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(54) **ELASTIC AND RESILIENT FILM HAVING A BARRIER LAYER**

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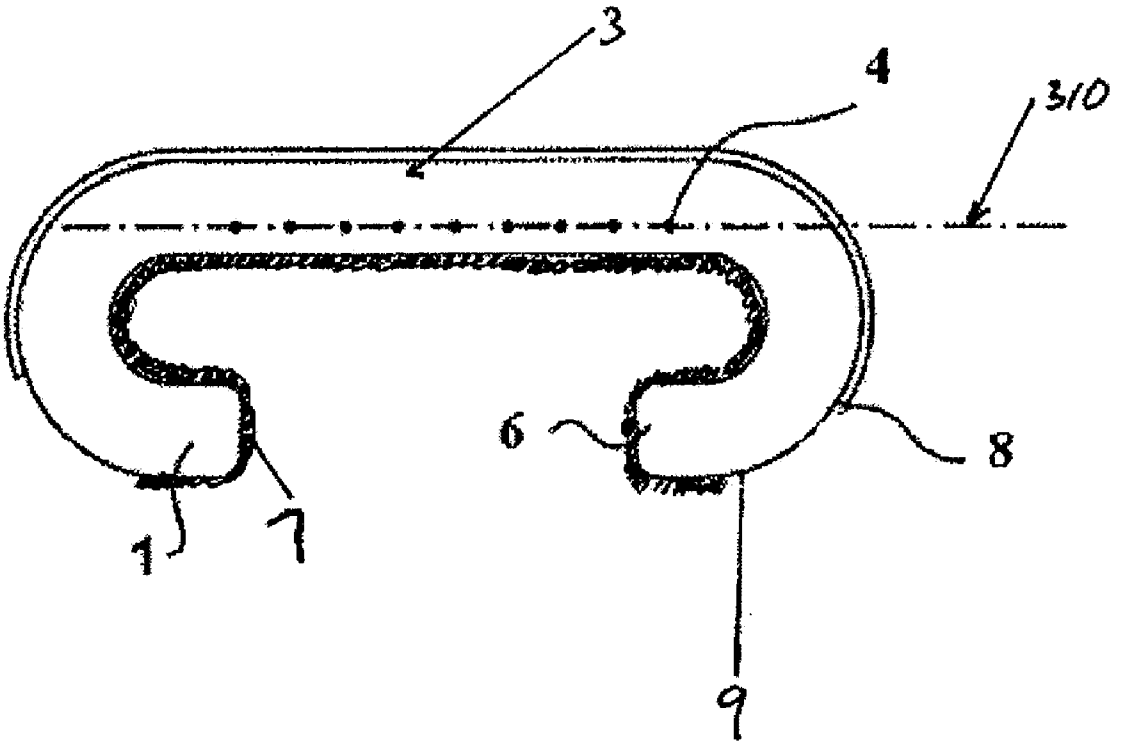
(57) **ABSTRACT**

An elastic and resilient film for application to an endless moving handrail includes a first film layer having a top surface and a bottom surface and further including one or more materials selected from Thermoplastic Olefin (TPO), Thermoplastic Elastormer (TPE), Thermoplastic Ionomer Resins, metallized Thermoplastic Polyurethane, Thermoplastic Vulcanizate (TPV), Polyvinylidene Fluoride (PVDF), and Thermoplastic Polyurethane/Polyolefin blends, wherein a first adhesive is on a bottom surface of the first film layer, an optional second film layer has a top surface and a bottom surface, with print applied to the top surface of the first film layer and an adhesive is on the bottom surface of the second film layer, and a substantially transparent film layer overlying the top surface of the second layer.



