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(54) Benævnelse: **METHOD FOR PRODUCING A TRANSPORT/DRIVE BELT**

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Description

The invention relates to a method for producing a transport/drive belt comprising at least one layer of a thermoplastic material and at least one layer of a woven fabric web.

Such belts, which are typically flat, have manifold uses as conveyor belts or also as drive belts. In this case, in particular the boundaries on the longitudinal edges of the extended belts are subject to a high mechanical strain and stress during use, so that often the boundary edges of the belt are unprotected with respect to environmental influences with increasing usage time, and dirt particles and bacteria may penetrate. This is unacceptable in particular from the aspect of good hygienic practice and the HACCP concept (hazard analysis and critical control point) in all fields of enterprise which are concerned with production, processing, and distribution of foods.

A production method for conveyor belts is known from DE 1 237 768, in which a carrier strip having a material strip glued thereon is guided to an edge of a belt and wrapped around it. Subsequently, the elastomeric material of the material strip is melted onto the top and bottom sides of the conveyor belt and reshaped by contact pressure of heated plates. The basic principle in this method comprises applying additional elastomeric material to the edge of the conveyor belt and bonding it to the elastic material of the conveyor belt to form a unit by the action of temperature and pressure.

A conveyor belt is disclosed in DE 1 289 300, which has a high-tensile-strength core made of multiple woven fabric inlays connected by connecting layers made of thermoplastic

material. The warp threads of the woven fabric inlays comprise a thermoplastic material in the boundary zones of the woven fabric, which melts under the action of temperature and pressure and bonds to the thermoplastic material of the connecting layers to form a unit. However, these thermoplastic warp threads have a lower tensile strength, so that they are undesirable in practice. Such warp threads are therefore often only used at specific intervals, so that the boundary can be cut off in this area, which substantially precludes flexible fabrication, however.

Methods are described in GB 1,030,354 and US 5,244,083, in which conveyor belts comprise multiple layers, which have different widths on the boundary areas. The widest boundary layer is folded around the other material layers. However, delamination and fraying of the multilayer structure is still possible in the case of belts produced in this manner.

Before this background, the invention is based on the object of creating a possibility of providing a transport/drive belt having a sealed and resilient edge in a simple and cost-effective way.

This object is achieved according to the invention by a method according to the features of Claim 1.

The further embodiment of the invention may be inferred from the subclaims.

In the case of a production method of the type described at the beginning, it is provided according to the invention that a mat is placed on at least one longitudinal edge of the transport/drive belt in order to transfer heat and/or

pressure to the transport/drive belt, so that exclusively the thermoplastic material of the transport/drive belt is melted and thermoformed, at least in certain regions, without additional material and, subsequently, after the thermoplastic material has solidified again, the mat is detached from the longitudinal edge of the transport/drive belt.

The core of the present invention is that the already provided thermoplastic material of the multiple belt layers in particular, for example, PVC, PU, PE, PA, PP, or polyolefins is reshaped into a uniform and sealed belt edge. Material removal or application of additional material is therefore not required. In the transport/drive belt produced in this manner, the resolidified material on the edge forms a unit, so that separation and detachment of the multiple layers is not possible.

So as not to impair the tensile strength, which is essentially determined by the material properties of the woven fabric inlay, it is provided according to the invention that the melting temperature of the material of the woven fabric web is higher than the melting temperature of the thermoplastic material.

In the case of a production method according to the invention, the melting and thermoforming of the thermoplastic material preferably takes place in a temperature range between 120°C and 200°C, more preferably in a temperature range between 160°C and 180°C.

In order to reliably prevent adhesion of the thermoplastic material in the molten and/or resolidified state, a separating medium, in particular a separating paper or a separating film, can be provided between the

transport/drive belt and the mat during the execution of the method according to the invention.

In order that the reshaped edge surface has a desired surface structure, for example, having a rough/smooth or matte/glossy property, the separating medium can be provided with a surface structure which is impressed on the surface of the thermoplastic material during the melting and thermoforming.

The mat is advantageously formed as a glass fiber mat in the method according to the invention.

The mat is detached from the thermoformed belt in connection with the separating medium without complications if the mat comprises a woven fabric with a nonstick coating.

