILATION DEVICE ALLOWING THE HUMAN
BODY TO BREATHE, AND METHOD FOR PRODUCING THE DEVICE
Technical Field

The present invention relates to a ventilation device to be applied to items
5 of clothing in order to allow the human body to breathe.

The invention also relates to the method for producing the device.

Background Art

It is known that people wear shoes and clothing mainly to protect
themselves from weather and the cold.

10 Depending on the external temperature and on the environmental
conditions, it is necessary to resort to various "layers" of clothing in order to
adapt the body to the surrounding environment.

This protection system allows, in particular, to easily adapt the body to
the thermal variations that can occur simply by adding or removing one or
15 more layers of clothing.

The human body inherently has a series of "mechanisms" that allow it to
adapt thermally to the surrounding environment.

In case of overheating, the body, in fact, reacts by increasing perspiration,
which by evaporating ensures a natural lowering of the temperature of the
20 body.

However, if the water vapor is unable to escape from the layers of
clothing in which the human body is wrapped, humidity increases and the
vapor condenses, returning to the liquid state of perspiration and thus
wetting the clothes starting from the ones that constitute the first layer
25 (underwear).

The only solution to this drawback is to replace as quickly as possible the
wet item with a dry one, with the risk, however, of subjecting the body to
sudden chilling.

A breathable item of clothing has recently been devised which is
30 disclosed in Italian Patent Application PD99A000149 of July 6, 1999 and in



the corresponding WO 01/01803 A1 and comprises a protective outer enclosure with an internal layer that affects at least part of the extension of said outer enclosure and defines internally an interspace.

The inner layer has, at least at the regions of the human body where sweat forms most abundantly, holes for access to said interspace for the vapor produced by sweating.

The inner layer and the outer enclosure have, in the top regions of the item, holes for the evacuation of the vapor that is conveyed by a "stack effect" inside said interspace, combined with means that hold out water, impurities or other substances.

The means that hold out water is constituted by a membrane that is permeable to vapor and/or air, impermeable to water, arranged in the upper regions where the vapor exit holes are formed, and interposed between said outer enclosure and said inner layer.

As an alternative, the means that hold out the water is constituted by a ventilation element that is provided with means for fixing to the fabric of an item of clothing at an appropriately provided opening.

The ventilation element has, at the part to be arranged externally, an orientation that slopes from the center toward the peripheral region and a top opening.

An external protective dome, raised substantially from the ventilation element, is fixed perimetrically thereto and has, in a position other than the central one, at least one hole that is not aligned with the central opening.

Although said means that hold out water have been found to be functional, even in the other embodiments disclosed in Italian Patent Application PD99A000149 of July 6, 1999 and in the corresponding WO 01/01803 A1, they have been found to have drawbacks, including difficulties in manufacture and/or production, but most of all their resulting or inherent color is hardly comparable to the color of the item, and this causes considerable problems in terms of visual impact, which is fundamental for

marketability.

An equally important factor is high cost.

Disclosure of the Invention

The aim of the present invention is therefore to provide a ventilation
5 device of the type suitable to be applied to items of clothing that allows
breathing, at the same time ensuring the fullest impermeability to water and
a visual impact that is distinctly better than the impact obtained with known
devices.

Within this aim, an object to be achieved with the present invention is to
10 provide a ventilation device that allows in every respect the natural
thermoregulation of the human body.

Another object is to obtain a ventilation device that is structurally very
simple to provide.

Another object of the present invention is to provide a ventilation device
15 that is easy to apply to any type of item of clothing.

This aim and these and other objects that will become better apparent
hereinafter are achieved by a ventilation device to be applied to items of
clothing, characterized in that it comprises:

-- an assembly with through holes, composed of a band of material that is
20 at least partially transparent and impermeable and is provided to be arranged
externally, a layer provided to be placed in view and made of natural or
synthetic fabric, natural or synthetic leather or equivalents, at least one layer
of adhesive polymeric material for joining one another said outer band and
said layer to be placed in view, between which is inserted:

25 -- a membrane which is impermeable to water and permeable to vapor,
provided for being arranged internally, and sealed at least perimetrically to
said assembly on the side of said layer to be placed in view.

Advantageously, between said assembly and said membrane there is a
layer of open-cell expanded plastic material.