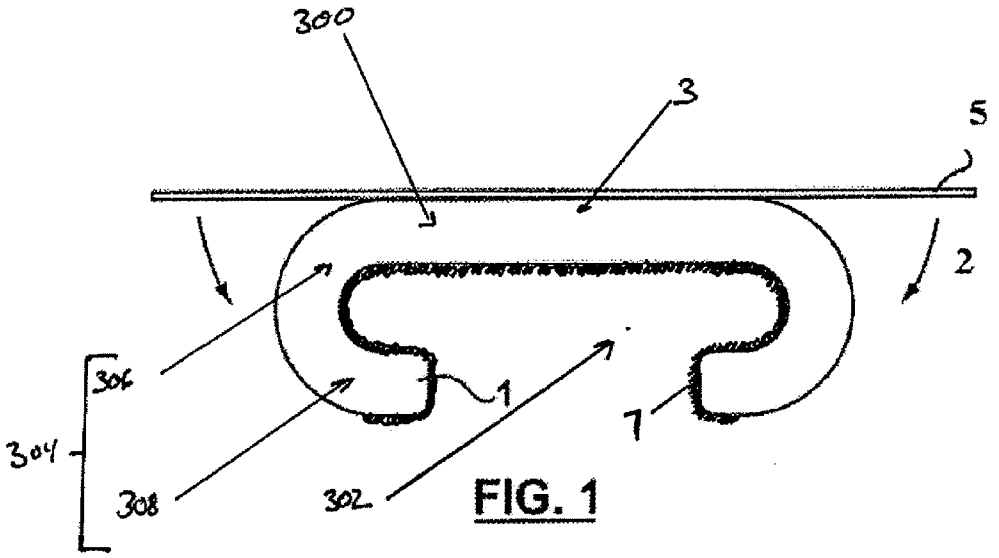



FIG. 1

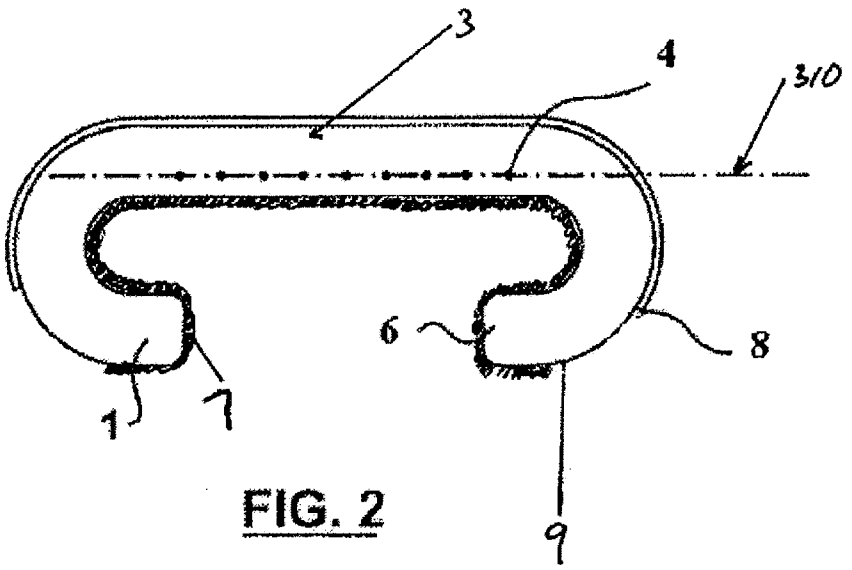



FIG. 2

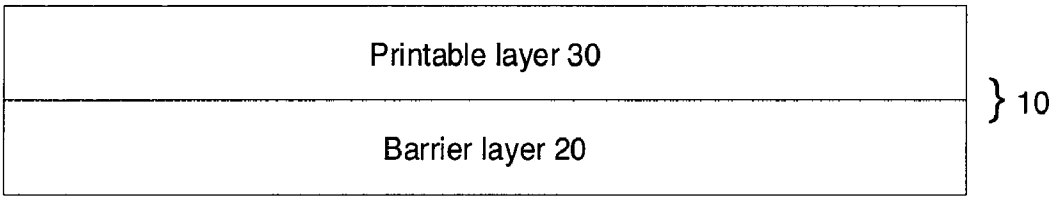



Fig. 3a

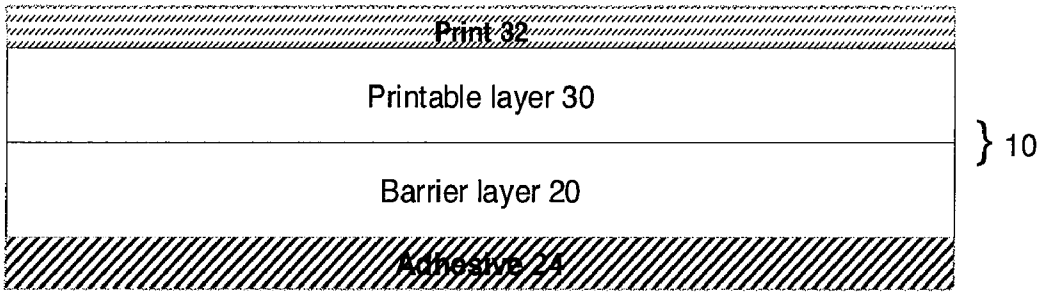



Fig. 3b

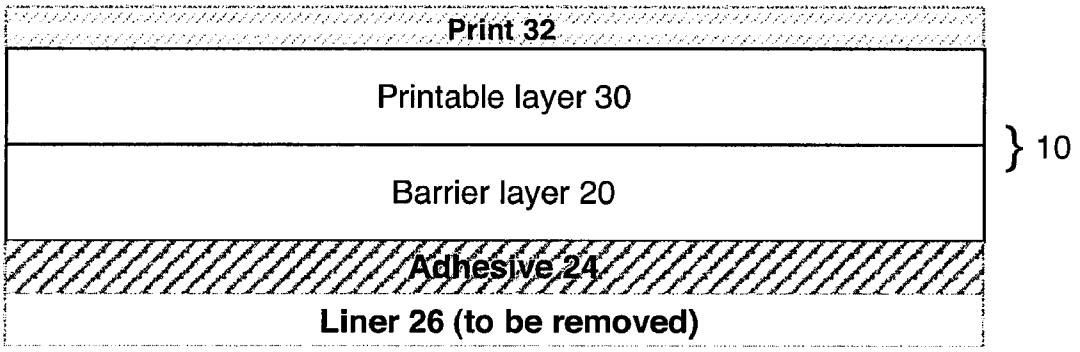



Fig. 3c

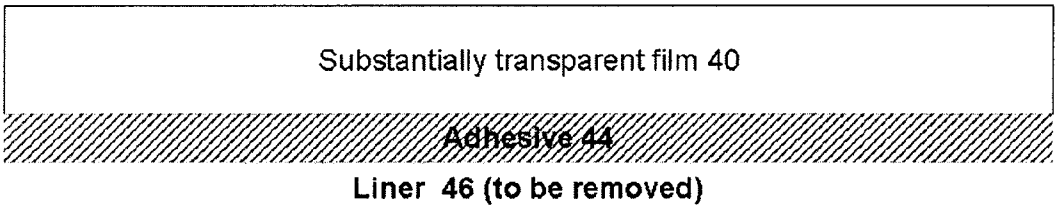



Fig. 3d

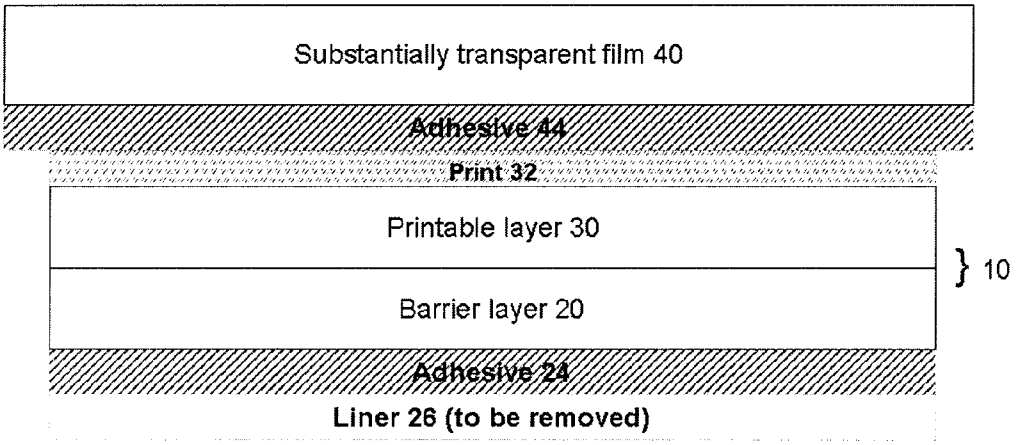



Fig. 3e

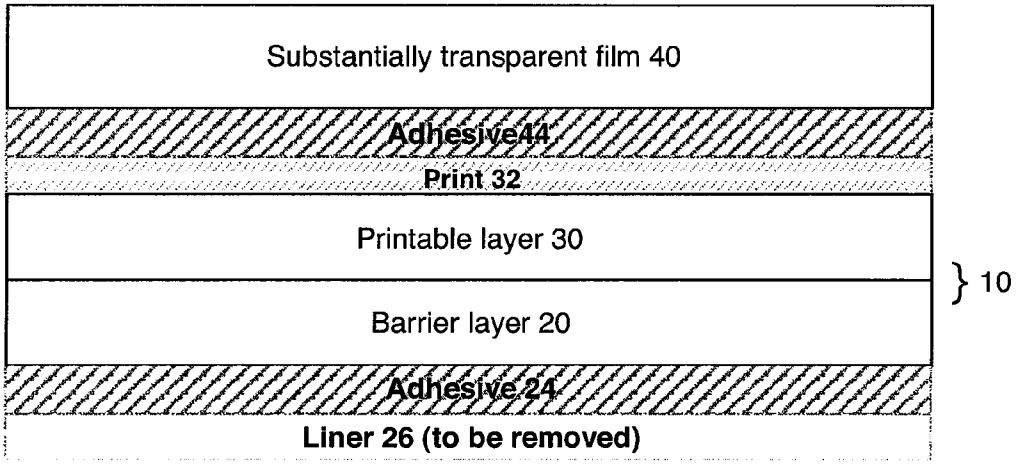



Fig. 3f

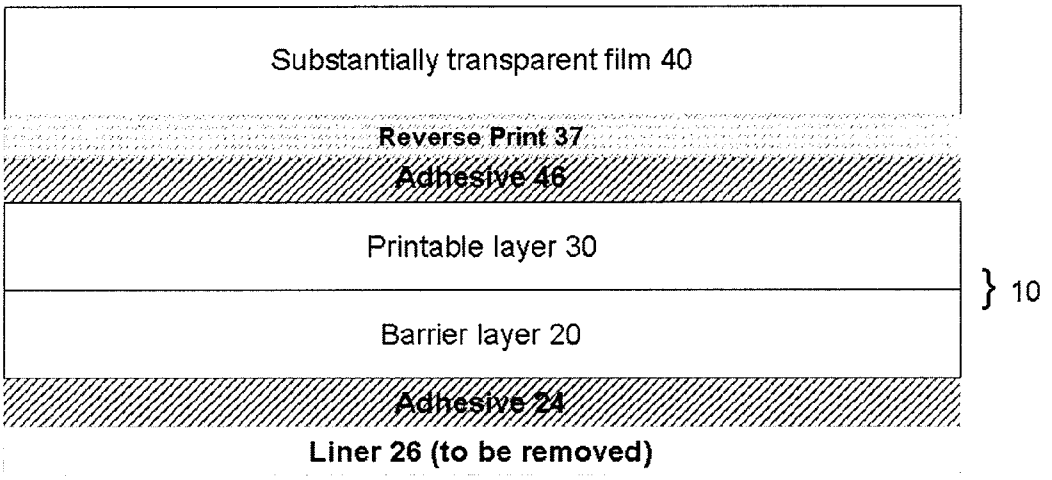

Substantially transparent film 40
Reverse Print 37
Adhesive 46
Printable layer 30
Barrier layer 20
10
Adhesive 24
Liner 26 (to be removed)

Fig. 3g

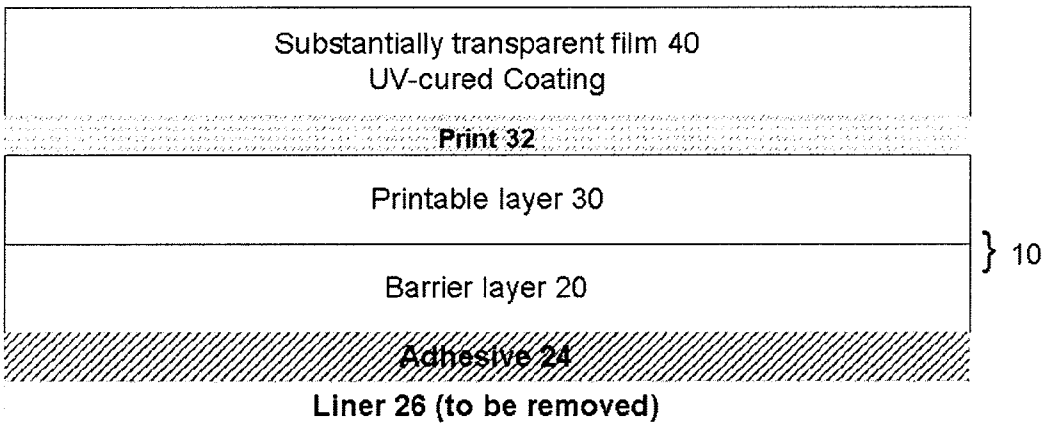

Substantially transparent film 40
UV-cured Coating
Print 32
Printable layer 30
Barrier layer 20
10
Adhesive 24
Liner 26 (to be removed)

