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# United States Patent [19]

**Murata et al.**

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[54] **THERMOPLASTIC ELASTOMER LAMINATES AND GLASS RUN CHANNELS MOLDED THEREFROM**


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[22] Filed: **Dec. 13, 1993**

**Related U.S. Application Data**

[62] Division of Ser. No. 872,158, Apr. 22, 1992, Pat. No. 5,302,463.

[30] **Foreign Application Priority Data**

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| Apr. 22, 1991 | [JP] | Japan | 3-90667 |
| Apr. 22, 1991 | [JP] | Japan | 3-90668 |
| Apr. 26, 1991 | [JP] | Japan | 3-97636 |
| May 10, 1991 | [JP] | Japan | 3-105918 |
| May 10, 1991 | [JP] | Japan | 3-105919 |
| May 10, 1991 | [JP] | Japan | 3-105920 |

[51] **Int. Cl.**[6] .............................................. **B32B 27/08**

[52] **U.S. Cl.** .................................... **428/517;** 428/516; 428/519

[58] **Field of Search** ............... 428/517, 519, 516, 122; 524/269



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[57] **ABSTRACT**

According to the present invention, there is provided a thermoplastic elastomer laminate which comprises

a layer comprising a thermoplastic elastomer (A) composed of a crystalline polyolefin and a rubber, and

a layer comprising an ultra-high molecular weight polyolefin (B) or an ultra-high molecular weight polyolefin composition.

In addition, a glass run channel composed of the thermoplastic elastomer laminate is also provided in the invention.