According to the invention there is provided a ventilation device (10) to be applied to items of clothing in order to allow the human body to breathe, comprising,:

an assembly (11) with through holes (12), composed of an outer band (13) of material that is at least partially transparent and impermeable provided to be arranged externally

5 with respect to the human body, and,

a membrane (16) which is impermeable to water and permeable to vapor, provided for being arranged internally towards the human body,

characterized in that said assembly (11) further comprises a layer (14) provided to be placed in view and made of natural or synthetic fabric, natural or synthetic leather or

10 equivalents, at least one layer (15) of adhesive polymeric material for mutually joining said outer band (13) and said layer (14) to be placed in view, said membrane (16) being sealed at least perimetrically to said assembly (11) on the side of said layer (14) to be placed in view.

Brief description of the drawings

Further characteristics and advantages of the present invention will become better apparent from the description of an embodiment thereof illustrated only by way of non-limitative example in the accompanying drawings, wherein:

5 Figure 1 is a perspective view of a portion of the device according to the invention;

Figure 2 is an exploded perspective view of the components of the device of Figure 1;

Figure 3 is a sectional view of the device in a step of its production;

10 Figure 4 is a sectional view of the device in a step of its production that follows the step of Figure 3.

Ways to carrying out the Invention

With reference to the figures, a preferred embodiment of a ventilation device according to the present invention is generally designated by the
15 reference numeral 10.

The ventilation device 10 comprises an assembly 11 with through holes 12 (in order to allow the passage of vapor) composed of a band 13 made of at least partially transparent and impermeable material to be arranged externally, a layer 14 to be placed in view, preferably of the same type as the
20 one that constitutes the item of clothing (not shown) on which the device is applied, therefore for example natural or synthetic fabric, natural or synthetic leather or equivalents, joined by applying heat to said band 13 by means of at least one layer 15 made of heat-sealing polymeric material inserted between them.

25 The layer 15 preferably has a thickness in the order of 0.1 mm and is made of a material that is compatible with the material of the band 11 and with the requirements of, for example, high-frequency bonding (cited hereafter) and therefore with a low melting point.

Advantageously, in this case the material can be constituted by PU

30 As an alternative, the layer 15 can be constituted by a coating or spread of

an adhesive that can be reactivated by pressure or heat.

The function of the band 13 is also to avoid unraveling of the fabric of the layer 14 to be placed in view after the provision of the holes 12.

The band must also be made of a material that is compatible with high-frequency bonding, for example PVC, if this type of bonding is subsequently adopted.

A membrane 16 that is impermeable to water and permeable to vapor (such as expanded PTFE and/or hydrophilic polymer), to be arranged internally, is sealed at least perimetrically by high-frequency bonding to the assembly 11 on the side of said layer 14.

Alternatively, sealing can also be performed by thermoformation (hot pressing in molds) or with another suitable means.

Conveniently, the membrane 16 can be laminated together with a supporting layer (mesh) 17, which in this case is shown at the inner part but can also be arranged toward the outside.

The membrane 16 can also be laminated with protective materials (not shown), which are in any case placed toward the inside.

Advantageously, between the layer 14 to be placed in view and the membrane 16 there is a layer 18 made of open-cell expanded plastic material, which is capable of creating a space for separating them in order to allow better passage of the vapor.

The layer 18 can also be used to produce a padding effect and, through the high-frequency bonding that produces compressed and expanded regions, provide on the outside decorations, designs, markings, et cetera.

As regards the production process, it provides for the following steps:

-- the band 13 is coupled by continuous or discontinuous thermoformation to the layer 14, to be placed in view, by means of the layer 15;

-- the through holes 12 are formed through the assembly 11, which has the appearance shown in Figure 3;

-- the membrane 16, optionally together with the mesh 17, is joined to the assembly 11 (optionally with the layer 18 inserted between them), by high-frequency bonding (Figure 4).

In practice it has been found that the present invention has achieved more than satisfactorily the intended aim and objects.

A considerable advantage has been achieved by the present invention in that a ventilation device has been provided which is suitable to be applied to items of clothing, and allows maximum breathing and at the same time ensures the fullest impermeability to water and is therefore particularly suitable for all items in which waterproofness is a fundamental prerogative.