Fig. 3h

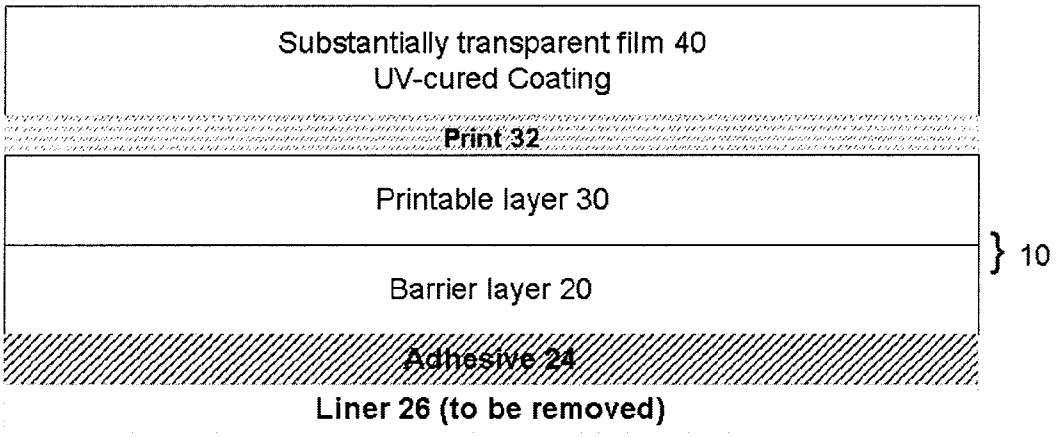



Fig. 3h

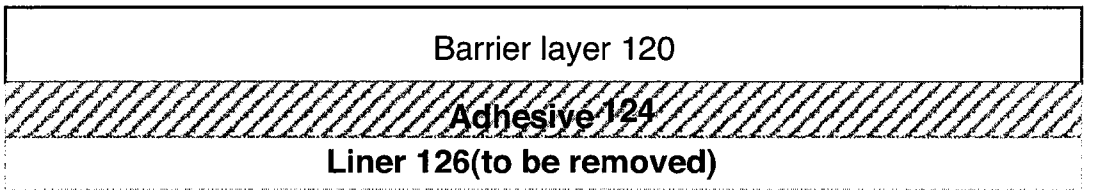



Fig. 4a

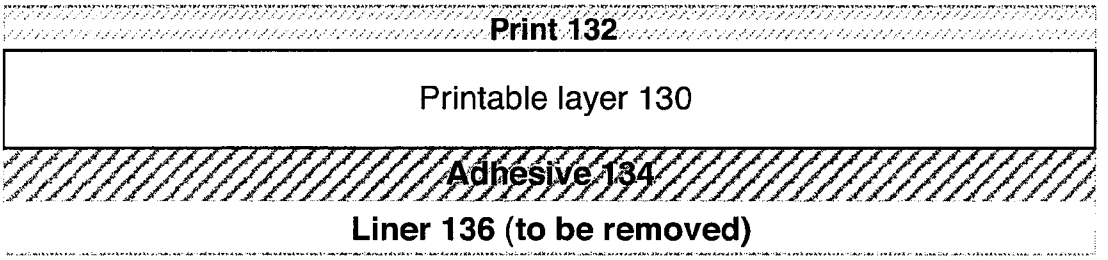



Fig. 4b

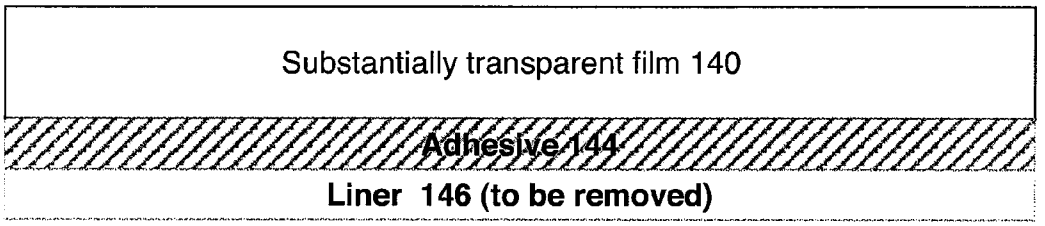



Fig. 4c

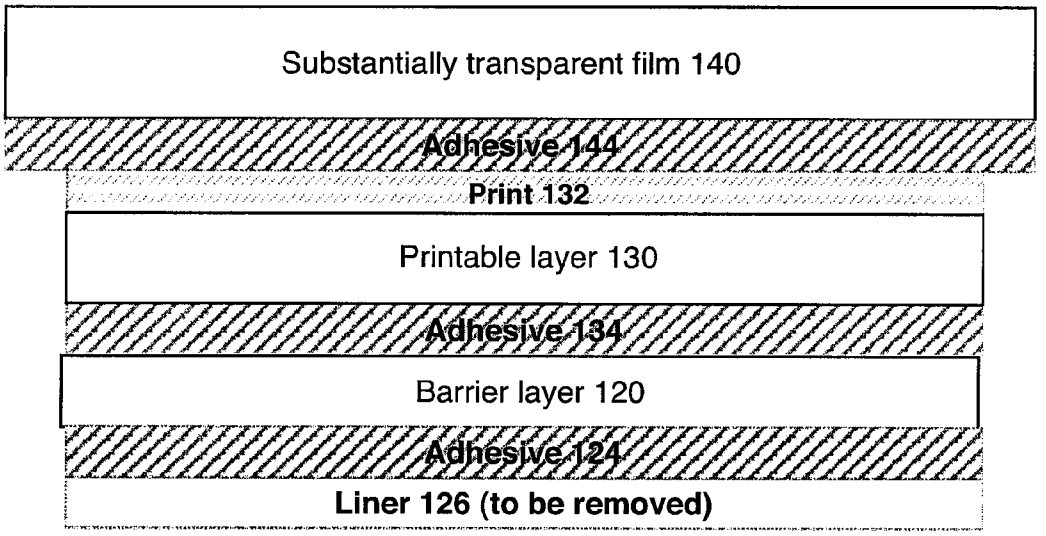



Fig. 4d

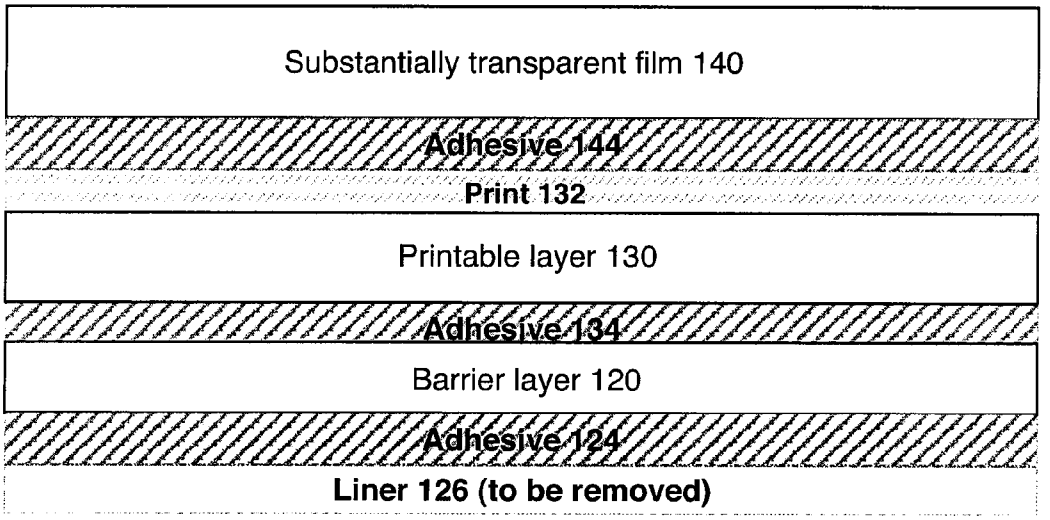



Fig. 4e

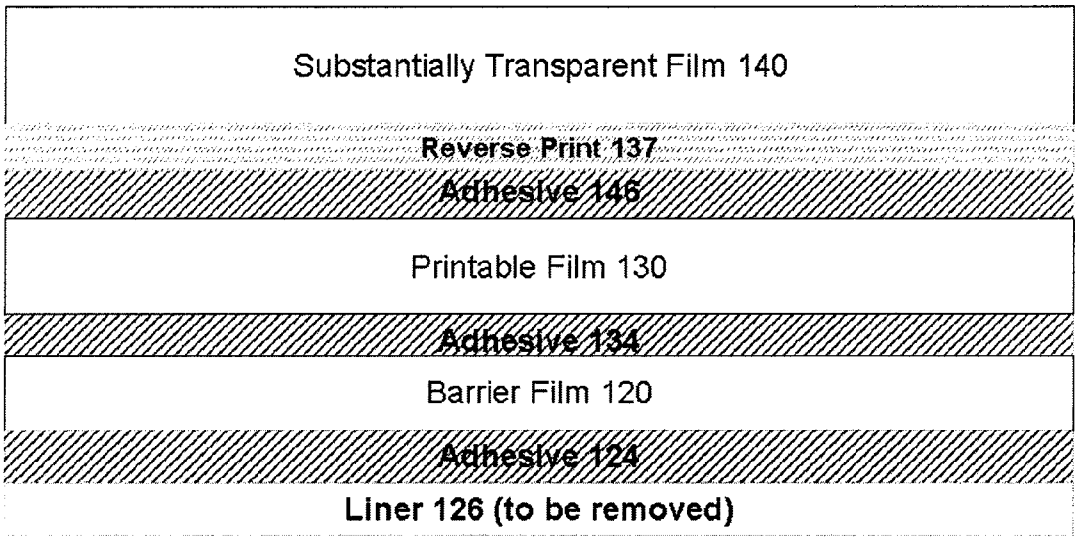

Substantially Transparent Film 140
Reverse Print 137
Adhesive 146
Printable Film 130
Adhesive 134
Barrier Film 120
Adhesive 124
Liner 126 (to be removed)

Fig. 4f

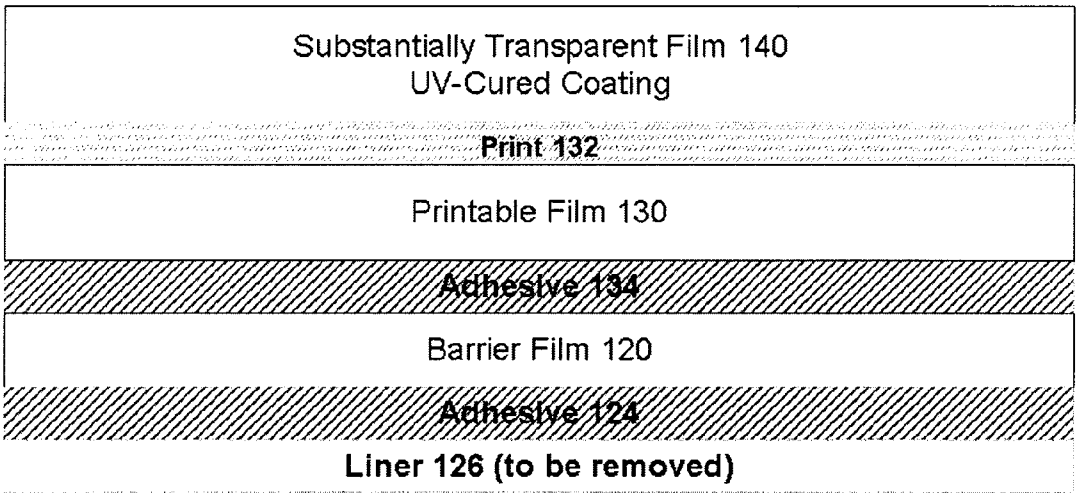

Substantially Transparent Film 140
UV-Cured Coating
Print 132
Printable Film 130
Adhesive 134
Barrier Film 120
Adhesive 124
Liner 126 (to be removed)