**8 Claims, 2 Drawing Sheets**

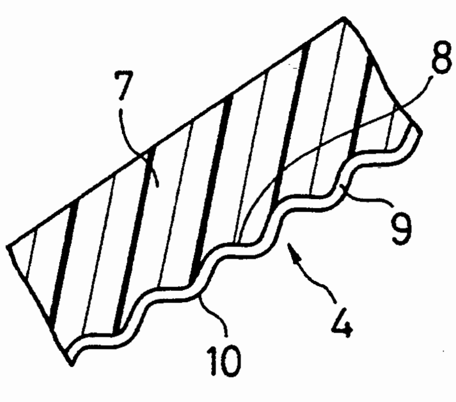


FIG.1

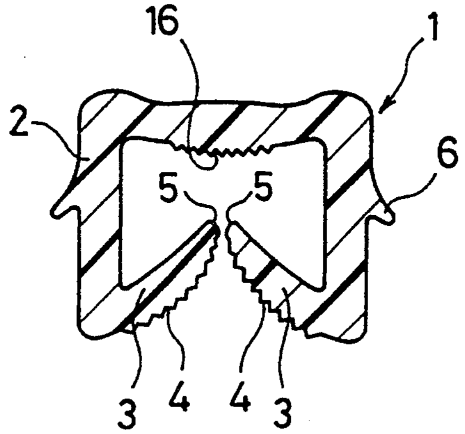



FIG.2

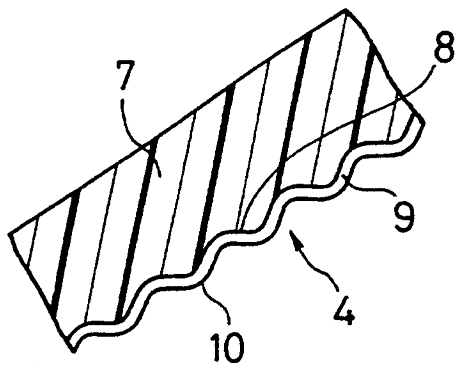



FIG.3

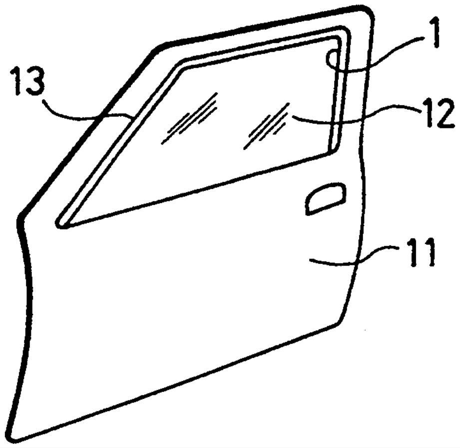


FIG.4

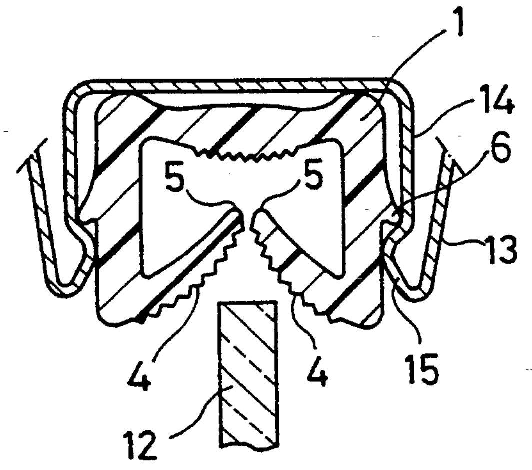
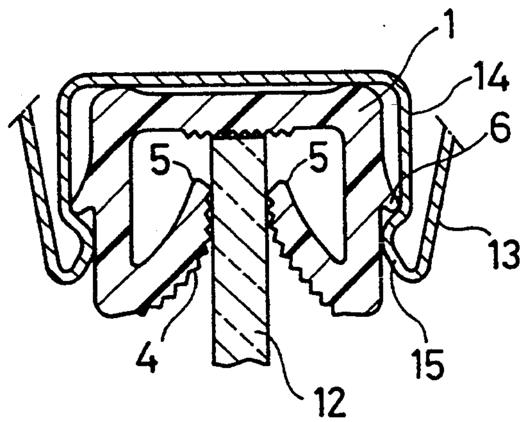



FIG.5



# THERMOPLASTIC ELASTOMER LAMINATES AND GLASS RUN CHANNELS MOLDED THEREFROM

This is a division of application Ser. No. 07/872,158 filed Apr. 22, 1992 now U.S. Pat. No. 5,302,463.

## FIELD OF THE INVENTION

This invention relates to thermoplastic elastomer laminates effectively useful in preparing interior automotive trims and sealing materials, and to glass run channels molded from said laminates, and more particularly to thermoplastic elastomer laminates consisting of a base layer made of thermoplastic elastomer and a surface layer made of lubricant resin, and to glass run channels having a window glass sliding portion composed of said laminates.

## BACKGROUND OF THE INVENTION

Various laminates have heretofore been used for preparing interior automotive trims, sealing materials or the like. For Example, glass run channel is known as one of important sealing materials used in automobile. This glass run channel is a guide member provided between a window glass and a window frame in order to make an intimate (liquid tight) sealing operation between the window glass and the window frame possible while facilitating the ascent-decent and open-shut operations of the window glass.

Materials used conventionally for preparing glass run channels include (1) a composite material comprising vulcanized rubber consisting essentially of an ethylene/propylene/diene copolymer rubber excellent in weathering resistance and heat resistance, an adhesive and nylon fiber, (2) a composite material comprising the above-mentioned vulcanized rubber and an adhesive, and (3) a non-rigid PVC for use in contour extrusion.

The conventional glass run channels composed of such composite materials as mentioned above comprise a main body having a groove-like cross-section and tongue-like draining portions, each extending from the tip of the side wall of groove toward the central side of the groove.

In the conventional glass run channels, a nylon film or the like is laminated with an adhesive to the surface of the window glass sliding portion of each draining portion in order that the window glass may part favorably from said sliding portion and also may be prevented from staining, or the surface of each sliding portions of the draining portions is subjected, before or after the above-mentioned lamination of the nylon film or the like, to embossment treatment in order to lessen the contact area of said sliding portions with the window glass.

In a process of preparing such glass run channels as mentioned above, however, there are involved such inconveniences as large number of steps and time-consuming jobs, wherein because of no adhesive properties existing between the above-mentioned non-rigid synthetic resin or vulcanized rubber and such surface material as nylon, it becomes necessary to take the steps of coating the surface of the window glass sliding portions of the main body of glass run channel molded from the above-mentioned non-rigid synthetic resin or vulcanized rubber with an adhesive, and laminating a nylon film or the like to the surface of said window glass sliding portions, arid further to carry out the embossment treatment of the surface of said sliding portion before or after the above-mentioned lamination of the nylon film or the like.



On one hand, when the conventional glass run channels are prepared by contour extrusion molding the above-mentioned composite material (3), i.e. a non-rigid polyvinyl chloride, the production process employed therefor is simplified. However, this composite material is poor in heat resistance and dimensional stability, and is inferior in practical performance to the above-mentioned composite materials (1) and (2).