The invention permits various embodiments. The basic principle of the method according to the invention is explained in greater detail as an example hereafter on the basis of an embodiment with reference to the appended figures. In the figures:

Figure 1 shows a schematic outline of a cross-sectional view of a transport/drive belt, which is composed of multiple layers, before the melting and thermoforming procedure;

Figure 2 shows the transport/drive belt having a longitudinal edge which is thermoformed according to the invention.

The illustration of Figure 1 shows a transport/drive belt 1, which comprises multiple layers of thermoplastic

material 2, which are situated essentially parallel and one over another. A woven fabric web 3 is inserted as an intermediate layer between each two layers of thermoplastic material 2, for example, polyvinyl chloride, polyurethane, polyethylene, polyamide, polypropylene, and/or a polyolefin. To simplify the illustration, the individual threads, i.e., the weft or warp threads of the woven fabric web 3, are not shown separately. It is essential in this case that they do not protrude beyond the thermoplastic material 2.

A mat 4, which is formed as a bag or pocket, is guided around one of the two edges of the transport/drive belt 1, the left in the plane of the drawing, and is placed around the belt edge. A separating paper 5 is arranged between the mat 4 and the thermoplastic material 2 of the transport/drive belt 1, which is also led around the entire edge from a top side to the bottom side.

For the actual thermoforming procedure, two heating plates 6 are applied to the top side and the bottom side of the arrangement made of transport/drive belt 1, separating paper 5, and mat 4. An action of temperature and/or pressure is transmitted to the above-described arrangement using the heating plates 6. The temperature is selected in such a way that the thermoplastic material 2 in the edge area is melted, but the woven fabric webs 3, whose material has a higher melting temperature, are not.

After the thermoplastic material 2 is melted, it is reshaped by the applied pressure so that the melts of the multiple layers at least partially merge into one another. The melting of the thermoplastic material 2 is performed in particular in a temperature range between 160°C and 180°C. A stainless steel film can also be placed around the

arrangement as the heating means as an alternative to the heating plates 6 shown.

The transport/drive belt 1 from Figure 1 is shown in Figure 2 after the thermoforming procedure having resolidified thermoplastic material 2. In Figure 2, it may be clearly seen that the thermoforming procedure performed according to the invention does not exert any substantial influence on the woven fabric webs 3. However, it may also be clearly seen on the processed edge of the transport/drive belt 1 that the thermoplastic material 2, which was originally provided in multiple layers, forms a unit having a rounded edge after the thermoforming procedure.

Only the longitudinal edge shown on the left is processed and thermoformed in each case in Figures 1 and 2 for illustration. The respective longitudinal edge shown on the right remains unchanged and the respective separate layers of the different materials may be seen clearly. However, it is preferably provided that both longitudinal edges are correspondingly thermoformed and sealed for the use of the transport/drive belt.

P a t e n t k r a v

1. Fremgangsmåde til fremstilling af et transport-/drivbånd (1) af mindst et lag af et termoplastisk materiale (2) og mindst et lag af en vævet stofbane (3), kendetegnet ved, at der på mindst en længdekant af transport-/drivbåndet (1) anbringes en måtte (4) for at overføre varme og/eller tryk på transport-/drivbåndet (1), således at det udelukkende er transport-/drivbåndets (1) termoplastiske materiale (2), der i det mindste områdemæssigt opsmeltes og omformes uden tilsætningsmateriale, og måtten (4) derefter løsnes fra længdekanten af transport-/drivbåndet (1), efter det termoplastiske materiale (2) er stivnet igen.

2. Fremgangsmåde ifølge krav 1, kendetegnet ved, at smeltetemperaturen af den vævede stofbanes (3) materiale er højere end smeltetemperaturen af det termoplastiske materiale (2).

3. Fremgangsmåde ifølge krav 1 eller 2, kendetegnet ved, at opsmeltningen og omformningen af det termoplastiske materiale (2) foregår i et temperaturområde mellem 120° C og 200° C.

4. Fremgangsmåde ifølge mindst et af de foregående krav, kendetegnet ved, at opsmeltningen og omformningen af det termoplastiske materiale (2) foregår i et temperaturområde mellem 160° C og 180° C.