Fig. 4g

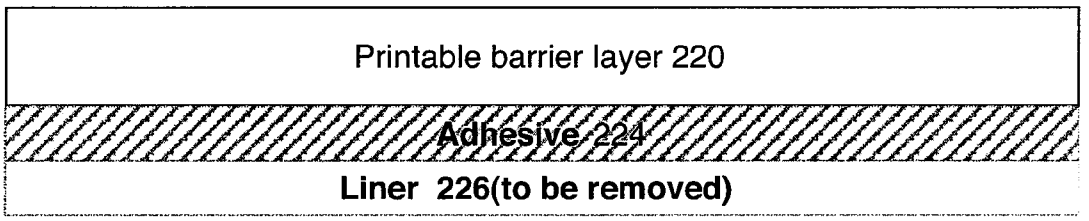



Fig. 5a

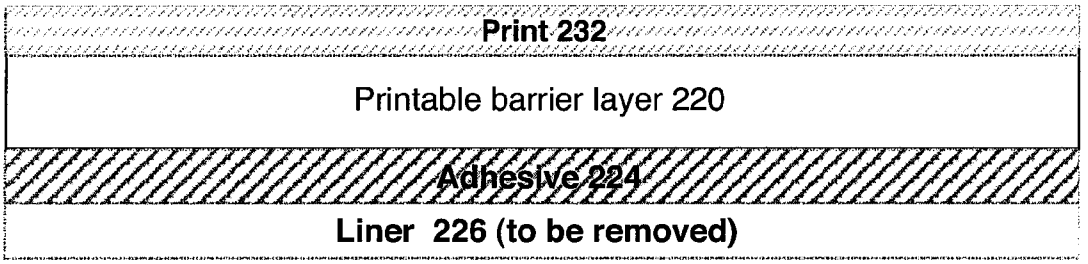



Fig. 5b

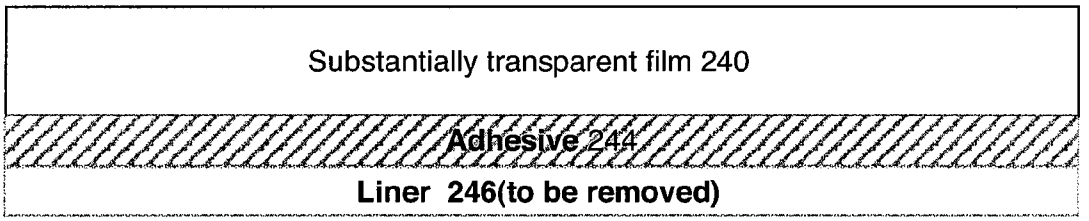



Fig. 5c

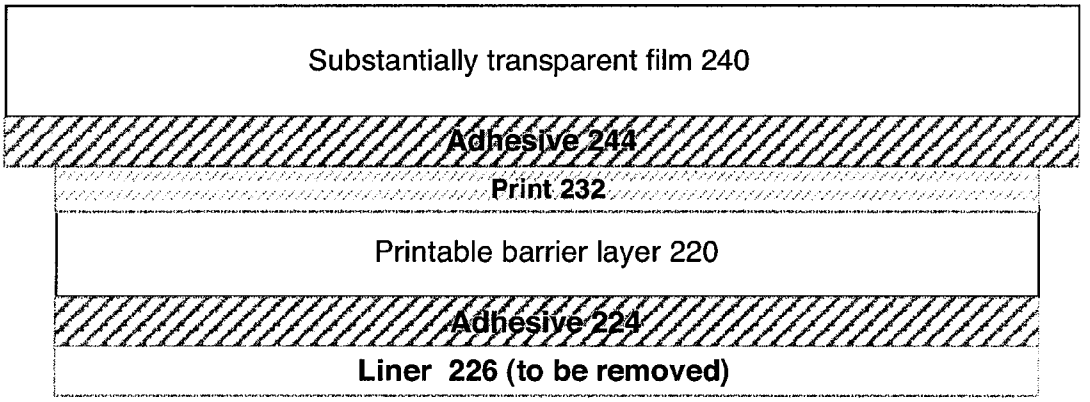



Fig. 5d

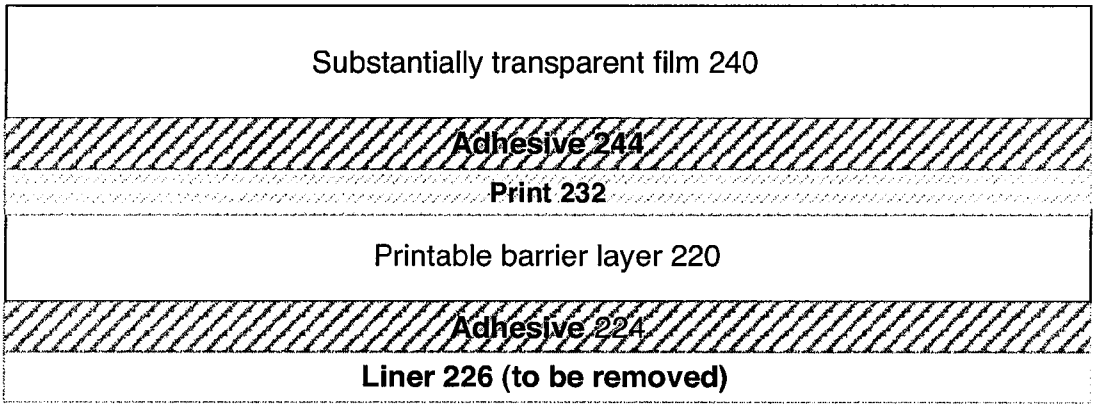



Fig. 5e

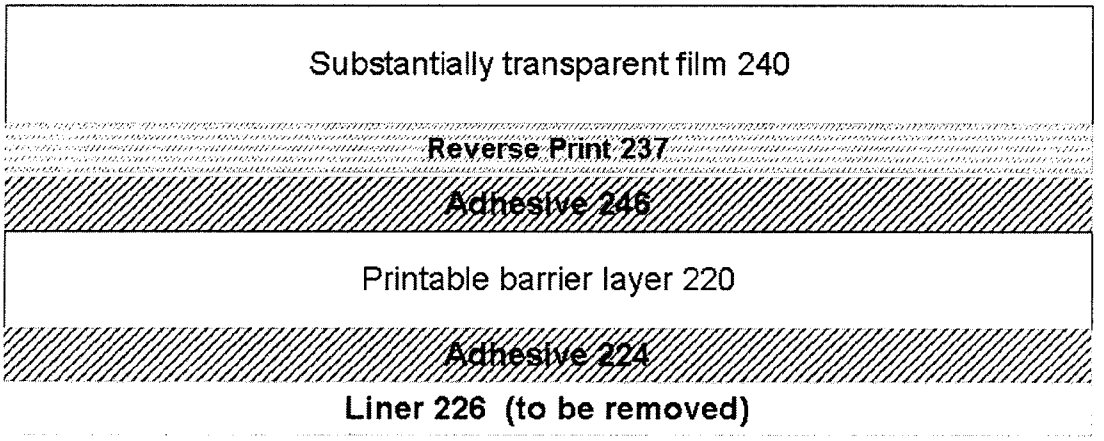



Fig. 5f

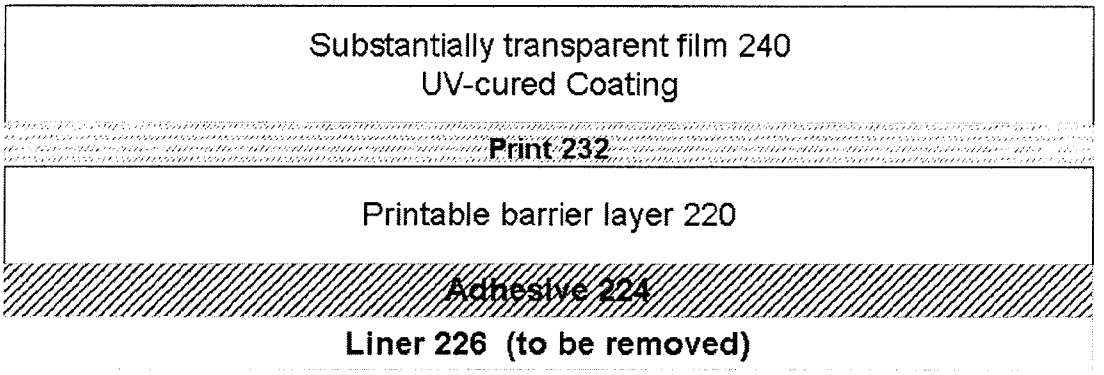



Fig. 5g

# ELASTIC AND RESILIENT FILM HAVING A BARRIER LAYER

## CROSS REFERENCE TO RELATED APPLICATIONS

**[0001]** This application claims priority to U.S. Provisional Patent Application Ser. No. 60/986,868, filed on Nov. 9, 2007, entitled "ADRAIL BARRIER FILM".

## FIELD OF THE INVENTION

**[0002]** The present invention generally relates to elastic and resilient films which are applied to a surface of an endless handrail of an escalator or moving walkway, which can be used to display decorative, informational or other visual material, typically in the form of print applied to one of the layers of the film that may be used to provide advertising. More particularly, the present invention relates to elastic and resilient films for application to a surface of an endless moving handrail which substantially retard the transmission of materials blooming from the endless moving handrail that affect the appearance of the visual material in the film.

## SUMMARY OF INVENTION

**[0003]** One embodiment of the present invention is directed to an elastic and resilient film for application to an endless moving handrail including a coextruded film having sufficient resilience to accommodate strains occurring on the surface of the endless moving handrail. The coextruded film including a first layer comprised of printable elastomeric material, and a second layer, beneath the first layer, comprised of one or more materials selected from the group consisting Thermoplastic Olefin, Thermoplastic Elastomers, Thermoplastic Ionomer Resins, metallized Thermoplastic Polyurethane, Thermoplastic Vulcanizate, Polyvinylidene Fluoride, and Thermoplastic Polyurethane/Polyolefin blends. The elastic and resilient film including an adhesive on a bottom surface of the second layer of the coextruded film, and a substantially transparent film layer overlying the top surface of the coextruded film. Or the substantially transparent film layer may be formed of a UV-curable clear coating.

**[0004]** The second layer of the coextruded film may substantially retard transmission of materials blooming from an endless moving handrail, on which said film is applied.

**[0005]** Print may be applied to the top surface of the first layer of the coextruded film or reverse print may be applied to a bottom surface of the substantially transparent film layer. The substantially transparent film layer may include an adhesive on a bottom surface thereof which may be transparent, tinted or opaque. The coextruded film and the substantially transparent film layer may be laminated together.

**[0006]** The coextruded film may include a tie-layer, such as a material containing maleic anhydride between the first layer and the second layer of the coextruded film, where the tie-layer promotes bonding of the first layer and second layer.

**[0007]** In one embodiment the coextruded film has a width dimension which is substantially the same as a width dimension of the substantially transparent film layer. Alternatively, the coextruded film has a width dimension which is less than a width dimension of the substantially transparent film layer.

**[0008]** According to another embodiment the first layer of the coextruded film is provided with a substantially solid color and is substantially opaque. The substantially transparent film layer may be tinted, but still render the print or reverse print visible, and the print or reverse print may include a pattern repeated at regular intervals along the first layer of the coextruded film.

**[0009]** In a further embodiment first layer of the coextruded film may be treated with a surface activation treatment prior to printing thereon to improve the adhesion of print applied thereto. The surface activation technique is one or more of a print receptive coating, a primer, a flame treatment, and a corona discharge process.

**[0010]** The elastic and resilient film may be applied to an endless moving handrail. The endless moving handrail may be comprised of one or more of Styrene Butadiene Rubber, Natural Rubber, Chloro Sulfonated Polyethylene, and Thermoplastic Polyurethane.

**[0011]** In yet a further embodiment the elastic and resilient film has a width dimension corresponding to the handrail, is elongate and has a length to fit the handrail, and may wrap at least partially around the handrail. The elastic and resilient film may have a thickness that does not substantially alter the dimensions of the handrail, to enable the handrail to be used with and without the film, and the adhesive may be selected to permit removal of a film.

**[0012]** A further embodiment of the present invention is directed to an elastic and resilient film for application to an endless moving handrail including a first layer having a top surface and a bottom surface and including, one or more materials selected from the group consisting of Thermoplastic Olefin, Thermoplastic Elastomers, Thermoplastic Ionomer Resins, metallized Thermoplastic Polyurethane, Thermoplastic Vulcanizate, Polyvinylidene Fluoride, and Thermoplastic Polyurethane/Polyolefin blends, and a first adhesive on a bottom surface of the first layer. The elastic and resilient film may include a second layer having a top surface and a bottom surface, the second layer including a second adhesive on the bottom surface of the second film layer. And the elastic and resilient film may further include a substantially transparent film layer overlying the top surface of the second layer.

**[0013]** In one embodiment the elastic and resilient film includes print formed on a top surface of the second layer. Alternatively, the substantially transparent film layer may include reverse print on a bottom surface. The substantially transparent film layer may include an adhesive on a bottom surface thereof, and be tinted, yet renders the print on the second layer or reverse print thereon visible. The adhesive on the substantially transparent layer may be clear, tinted or opaque. The print or reverse print may be a pattern repeated at regular intervals along the length of the second layer or the substantially transparent film layer. Alternatively, the substantially transparent film layer may be formed of a UV-curable clear coating.

**[0014]** In one embodiment the first layer, second layer and substantially transparent film layer are laminated together. The first layer may substantially retard transmission of materials blooming from an endless moving handrail, on which said elastic and resilient film is applied.

**[0015]** In a further embodiment, the first layer has a width dimension which is substantially the same as a width dimension of the substantially transparent film layer. Alternatively, the second layer may have a width dimension which is less than a width dimension of the substantially transparent film layer.

**[0016]** The second layer may be provided with a substantially solid color and may be substantially opaque. The first and second layers may be an elastomeric film comprising thermoplastic polyurethane.

**[0017]** In one embodiment the top surface of the second layer is treated with a surface activation technique prior to printing thereon to improve the adhesion of print applied thereto. The surface activation techniques may be one or more of a print receptive coating, a primer, a flame treatment, and a corona discharge process.

**[0018]** In another embodiment, the elastic and resilient film is applied to an endless moving handrail which may be made of one or more of styrene butadiene, natural rubber, chloro sulfonated polyethylene, and thermoplastic polyurethane.