When the conventional glass run channels molded from the above-mentioned composite materials (1) or (2), there is a durability problem of the channels because the nylon film or the like is laminated by means of an adhesive to the window glass sliding portions of the draining portions, and there is also such a drawback that the thus laminated nylon film is liable to peel off from said window glass sliding portions with time and upon exposure outdoors. Furthermore, the embossed pattern formed on the surface of the window glass sliding portions by the embossment treatment is not fully satisfactory in point of combination of fineness and uniformity, and there is much room for improvement in intimate contacting properties between the window glass sliding portion and the window glass at the time of shutting the window glass and also in light sliding properties between the window glass sliding portions and the window glass at the time of opening the window glass.

Accordingly, there has been desired the advent of laminates which are excellent in weathering resistance, heat resistance and dimensional stability, can be prepared by a simplified production process and can be used for the purposes such as interior automotive trims, sealing materials or the like, and also the advent of glass run channels comprising window glass sliding portions molded from said laminates.

## OBJECT OF THE INVENTION

The present invention is intended to solve such problems associated with the prior art as mentioned above, and an object of the invention is to provide thermoplastic elastomer laminates excellent in weathering resistance, heat resistance and dimensional stability, which can also be prepared by a simplified production process and are excellent in so-called economical efficiency.

A further object of the invention is to provide glass run channels which are excellent not only in economical efficiency but also in durability, intimate contacting properties with the window glass at the time of shutting the window glass and in easy sliding properties with the window glass at the time of opening the window glass.

## SUMMARY OF THE INVENTION

The first thermoplastic elastomer laminates of the present invention comprises a layer comprising a thermoplastic elastomer (A) composed of a crystalline polyolefin and a rubber, and a layer comprising an ultra-high molecular weight polyolefin (B).

The thermoplastic elastomer (A) referred to above preferably includes those obtained by subjecting a mixture comprising 70—10 parts by weight of a crystalline polypropylene (a) and 30—90 parts by weight of rubber (b) which is ethylene/propylene copolymer rubber or an ethylene/propylene/diene copolymer rubber (the sum total of the components (a) and (b) is 100 parts by weight) to dynamic heat treatment in the presence of organic peroxide, said rubber (b) being partially cross-linked.

The ultra-high molecular weight polyolefin (B) referred to above preferably has an intrinsic viscosity [η], as measured in decalin at 135° C., of 10–40 dl/g.

The second thermoplastic elastomer laminates of the invention comprises a layer comprising a thermoplastic elastomer (A) composed of a crystalline polyolefin and rubber and a layer, and a layer comprising an ultra-high molecular weight polyolefin composition (C), said ultra-high molecular weight polyolefin composition consisting essentially of an ultra-high molecular weight polyolefin having an intrinsic viscosity [η], as measured in decalin at 135° C., of 10–40 dl/g, and polyolefin having an intrinsic viscosity [η], as measured in decalin at 135° C., of 0.1–5 dl/g, said ultra-high molecular weight polyolefin existing in a proportion of 15–40% by weight based on 100% by weight of the sum total of the ultra-high molecular weight polyolefin and polyolefin, and said ultra-high molecular weight polyolefin composition (C) having an intrinsic viscosity [η], as measured in decalin at 135° C., of 3.5–8.3 dl/g.

The above-mentioned thermoplastic elastomer (A) is the same as used in the first thermoplastic elastomers of the invention.

The aforesaid ultra-high molecular weight polyolefin composition (C) may contain 1–20% by weight, based on the composition (C), of a liquid or solid lubricant.

The third thermoplastic elastomer laminates of the invention comprises a layer comprising a graft-modified thermoplastic elastomer (GA) and a layer comprising an ultra-high molecular weight polyolefin (B), said graft-modified thermoplastic elastomer (GA) being obtained by dynamic heat treatment and partial cross-linkage of a blend in the presence of an organic peroxide, said blend containing (i) 95—10 parts by weight of a peroxide cross-linking olefin copolymer rubber, (ii) 5–90 parts by weight of a polyolefin (the sum total of the (i) and (ii) components is 100 parts by weight) and (iii) 0.01–10 parts by weight of an α,β-unsaturated carboxylic acid or its derivatives, or an unsaturated epoxy monomer.