It should be noted that the band 13 (which is transparent) places the layer 14 in view, and this gives the assembly an excellent visual impact.

Another very important advantage has been achieved in that a ventilation device has been provided which ensures, in every respect, the natural thermoregulation of the human body.

Moreover, one should consider the fact that the ventilation device devised with the present invention is structurally very simple to provide.

It is also worth pointing out the fact that the ventilation device that has been devised is easy to apply to any type of item of clothing.

All the details may further be replaced with other technically equivalent elements.

The materials used, so long as they are compatible with the contingent use, as well as the dimensions, may be any according to requirements.

The disclosures in Italian Patent Application No. PD2001A000016 from which this application claims priority are incorporated herein by reference.

CLAIMS

1. A ventilation device (10) to be applied to items of clothing in order to allow the human body to breathe, comprising:
an assembly (11) with through holes (12), composed of an outer band (13) of material
5 that is at least partially transparent and impermeable provided to be arranged externally with respect to the human body, and,
a membrane (16) which is impermeable to water and permeable to vapor, provided for being arranged internally towards the human body,
characterized in that said assembly (11) further comprises a layer (14) provided to be
10 placed in view and made of natural or synthetic fabric, natural or synthetic leather or equivalents, at least one layer (15) of adhesive polymeric material for mutually joining said outer band (13) and said layer (14) to be placed in view, said membrane (16) being sealed at least perimetrically to said assembly (11) on the side of said layer (14) to be placed in view.
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2. The ventilation device according to claim 1, characterized in that between said assembly (11) and said membrane (16) is provided a layer (18) of open-cell expanded plastic material.
- 20 3. The ventilation device according to claim 1, characterized in that said layer (15) of adhesive polymeric material is made of heat-sealing material.
4. The ventilation device according to claim 3, characterized in that said layer (15) of heat-sealing material is constituted by PU.

5. The ventilation device according to claim 3, characterized in that said layer (15) of heat-sealing material preferably has a thickness in the order of 0.1 mm.

5 6. The ventilation device according to claim 1, characterized in that said layer (15) of adhesive polymeric material is constituted by a spread or coating of an adhesive that can be reactivated by pressure or heat.

7. The ventilation device according to claim 1, characterized in that said sealing of said
10 membrane is a high-frequency bond.

8. The ventilation device according to claim 1, characterized in that said sealing of said membrane is a thermoformed element.

15 9. The ventilation device according to claims 1 and 3, characterized in that said layer (15) of heat-sealing material is made of a material that is compatible with the material of said band (13) to be arranged externally and with the requirements of high-frequency bonding.

20 10. The ventilation device according to claim 1, characterized in that said band (13) to be arranged externally is made of a material that is compatible with high-frequency bonding.

11. The ventilation device according to claim 10, characterized in that said band (13) to be arranged externally is made of PVC.

12. The ventilation device according to claim 1, characterized in that said membrane
5 (16) is laminated together with a supporting layer (17) being preferably a mesh.

13. The ventilation device according to claim 1, characterized in that said membrane
(16) is laminated with protective materials that are arranged on its side that faces
inward.

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14. A method for producing a device according to one or more of the preceding claims,
consisting in:

- coupling a band (13) of at least partially transparent material to a layer (15) to be
placed in view by way of a layer (14) of adhesive plastic material;
- 15 -- providing through holes (12) in the assembly (11) thus formed;
- joining hermetically a membrane (16) to the assembly.

15. The method according to claim 14, characterized in that the coupling of said band
(13) made of at least partially transparent material with the layer (14) to be placed in
20 view by way of the layer (14) of adhesive plastic is performed by thermoformation.

16. The method according to claim 14, characterized in that the coupling of said band
(13) made of at least partially transparent material with the layer (14) to be placed in

view by way of the layer (15) of adhesive plastic is performed by reactivation of the adhesive by way of pressure or heat.

17. The method according to claim 14, characterized in that the sealing of said
5 membrane (16) is performed by high-frequency bonding.

18. The method according to claim 14, characterized in that the sealing of said
membrane (16) is performed by thermoformation.

10 19. The method according to claim 14, consisting in inserting a layer (18) of open-cell
expanded plastic material between said assembly (11) and said membrane (16) prior to
high-frequency bonding.