**[0019]** In another embodiment, the elastic and resilient film has a width dimension corresponding to the handrail, is elongate and has a length to fit the handrail. Alternatively, the elastic and resilient film may have a width dimension enabling the elastic and resilient film to wrap at least partially around the handrail. And the thickness of the elastic and resilient film may not substantially alter the dimensions of the handrail, to enable the handrail to be used with and without the film, and wherein the adhesive is selected to permit removal of a film.

**[0020]** A further embodiment of the present invention is directed to an elastic and resilient film for application to a moving handrail including, a first layer having a top surface and a bottom surface and comprising, one or more materials selected from the group consisting of Thermoplastic Olefin, Thermoplastic Elastomers, Thermoplastic Ionomer Resins, metallized Thermoplastic Polyurethane, Thermoplastic Vulcanizate, Polyvinylidene Fluoride, and Thermoplastic Polyurethane/Polyolefin blends, and an adhesive on the bottom surface of the first layer. The elastic and resilient film may further include a substantially transparent film layer overlying the top surface of said first layer.

**[0021]** The elastic and resilient film may include print formed on a top surface of the first layer or reverse print formed on a bottom surface of the substantially transparent film layer.

**[0022]** The substantially transparent film layer may have an adhesive on a bottom surface thereof. The substantially transparent film layer may be tinted, yet render the print on the first layer or the reverse print thereon visible. The adhesive on the substantially transparent film layer may be tinted, clear or opaque. The print or reverse print may be repeated at regular intervals along the length of the first layer or the substantially transparent film layer. And the substantially transparent film layer may be formed of a UV-curable clear coating.

**[0023]** In one embodiment, the first layer substantially retards transmission of materials blooming from an endless moving handrail, on which said elastic and resilient film is applied. The first layer and the substantially transparent film layer may be laminated together. The first layer may be a substantially solid color and substantially opaque, and may have a width dimension which is substantially the same as a width dimension of the substantially transparent film layer. Alternatively the first layer may have a width dimension which is less than a width dimension of the substantially transparent film layer.

**[0024]** In one embodiment, the top surface of the first layer may be treated with a surface activation treatment prior to printing thereon including one or more of a print receptive coating, a primer, a flame treatment and a corona discharge process.

**[0025]** The elastic and resilient film may be applied to an endless moving handrail comprised of one or more of styrene butadiene rubber, natural rubber, chloro sulfonated polyethylene, and thermoplastic polyurethane.

**[0026]** In one embodiment the elastic and resilient film has a width dimension corresponding to the handrail, is elongate and has a length to fit the handrail. Alternatively, the elastic and resilient film may have a width dimension enabling the elastic and resilient film to wrap at least partially around the handrail. And the elastic and resilient film may have a thickness that does not substantially alter the dimensions of the handrail, to enable the handrail to be used with and without the film, and wherein the adhesive is selected to permit removal of a film.

**[0027]** Another embodiment of the present invention is directed to a method of manufacturing a flexible and resilient film to be applied to an endless moving handrail including steps of providing a first layer having sufficient resilience to accommodate strains occurring on the surfaces of the endless moving handrail, an adhesive on a bottom surface of the first layer, the first layer comprising one or more of one or more materials selected from the group consisting of Thermoplastic Olefin, Thermoplastic Elastomers, Thermoplastic Ionomer Resins, metallized Thermoplastic Polyurethane, Thermoplastic Vulcanizate, Polyvinylidene Fluoride, and Thermoplastic Polyurethane/Polyolefin blends, providing a second layer having sufficient resilience to accommodate strains occurring on the surfaces of the endless moving handrail and an adhesive on a bottom surface of the second layer, providing a substantially transparent film layer having an adhesive on a bottom surface thereof, and laminating the first layer, second layer, and substantially transparent film layer together with the second layer between the first layer and the substantially transparent film layer. The method may include steps of applying print to the top surface of the second layer or applying a reverse print to an underside of the substantially transparent film layer.

**[0028]** Another embodiment of the present invention is directed to a method of manufacturing a flexible and resilient film to be applied to an endless moving handrail comprising the steps of providing a first layer having sufficient resilience to accommodate strains occurring on the surfaces of the endless moving handrail, an adhesive on a bottom surface of the first layer, the first layer comprising one or more of one or more materials selected from the group consisting of Thermoplastic Olefin, Thermoplastic Elastomers, Thermoplastic Ionomer Resins, metallized Thermoplastic Polyurethane, Thermoplastic Vulcanizate, Polyvinylidene Fluoride, and Thermoplastic Polyurethane/Polyolefin blends, providing a substantially transparent film layer having an adhesive on a bottom surface thereof, and laminating the first layer and the substantially transparent film layer together. The method may include steps of applying print to the top surface of the first layer or applying a reverse print to an underside of the substantially transparent film layer.

**[0029]** Yet a further embodiment of the present invention is directed to a method of manufacturing a flexible and resilient film to be applied to an endless moving handrail including the steps of coextruding a first film having at least first and second layers and sufficient resilience to accommodate strains occurring on the surfaces of the endless moving handrail, and

providing an adhesive on a bottom surface of the first layer, the first layer of the first film comprising one or more of the materials selected from the group consisting of Thermoplastic Olefin, Thermoplastic Elastomers, Thermoplastic Ionomer Resins, metallized Thermoplastic Polyurethane, Thermoplastic Vulcanizate, Polyvinylidene Fluoride, and Thermoplastic Polyurethane/Polyolefin blends, the second layer of the first film having sufficient resilience to accommodate strains occurring on the surfaces of the endless moving handrail; providing a substantially transparent film layer having an adhesive on a bottom surface thereof, and laminating the first film and substantially transparent film layer together. The method may further include steps of applying print to the top surface of the first layer or applying a reverse print to an underside of the substantially transparent film layer.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0030]** The above and related objects, features and advantages of the present invention will be more fully understood by reference to the following, detailed description of the preferred, albeit illustrative, embodiments of the present invention when taken in conjunction with the accompanying figures, wherein:

**[0031]** FIG. **1** shows a schematic cross-section through a handrail and the application of a film to the top surface of the handrail in accordance with an embodiment of the present invention;

**[0032]** FIG. **2** shows a schematic cross-section similar to FIG. **1** showing the handrail after application of the film in accordance with an embodiment of the present invention;

**[0033]** FIGS. **3***a*, **3***b*, **3***c*, **3***d*, **3***e*, **3***f*, **3***g*, and **3***h* show embodiments relating to an elastic and resilient film in accordance with the present invention comprising a coextruded layer;

**[0034]** FIGS. **4***a*, **4***b*, **4***c*, **4***d*, **4***e*, **4***f*, **4***g* show embodiments relating to an elastic and resilient film in accordance with the present invention comprising three layers;

**[0035]** FIGS. **5***a*, **4***b*, **5***c*, **5***d*, **5***e*, **5***f*, **5***g* show embodiments relating to an elastic and resilient film in accordance with the present invention comprising two layers.

## DETAILED DESCRIPTION

**[0036]** The present invention generally relates to elastic and resilient films which are applied to a surface of an endless handrail of an escalator or moving walkway, which can be used to display decorative, informational or other material, typically in the form of print applied to one of the layers of the film. More particularly, the present invention relates to elastic and resilient films for application to a surface of an endless moving handrail, which substantially retard the transmission of materials blooming from the endless moving handrail. To retard the transmission of these materials blooming from the handrails the present invention utilizes one or more barrier layers.

**[0037]** In the context of the present invention, the assignee of the present invention has developed films which are applied to handrails of escalator or moving walkways. Examples of uses of such films are described in earlier patents also assigned to the assignee of the present invention, such as for example, U.S. Pat. Nos. 6,450,228, 6,682,806, 7,041,195 7,108,905, and 7,278,528, the contents of which are hereby incorporated by reference. The purpose of such films may be either to enhance the appearance of the handrail or to display advertising and other information. Such a film, it is believed, has potential use in a number of applications. For example, it is believed that it may be desirable in high traffic areas such as airports, shopping malls, subway stations etc. Such films may be used to rent advertising space on the surface of the endless moving handrail.

**[0038]** FIG. **1** shows, in cross-section, a schematic drawing of a typical handrail **1** to which a film **5** may be applied in accordance with an embodiment of the present invention. The arrows **2** indicate that the film **5** may be first applied to the top surface of the handrail **1** and may then be wrapped progressively around the handrail **1**. An apparatus such as that disclosed in the patents mentioned above may be used to apply the film **5** to the handrail **1**. Other known or hereafter developed techniques may be used to apply films of the present invention to handrails in accordance with the present invention.

**[0039]** FIG. **2** shows a schematic drawing of a handrail **1** after application of a film **5**, in accordance with an embodiment of the present invention. FIG. **2** also shows elongate wires or stretch inhibitors **4** that may be embedded within the handrail **1**, in a known manner, to provide the handrail with the desired characteristics, in accordance with an embodiment of the present invention. While not required by the present invention, these stretch inhibitors **4** may be used to define a neutral axis **310** about which the handrail **1** flexes. Thus, portions of the film **5** above and below the neutral axis **310**, in use, are subject to tensile and compressive strains when the handrail is flexed in either direction.

**[0040]** The handrail **1** has a body **300**, that may be formed of a variety of materials, as detailed below. The body **300** of handrail **1** defines a T-shaped slot **302**. The wires or stretch inhibitors **4** are embedded in the body **300** and may be bonded to the material of the body. The handrail **1** may have shoulders **304** that are generally semi-circular and extend from the top of the handrail around to the underside of the handrail. The shoulders **304** include an upper portion **306** extending through about 90 degrees, starting at a substantially flat portion **3**, and a lower portion **308** also extending through about 90 degrees. The upper portion **306** and the lower portion **308** may be separated by a plane that extends through the widest portion of the handrail **1**.

**[0041]** At the end of the lower portion **308** there may be a short lip **6**. The lips **6**, together, have upper surfaces defining the underside of the top section of the T-shaped slot **302**. The lips **6** may also have end surfaces facing one another and bottom surfaces, that are, in effect continuations of the outer surfaces of the lower portion **308** of the shoulder **304**.

**[0042]** As indicated at **8**, film **5** may wrap just a part way around the handrail **1**. Alternatively, as indicated at **9**, the film may wrap around to a point short of the end surfaces of the lips **6** of the handrail **1** and just before reaching a fabric slider **7**, which may extend past the end surfaces of the lips **6**.

**[0043]** One of skill in the art will appreciate that in practice the slider **7** is generally embedded into the material of the handrail **1** in the vicinity of the lips **6**, and particularly on bottom surface of the lips **6**, which are part of the lower portion **308** of the shoulder **304**. In FIGS. **1** and **2**, the slider has been exaggerated to provide a better understanding of its location.

**[0044]** Extension of the film **5** on to the fabric slider **7** is not desirable because the film will only poorly bond to the fabric slider **7** which can result in poor performance of the film. If the film **5** overlies portions of fabric slider **7**, the edges of the

film **5** in contact with the fabric slider **7** may prematurely separate from the handrail **1**, promoting failure of the film **5**.