The graft-modified thermoplastic elastomer (GA) referred to above preferably includes those further containing (iv) 5–100 parts by weight of a peroxide non-cross linking rubbery substance and/or (v) 3–100 parts by weight of a mineral oil softener based on 100 parts by weight of the sum total of the components (i) and (ii).

In the graft-modified thermoplastic elastomer (GA) mentioned above, it is desirable that the content of the peroxide cross-linking olefin copolymer rubber (i) is 95—60 parts by weight and that of the polyolefin (ii) is 5–40 parts by weight (the sum total of the components (i) and (ii) is 100 parts by weight).

The ultra-high molecular weight polyolefin (B) used herein is the same as used in the first thermoplastic elastomer laminates of the invention.

The fourth thermoplastic elastomer laminates of the invention comprises a layer comprising a graft-modified thermoplastic elastomer (GA) and a layer comprising an ultra-high molecular weight polyolefin composition (C), said graft-modified thermoplastic elastomer (GA) being obtained by dynamic heat treatment and partial cross-linkage of a blend in the presence of an organic peroxide, said blend containing (i) 95—10 parts by weight of a peroxide cross-linking olefin copolymer rubber, (ii) 5–90 parts by weight of a polyolefin (the sum total of the (i) and (ii) components is 100 parts by weight) and (iii) 0.01–10 parts by weight of an α,β-unsaturated carboxylic acid or its derivatives, or an unsaturated epoxy monomer, said ultra-high molecular weight polyolefin composition (C) consisting essentially of an ultra-high molecular weight polyolefin having an intrinsic viscosity [η], as measured in decalin at 135° C., of 10–40 dl/g and a polyolefin having an intrinsic viscosity [η], as measured in decalin at 135° C., of 0.1–5 dl/g, said ultra-high molecular weight polyolefin existing in a proportion of 15–40% by weight based on 100% by weight of the sum total of the ultra-high molecular weight polyolefin and polyolefin, and said ultra-high molecular weight polyolefin composition (C) having an intrinsic viscosity [η], as measured in decalin at 135° C., of 3.5–8.3 dl/g.



The graft-modified thermoplastic elastomer (GA) used herein preferably includes the same as used in the third thermoplastic elastomer laminates of the invention.

In the graft-modified thermoplastic elastomer (GA) mentioned above, it is desirable that said elastomer (GA) contains 95—60 parts by weight of the aforesaid peroxide cross-linking olefin copolymer rubber (i) and 5–40 parts by weight of the aforesaid polyolefin (ii) (the sum total of the components (i) and (ii) is 100 parts by weight).

The ultra-high molecular weight polyolefin composition (C) used herein may contain 1–20% by weight of a liquid or solid lubricant based on the composition (C).

The first glass run channel of the present invention comprises a main body having a groove-like cross-section and tongue-like draining portions extending from the tip of side wall of the groove toward the central side of said groove, portions of said glass run channel to be in contact with the window glass comprising a layer of a thermoplastic elastomer (A) composed of a crystalline polyolefin and a rubber and a layer of an ultra-high molecular weight polyolefin (B), said ultra-high molecular weight polyolefin (B) layer being designed so as to be in contact with the window glass, and said ultra-high molecular weight polyolefin (B) having an intrinsic viscosity [η], as measured in decalin at 135° C., of 10–40 dl/g.

The thermoplastic elastomer (A) used herein preferably includes those as defined in the first thermoplastic elastomer laminates of the present invention.

The second glass run channel of the invention comprises a main body having a groove-like cross-section and tongue-like draining portions, each extending from the tip of side wall of the groove toward the central side of said groove, portions of said glass run channels to be in contact with the window glass comprising a layer of a thermoplastic elastomer (A) composed of a crystalline polyolefin and rubber and a layer of an ultra-high molecular weight polyolefin composition (C), said layer of the ultra-high molecular weight polyolefin composition (C) being designed so as to be in contact with the window glass, said ultra-high molecular weight polyolefin composition (C) consisting essentially of an ultra-high molecular weight polyolefin having an intrinsic viscosity [η], as measured in decalin at 135° C., of 10–40 dl/g and a polyolefin having an intrinsic viscosity [η], as measured in decalin at 135° C., of 0.1–5 dl/g, said ultra-high molecular weight polyolefin existing in a proportion of 15–40% by weight based on 100% by weight of the sum total of the ultra-high molecular weight polyolefin and the polyolefin, and said ultra-high molecular weight polyolefin composition (C) having an intrinsic

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