5. Fremgangsmåde ifølge mindst et af de foregående krav, kendetegnet ved, at der mellem transport-/drivbåndet (1) og måtten (4) tilvejebringes et skillemedium, især et skillepapir (5).

6. Fremgangsmåde ifølge krav 5, kendetegnet ved, at

skillemediet forsynes med en overfladestruktur, som påtrykkes ved opsmeltningen og omformningen af overfladen af det termoplastiske materiale (2).

7. Fremgangsmåde ifølge mindst et af de foregående krav, kendetegnet ved, at måtten (4) er udformet som en glasfibermåtte.

8. Fremgangsmåde ifølge mindst et af de foregående krav, kendetegnet ved, at måtten (4) har et vævet stof med en anti-klæbningsbelægning.

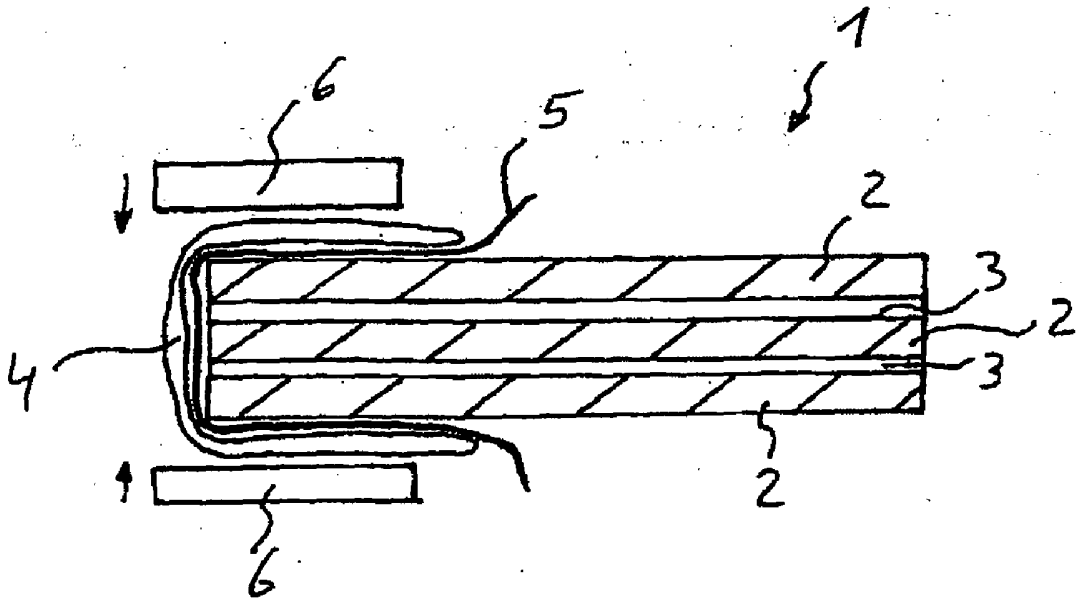

Fig. 1

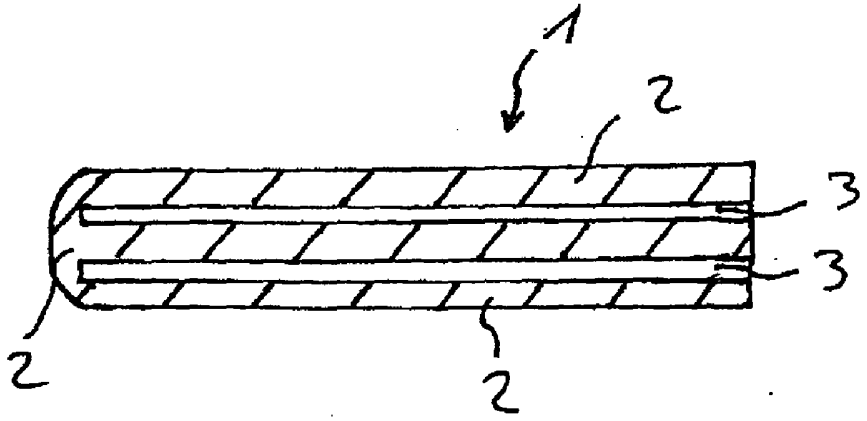

Fig. 2