**[0045]** Depending upon a number of factors including the desired appearance, the intended life cycle of the film, and the construction of the film **5** and handrail **1**, the extent to which the film **5** wraps around the handrail **1** can be varied. For example, the film **5** can extend to just cover the substantially flat portion **3** of the handrail **5**. Alternatively, the film **5** can extend to wrap completely around the upper portion **306** of the shoulder **304**, that is to the widest part of the handrail **1**; extend over the upper portion **306** of the shoulder **304** to the neutral axis **4**; extend over the upper portion **306**, past the neutral axis **310**, to a point equidistant from the neutral axis **310** as the substantially flat portion **3** is from the neutral axis **310**; extend to cover at least part of the lower portion **308** of the shoulder **304**, shown in FIG. **2** at **8**; extend to a point **9** on the lower portion **308** that is just short of the where the slider **7** extends onto the lip **6**.

**[0046]** It will be appreciated that the further the film **5** wraps around the handrail towards the lips **6**, the greater the strain imposed on the film **5** when the handrail flexes. When the film **5** extends around pulleys or rollers while running as part of an escalator or moving walkway, the handrail **1** and portion of the film **5** beneath the neutral axis **310** may be put in compression. Such compressive strains tend to promote separation of the edges of the film **5** from the handrail **1**, which can lead to puckering of those edges of the film **5**.

**[0047]** In a further embodiment the various layers of the film **5** may wrap around the handrail **5** to different extents. Thus, by way of example, one layer may only extend across the substantially flat portion **3**, while a second layer may extend to a point **8** or even to **9** just short of the slider **7** and lips **6**.

**[0048]** As will be described in greater detail below, in some embodiments of the present invention, a substantially transparent film layer **10** (see, e.g., FIG. **3***e*), may extend to a point **8** or **9**, while other layers **20**, and **30** may have a smaller width dimension. This reduction in width dimension of layers **20** and/or **30** reduces the stress and strain in those layers as the endless moving handrail flexes. The extension of the substantially transparent film layer to a point **8** (partially onto a lower portion **308** of the shoulder **304**) or **9** (to a location just short of where the slider **7** is exposed on the lip **6**) promotes adhesion of the entire film to the handrail and limits the likelihood of individuals picking at the layers and potentially damaging the film.

**[0049]** Handrails on escalators and moving walkways are typically made of a variety of materials, including Styrene Butadiene Rubber (SBR), a combination of Styrene Butadiene and Natural Rubber (SBR/NR), Chloro Sulfonated Polyethlene (CSM) or Thermoplastic Polyurethane (TPU), to name a few. One common problem associated with the use of advertising films on handrails made from SBR, for example, is that there are various chemicals that bloom onto the handrail's surface which can quickly discolor a decorative film applied thereto. Specifically, many types of rubbers, particularly SBR, incorporate protective materials that over the lifetime of the rubber migrate (bloom) to the surface. These materials act as a protectant for the underlying rubber and help to minimize the deleterious effects of, for example, UV light, ozone, etc. While in many applications these materials are beneficial to rubber, in the context of applying films with a decorative display, these materials blooming out of the handrail can ruin the decorative effect of the film and produce unsightly discoloration.

**[0050]** The present invention utilizes a layer having inherent barrier properties, as described in greater detail below. This barrier layer retards the transmission of materials blooming out of the handrail, and effectively increases the amount of time required for these materials to bloom out of the handrail and travel to a layer where the printed display is located. At the same time, the layer having these inherent barrier properties should maintain the overall elasticity of the film.

**[0051]** The present invention is particularly directed to preventing the diffusion of materials that will react with either the materials of the films, the adhesives, or the print to visually affect the appearance of the film. Thus, complete prevention of diffusion of material through the barrier layer is not necessary, but rather the barrier layer can be selected or optimized to prevent the diffusion of particular materials that adversely affect the visual impact of the film for a sufficient period of time to allow, for example, an advertisement to be placed for a desired time.

**[0052]** In another aspect of the present invention, the barrier layer may be optimized to prevent this diffusion of staining chemicals for a particular period of time. For example, an advertisement applied to a handrail may only be needed for a particular period of time such as, for example, a one or two day, or a **1**-week period for a convention, or alternatively it may be needed for a longer period such as a one, two or three month period during which a particular ad campaign is to be run. The barrier layer can be optimized to retard the diffusion of staining chemicals for a specific period of time.

**[0053]** One of the aspects of the invention is the use of these films as advertizing platforms. It is believed that by optimizing the barrier layers, a business or other owner of a moving handrail can generate recurring and scheduled revenue streams by permitting advertisement on such handrails and also control costs associated with providing that advertising. By tailoring the effectiveness of the barrier layer to the contracted time period, that is ensuring that the barrier layer will be effective for the entire advertising contract period, the business owner can save costs associated with having to remove and reapply an advertisement. Similarly, by tailoring the barrier layer to be effective for no more than the contract period, with proper safety margins, the costs associated with the manufacture of the advertisement itself can be minimized because an advertisement that will only be displayed for a week, does not necessarily require the same type or thickness of barrier layer material as one that is to run for a longer period of time such as one or two months. Thus by optimizing the barrier layer, the advertising revenue stream can be maximized.

**[0054]** In one embodiment of the present invention (FIGS. **3***a*-**3***f*), an elastic and resilient film to be applied to an endless handrail may be formed of a coextruded film **10**. As shown in FIG. **3***a*, a coextruded film **10** is formed by coextruding a printable layer **30** and a barrier layer **20**.

**[0055]** The printable layer **30** may be comprised of a elastic and resilient material such as Thermoplastic Polyurethane, or other suitable elastomeric materials. The printable layer **30** is preferably white or another printable color and is substantially opaque.

**[0056]** The barrier layer **20** is preferably capable of substantially retarding transmission of materials blooming from

the rubber surface of an endless moving handrail, on which the film may be applied and may be comprised of one or more of Thermoplastic Polyurethane (TPU), Thermoplastic Olefin (TPO), Thermoplastic Elastomers (TPE) such as those sold under the trade name Versaflex® Alloys, Thermoplastic Ionomer Resins such as those sold under the trade name Surlyn®, metallized Thermoplastic Polyurethane, Thermoplastic Vulcanizate (TPV) such as those sold under the trade name Santoprene™, Polyvinylidene Fluoride (PVDF), and Thermoplastic Polyurethane/Polyolefin blends including those described in copending and commonly assigned U.S. patent application Ser. No. 11/972,864, the teachings of which are incorporated herein by references. The coextruded film has a width of between 60 and 170 mm and preferably between 80 and 156 mm, but could be varied depending upon the width of a specific handrail. The barrier layer **20** has a thickness of between 0.5 and 5.0 mils and preferably between 0.9 and 2.5 mils. The printable layer **30** has a thickness of between 0.5 and 5.0 mils and preferably between 0.9 and 3.0 mils.

**[0057]** A tie-material (not shown) may be used between the printable layer **30** and the barrier layer **20**. The tie-material promotes good adhesion between the barrier layer **20** and the printable layer **30** during the coextrusion process such that the coextruded film can withstand the repetitive stresses a typical moving handrail undergoes in operation. Examples of suitable tie-materials include commercially available polymers grafted with Maleic Anhydride such as those sold under the trade name Polybond®, other tie-materials suitable for use in the coextruded layer **10** include amine-grafted compatibilizers known to those of skill in the art.

**[0058]** According to one embodiment, as shown in FIG. **3***b*, print **32** may applied to the top surface of the printable layer **30** of the film **10**, and an adhesive **34** may applied to the bottom surface of the barrier layer **20** of co-extruded film **10**. The adhesive may be a pressure sensitive adhesive (PSA) or other adhesives as known and used in the art. Examples of appropriate adhesives include acrylic based PSAs, rubber based PSAs, and others.

**[0059]** Prior to printing on the printable layer **30** of the coextruded film **10**, the top surface of the printable layer **30** may receive a surface treatment to enhance the print receptive properties of the layer **30**. The surface treatment may include application of a print receptive coating. Alternatively, the surface treatment may be a corona discharge process, a flame treatment process, a chemical treatment, and other processes known to those of skill in the art. The surface treatment may also comprise more than one application of a surface treatment, for example a layer **30** could be treated via corona discharge and subsequently a print receptive coating could be applied.

**[0060]** As used herein the term "print" is used to convey the application of an image, visual material and/or language, possibly repeated at regular intervals along the handrail, to convey a visual or written statement to a viewer. While it is contemplated that this print could indeed be ink such as commonly understood with the term print, the language should not be interpreted so narrowly and should include other methods of conveying such visual statement including, for example, photolithography, and others that might be used in advertising.

**[0061]** The print can be formatted on the film **5** so that in a central portion of the film, the portion that would cover the substantially flat portion **3** of the handrail **1** in FIG. **1**, is aligned to present an apparent upright image to a viewer of the escalator or moving walkway. On the portions of the film **5** that cover the shoulder **304**, the print can be configured to allow for the fact that these portions will generally be vertical. The print can be oriented on these shoulder portions so that it also appears vertical to the viewer, possibly requiring a different orientation during printing than those portions of the print that cover the substantially flat portion **3**.

**[0062]** A removable liner **26**, as shown in FIG. **3***c* may be used to protect the adhesive and to prevent the coextruded film **10** from sticking to itself during storage, where the film **10** is typically rolled. The liner **26** may be removed when the coextruded film **10** is to be applied to the surface of an endless handrail, for example. The liner **26** may be comprised of paper, linen, polyester or other materials treated for use as a release liner as known in the art.

**[0063]** A substantially transparent film layer **40**, formed of a substantially transparent film as shown in FIG. **3***d*, with an adhesive **44** applied to the bottom surface thereof, is also provided. A liner **46**, used to protect the adhesive **44** on the substantially transparent film layer **40** and prevent the film **40** from sticking to itself during storage, is removed prior to lamination. The liner **46** may be comprised of the materials discussed above with respect to liner **26**. In one embodiment, the substantially transparent film layer **40** may be tinted, yet allow print to be viewed there through. In yet a further embodiment where heat lamination is employed in the method of manufacture, the substantially transparent film layer **40** does not include an adhesive **44**. In such an embodiment, bonding of the substantially transparent film layer **40** may be enabled through the heat lamination process itself which is well known in the art.

**[0064]** The substantially transparent film layer **40** may have a width of between 60 and 170 mm and preferably between 80 and 156 mm, but could be varied depending upon the width of a specific handrail. The substantially transparent film layer has a thickness of between 1.0 and 5.0 mils and preferably between 1.0 and 3.0 mils.

**[0065]** Following removal of the liner **46** and lamination of the substantially transparent film layer **40** and the coextruded film **10**, the resultant film is as shown in FIG. **3***e*. As shown in FIG. **3***e*, the substantially transparent film layer **40** has been laminated on top of the print **32** on the top of surface of the printable layer **30** of the coextruded film **10** to form a film ready for application to a handrail.

**[0066]** As used herein the term "lamination" refers to the process whereby multiple layers of film are joined to produce a multi-layer film. This term may include heat lamination, pressure lamination, and other means of joining layers to form the multi-layer film either with or without adhesives.

**[0067]** In the embodiment as shown in FIG. **3***e*, the substantially transparent film layer **40** has a greater width dimension than the coextruded film **10**. In this embodiment, less total surface area of the printable layer **30** will be available for decorative, informational or other material, as compared to the embodiment where they the coextruded film **10** and the substantially transparently film layer **40** are the same width, however, this embodiment places less stress on the coextruded layer **10**, and thus requires less flexibility and resilience.

**[0068]** Alternatively, as shown in FIG. **3***f* the substantially transparent film layer **40** may have substantially the same width dimension as the coextruded film **10**. In this embodiment, there is a greater surface area available of the printable layer **30** to display decorative, informative and other infor-

mation. However, this embodiment requires the coextruded layer to be more resilient and elastic than the embodiment shown in FIG. **3***e*.

**[0069]** Though described to this point as forming a film ready for application to a handrail by combining the two films **10** and **40**, this could also be done in the field, for example, at the handrail itself. In such a scenario, the coextruded film **10** may be applied first to the handrail. Where the printable layer **30** of the coextruded film **10** has already been printed upon, a liner (not shown) may be employed to protect the print while the coextruded film **10** is applied to the handrail. After application of the coextruded film **10**, the liner covering the print on the printable layer **30** and the liner **46** on the substantially transparent film layer **40** may be removed. The substantially transparent film layer **40** may then be applied over the coextruded layer and the handrail.

**[0070]** A further aspect of the present invention utilizes a reverse print **37**, as shown in FIG. **3***g*. According to this aspect of the invention rather than applying print **32** onto printable layer **30**, the print may be applied as reverse print **37** to an underside of the substantially transparent film layer **40**. Following application of the reverse print **37**, an adhesive **46** may be applied over the reverse print **37**, which may be used to laminate the substantially transparent film layer **40** and reverse print **37** to printable layer **30** and the coextruded film **10**.

**[0071]** Reverse print **37**, in this instance refers to the manner in which the print may be applied to the substantially transparent film layer **40**. When applied and viewed from the side of the substantially transparent film layer **40** on which the print is applied, the distinctive pattern will appear in reverse. As a result, when the substantially transparent film layer **40** is turned over, as it would be when laminated together with the other layers for application to a handrail, the print appears normal (i.e., legible to the viewer).

**[0072]** In one embodiment of the present invention the adhesive **46** is prepared with a removable liner (not shown) already applied thereto. The adhesive **46** and the substantially transparent film layer **40** are then laminated together after the reverse print **37** is applied to the underside of the substantially transparent film layer **40**. The adhesive may be clear, opaque or tinted. Those of skill in the art will appreciate that other adhesives including adhesives not formed on a liner or requiring lamination to the substantially transparent film layer may alternatively be used with this embodiment.

**[0073]** Such an embodiment lends itself to joining or laminating with the coextruded film **10** in the field, for example at the handrail itself, because, the coextruded film **10** is not needed to protect the reverse print. Rather the reverse print is protected by the adhesive **46** and/or liner. Thus each of films **10** and **40** can be individually applied to the handrail. Further, rather than using an adhesive **46**, the substantially transparent film layer **40** with reverse print **37** applied thereto, may be heat laminated to coextruded film **10**.

**[0074]** In an alternative embodiment, the substantially transparent film layer **40** may be comprised of a suitable coating, for example a UV-curable clear coating. For example, urethane acrylate formulations and other coatings known to those of skill in the art. In this embodiment, the UV-curable coating, once cured forms a substantially transparent film layer **40**, but does not necessarily require an adhesive **44** in FIG. **3***e*, to bond the substantially transparent film layer **40** to the coextruded layer **10**. Of course, if desired an adhesive or primer, for example, may be employed to improve bonding. In this embodiment, prior to application of the UV-curable coating print **32** may be applied to the printable layer **30** of the coextruded film **10**. In one embodiment, after print **32** is applied to the printable layer **30**, the UV-curable coating may be applied. However, in an alternative embodiment the print **32** can be applied to the printable layer **30**, and a second liner (not shown) can be employed which will protect the print during storage and transport until the UV-curable coating is applied. Once applied, the UV-curable coating may be cured by exposure to a UV light source, and the UV-cured coating protects the print **32**. It is preferred that the UV-curable coating is applied in a controlled setting such as a production facility as some UV curable coatings include hazardous materials and chemicals. But such a coating could also be applied in the field in some applications. Thus this embodiment may be completely or partially assembled prior to application of the film to a handrail. The end result, whether formed as a complete film in a controlled environment or formed in the field appears in cross section as shown in FIG. **3***h*.

**[0075]** In another embodiment of the present invention, an elastic and resilient film to be applied to an endless handrail comprises three film layers. In this embodiment rather than using the coextruded film **10** (shown in FIG. **3***a*), a separate barrier film **120** and printable film **130** are used as shown in FIG. **4***d*. The barrier layer **120** may be prepared as shown in FIG. **4***a*, and may include an adhesive **124** on the bottom surface thereof, which may be protected from sticking to itself for storage by a liner **126**. The barrier layer **120** comprises an elastic and resilient material which is capable of substantially retarding transmission of materials (such as oils and emulsions) blooming from the rubber surface of an endless moving handrail, on which the film may be applied. The barrier layer **120** may be formed of the same materials as barrier layer **20** described above. The adhesive **124** may be a PSA or other adhesive as described above. The barrier film **120** may have a width of between 60 and 170 mm and preferably between 80 and 156 mm, but could be varied depending upon the width of a specific handrail. The barrier film **120** may have a thickness of between 1.0 and 5.0 mils and preferably between 1.0 and 3.0 mils

**[0076]** Separately, the printable layer **130**, which has an adhesive **134** on its bottom surface, may be sent through a printing process, wherein the desired print **132** may be applied to the top surface of the printable layer **130**, resulting in the layer as shown in FIG. **4***b*. The printable layer **130** may be comprised of Thermoplastic Polyurethane or other suitable elastomeric materials as described above with respect to printable layer **30**. As with the printable layer **30**, prior to printing on the printable layer **130** in this embodiment, the printable layer **130** may receive a surface treatment to enhance the bonding characteristics of the print **132** to the printable layer **130**. The printable layer **130** may have a width of between 60 and 170 mm and preferably between 80 and 156 mm, but could be varied depending upon the width of a specific handrail. The printable layer **130** may have a thickness of between 1.0 and 5.0 mils and preferably between 1.0 and 3.0 mils.

**[0077]** The substantially transparent film layer **140** may also be separately prepared with an adhesive **144** and a liner **146** to prevent the film from sticking to itself during storage, as shown in FIG. **4***c*. The substantially transparent film layer **140** may be comprised of Thermoplastic Polyurethane or other suitable elastomeric materials. The adhesive **144** may

be a PSA or other adhesive as described above. The substantially transparent film layer **140** may have a width of between 60 and 170 mm and preferably between 80 and 156 mm, but could be varied depending upon the width of a specific handrail. The substantially transparent film layer **140** may have a thickness of between 1.0 and 5.0 mils and preferably between 1.0 and 3.0 mils

**[0078]** These three films may then be laminated together to form a final elastic and resilient film ready to be applied to a moving handrail as shown in FIG. **4**(*d*) and **4**(*e*). Prior to lamination, the liners **136** and **146** may be removed from the printable layer **130** and the substantially transparent film layer **140**, respectively. Following lamination, the elastic and resilient film is as shown in FIG. **4***d* or **4***e*.

**[0079]** In one embodiment, the substantially transparent film layer **140** may be laminated to the printable layer **130** immediately or shortly after print **132** is applied to the printable layer **130**. This protects the print **132**. However, one of skill in the art would understand that the barrier layer **120** and the printable layer **130** could be laminated to together first, print **126** applied to the combination, and thereafter the substantially transparent film layer **140** laminated thereto to protect the print **126**.

**[0080]** Though shown in FIG. **4**(*d*) with the substantially transparent film layer **140** having a greater width dimension than the printable layer **130** and barrier layer **120**, the elastic and resilient film could also be comprised of films having the same width dimensions, like the film as shown in FIG. **4***e*.

**[0081]** In another embodiment, one or more of the layers **120**, **130** and film **140** may be joined or laminated to the other layers in the field as the film is being applied to the handrail. Thus for example, the layer **120** could be applied individually to the handrail, and thereafter substantially transparent film layer **140** and printable layer **130** (either individually or commonly if they have been previously laminated together) can be applied to the top surface of layer **120**. One of skill in the art will readily appreciate that other orders of lamination or joining two or more of the layers and the application of the print could be performed without departing from the scope of the instant invention.

**[0082]** A further aspect of the present invention utilizes a reverse print **137**, as shown in FIG. **4***f*. According to this aspect of the invention rather than applying print **132** onto layer printable layer **130**, the print may be applied as reverse print **137** to an underside of the substantially transparent film layer **140** in a fashion similar to the coextruded barrier layer embodiment discussed above with respect to FIGS. **3***a*-**3***g*. An adhesive **146**, as described above with respect to the use of reverse print in the coextruded embodiments, may be applied over the reverse print **137**, which may be used to laminate the substantially transparent film layer **140**, and reverse print **137** to printable layer **130**. Such an embodiment lends itself to joining or laminating the substantially transparent film layer **140** with the printable layer **140** and the barrier layer **120** in the field, for example at the handrail itself. Thus each of layers **120**, **130** and substantially transparent film layer **140** could be individually applied to the handrail.

**[0083]** Alternatively, layers **120** and **130** can be laminated together prior to application to the handrail, and substantially transparent film layer **140** with the reverse print **137** can be applied to these joined layers after they have been applied to the handrail. Further, all three layers and film can be joined or laminated together to form a complete film ready to be applied to a handrail in a single application step. Finally, rather than using an adhesive **146**, the substantially transparent film layer **140** with reverse print applied thereto, may be heat laminated to printable layer **130**, either prior to or after joining layers **120** and **130** to each other.

**[0084]** In an alternative embodiment, the substantially transparent film layer **140** may be comprised of a suitable coating, for example a UV cured clear coating. The UV-cured coating may be formed of the coating materials described above in the coextruded embodiments. In this embodiment, the UV-curable coating, once cured forms a substantially transparent film layer **140**, but does not necessarily require an adhesive **144** in FIG. **4***d*, to bond the substantially transparent film layer **140** to printable layer **130**. In one embodiment, after print **132** is applied to printable layer **130**, the UV-curable coating is applied. However, in an alternative embodiment the print **132** can be applied to the layer **130**, and a second liner (not shown) can be employed which will protect the print during storage and transport until the UV-curable coating is applied. Once applied, the UV-curable coating may be cured by exposure to a UV light source, and the UV-cured coating protects the print **132**. It is preferred that the UV-curable coating is applied in a controlled setting such as a production facility as some UV curable coatings include hazardous materials and chemicals. But such a coating could also be applied in the field in some applications.

**[0085]** This embodiment may be completely or partially assembled prior to application of the film to a handrail. For example, in one embodiment, layers **120** and **130** are combined after the print **132** and the UV-cured coating are applied to layer **130**. Alternatively, layer **120** and **130** may be joined and thereafter print **132** and the UV-cured coating may be applied. In either event, the result is a film ready to be applied to a handrail. In addition, the joining of the layers may occur in the field. In this alternative, layers **120** and **130** may be either individually or jointly applied to the handrail. Where layer **130** already includes print **132** and the UV-cured coating forming substantially transparent film layer **140**, the layers **120** and **130** may be simply joined on the handrail to form a complete film. Alternatively, if layer **130** only has the print **132** applied, and the UV-curable coating may be applied in the field, the liner covering the print **132** on layer **130** may removed, and the UV curable coating may applied over the print **132** and the top surface of layer **130**. Thereafter, a UV-light source may be used to cure the coating. The end result, whether formed as a complete film in a controlled environment or formed in the field appears in cross section as shown in FIG. **4***g*.

**[0086]** In another embodiment of the film of the present invention, the elastic and resilient film comprises two layers. In this embodiment rather than using separate barrier layer **120** and printable layer **130**, a single printable barrier layer **220** may be used. Print **232** may be applied directly on a printable barrier layer **220** and no separate printable film is required. The printable barrier layer **220** may be formed, as above, with an adhesive **224** on one surface, which is protected during storage by a liner **226** formed of the materials discussed above, as shown in FIG. **5***a*. The printable barrier layer **220** may be comprised of an elastic and resilient material which is capable of substantially retarding transmission of materials (such as oils and emulsions) blooming from the rubber surface of an endless moving handrail such as those materials described above with respect to barrier layer **120**.

**[0087]** The print **232** may be applied directly on the top surface of the printable barrier film **220**, as shown in FIG. **5***b*.

As with the other embodiments, prior to printing on the printable barrier layer **220**, the top surface may receive a surface treatment as described above to enhance the bonding characteristics of the print to the printable barrier layer **220**.

**[0088]** A substantially transparent film layer **240** is also provided, as shown in FIG. **5***c* having an adhesive **244** applied to one surface of film **240**. A liner **246** may be applied to the adhesive **244**, as discussed above.

**[0089]** The substantially transparent film layer **240** and the printable barrier layer **220** with the print **232** may then be laminated together following removal of the liner **246** from the substantially transparent film layer **240**, resulting in the structure shown in FIG. **5***d*, which is ready to be applied to a handrail.

**[0090]** As discussed above, though shown here with the substantially transparent film layer **240** having a greater width than the printable barrier layer **220**, these films could also have the same width as shown in FIG. **5***e*.

**[0091]** Further, as discussed above in other embodiments, the printable barrier layer **220** may not be printed upon, but rather reverse print **237** as shown in FIG. **5***f* may be employed in the substantially transparent film layer **240** with adhesive **246**. The lamination of the printable barrier layer **220** and the substantially transparent film layer **240**, may be performed in the field at the handrail itself, or they may be combined elsewhere and applied as a complete film to the handrail. Still further, the substantially transparent film layer **240** may be heat laminated to the printable barrier layer **220**. The adhesive **246** may be one of those described above with respect to the reverse print embodiments. The methods, techniques, and order of lamination of the substantially transparent film layer **240**, adhesive **246**, and reverse print **237**, are the same or similar to those discussed in greater detail above, for example in the coextruded embodiments.

**[0092]** Finally, as above, the substantially transparent film layer **240** may be formed by a UV curable clear coating to protect the print **232** applied to the printable barrier layer **220**. The methods and techniques of applying the UV-curable coating to form the substantially transparent film layer **240** are the same or similar to those discussed in greater detail above, for example in the coextruded embodiments.

**[0093]** Another aspect of the present invention is that the film may be prestretched prior to lamination and/or prior to application to a handrail, this aspect is also detailed in commonly owned U.S. Pat. No. 7,278,528. Prestretching of the film can by performed, generally in one direction, and typically of the order of five to twelve percent, e.g., a strain would be applied in the longitudinal direction of the film of the order of five to twelve percent. The exact degree of strain will vary depending upon the film, application, handrail configuration, etc. Nonetheless, such a strain must, necessarily, correspondingly elongate print applied to the film. For many images or patterns, this small percentage of elongation in one direction may not have any significant effect and can possibly be overlooked. For other images, to ensure that the image has desired proportions on the film after application, the image would be, correspondingly, shrunk or reduced in the axial direction, then when extended, it will be returned to its original, intended length. The axial stretching should have little or no effect on the transverse dimension of an image, although it is known that elongation in one direction can cause a reduction in the corresponding perpendicular dimension, and this can be compensated for where it occurs.

**[0094]** Another aspect of the prestretch is that the degree of prestretch, measured as a strain or percentage elongation of the film, is preferably at least greater than the maximum degree of compressive reduction in length of the film, i.e. negative elongation, that could occur in use, as the moving handrail travels along its path during use. This will then ensure that, all portions of the film, even when the handrail is flexed, will always be maintained in tension. The handrail itself, particularly towards the lips may be subjected to significant compressive strains, but the net strain in the film will always be a tensile strain. Consequently, there should be no tendency for the film to lift from the handrail.

**[0095]** While such prestretching of the film will increase the total tensile load applied to the top portion of the film on top of the handrail, as this is only the relatively short distance from the neutral axis, the total tensile strain applied to the film should still be acceptable. For certain handrail designs, configurations and selection of materials for film, this may result in excessive tensile loads being applied to the film. In such cases, it may be possible to reduce the prestretch applied to the film, so that, for the edges of the film, small, compressive strains may be applied. These should be selected to be so small that they can be readily borne by the adhesive used to adhere the film to handrail without causing any significant wrinkling or puckering to occur.

**[0096]** Now that the preferred embodiments of the present invention have been shown and described in detail, various modifications and improvements thereon will become readily apparent to those skilled in the art. Accordingly, the spirit and scope of the present invention is to be construed broadly and limited only by the appended claims and not by the foregoing specification.

**1**. An elastic and resilient film for application to an endless moving handrail comprising:

(a) a coextruded film having sufficient resilience to accommodate strains occurring on the surface of the endless moving handrail, said coextruded film comprising:

(i) a first layer comprised of printable elastomeric material; and

(ii) a second layer, beneath the first layer, comprised of one or more materials selected from the group consisting of Thermoplastic Olefin, Thermoplastic Elastomer, Thermoplastic Ionomer Resins, metallized Thermoplastic Polyurethane, Thermoplastic Vulcanizate, Polyvinylidene Fluoride, and Thermoplastic Polyurethane/Polyolefin blends; and

(b) an adhesive on a bottom surface of the second layer of the coextruded film; and

(c) a substantially transparent film layer overlying the top surface of the coextruded film.

**2**. The elastic and resilient film of claim **1**, wherein the second layer of the coextruded film substantially retards transmission of materials blooming from an endless moving handrail, on which said film is applied.

**3**. The elastic and resilient film of claim **1**, wherein print is applied to the top surface of the first layer of the coextruded film.

**4**. The elastic and resilient film of claim **1**, wherein the substantially transparent film layer has an adhesive on a bottom surface thereof.

**5**. The elastic and resilient film of claim **3**, wherein the coextruded film and the substantially transparent film layer are laminated together.

**6**. The elastic and resilient film of claim **1**, wherein reverse print is applied to a bottom surface of the substantially transparent film layer.

**7**. The elastic and resilient film of claim **6**, wherein the substantially transparent film layer has an adhesive on a bottom surface thereof covering the reverse print.

**8**. The elastic and resilient film of claim **7**, wherein the adhesive is opaque.

**9**. The elastic and resilient film of claim **7**, wherein the adhesive is clear.

**10**. The elastic and resilient film of claim **7**, wherein the adhesive is tinted.

**11**. The elastic and resilient film of claim **6**, wherein the coextruded film and the substantially transparent film layer are laminated together.

**12**. The elastic and resilient film of claim **1**, wherein the coextruded film further comprises a tie-layer between the first layer and the second layer of the coextruded film, and wherein said tie-layer promotes bonding of the first layer and second layer.

**13**. The elastic and resilient film of claim **12**, wherein the tie-layer comprises a material containing maleic anhydride.

**14**. The elastic and resilient film of claim **1**, wherein the coextruded film has a width dimension which is substantially the same as a width dimension of the substantially transparent film layer.

**15**. The elastic and resilient film of claim **1**, wherein the coextruded film has a width dimension which is less than a width dimension of the substantially transparent film layer.

**16**. The elastic and resilient film of claim **1**, wherein the first layer of the coextruded film is provided with a substantially solid color and is substantially opaque.

**17**. The elastic and resilient film of claim **1**, wherein the substantially transparent film layer is tinted, yet renders the print visible.

**18**. The elastic and resilient film of claim **6**, wherein the substantially transparent film layer is tinted, yet renders the print visible.

**19**. The elastic and resilient film of claim **1**, wherein the print comprises a pattern repeated at regular intervals along the first layer of the coextruded film.

**20**. The elastic and resilient film of claim **6**, wherein the reverse print comprises a pattern repeated at regular intervals along the first layer of the coextruded film.

**21**. The elastic and resilient film of claim **1**, wherein the first layer of the coextruded film is treated with a surface activation treatment prior to printing thereon to improve the adhesion of print applied thereto.

**22**. The elastic and resilient film of claim **21**, wherein the surface activation technique is one or more of a print receptive coating, a primer, a flame treatment, and a corona discharge process.

**23**. The elastic and resilient film of claim **1**, wherein said elastic and resilient film is applied to an endless moving handrail.

**24**. The elastic and resilient film of claim **23**, wherein said endless moving handrail is comprised of one or more Styrene Butadiene Rubber, Natural Rubber, Chloro Sulfonated Polyethylene, and Thermoplastic Polyurethane.

**25**. The elastic and resilient film of claim **23**, wherein the said elastic and resilient film has a width dimension corresponding to the handrail, is elongate and has a length to fit the handrail.

**26**. The elastic and resilient film of claim **23**, wherein said elastic and resilient film has a width dimension enabling the elastic and resilient film to wrap at least partially around the handrail.

**27**. The elastic and resilient film of claim **23**, wherein the elastic and resilient film has a thickness that does not substantially alter the dimensions of the handrail, to enable the handrail to be used with and without the film, and wherein the adhesive is selected to permit removal of a film.

**28**. The elastic and resilient film of claim **1**, wherein the substantially transparent film layer is formed of a UV-curable clear coating.

**29**. An elastic and resilient film for application to an endless moving handrail comprising:

(a) a first layer having a top surface and a bottom surface and comprising:
  (i) one or more materials selected from the group consisting of Thermoplastic Olefin, Thermoplastic Elastomer, Thermoplastic Ionomer Resins, metallized Thermoplastic Polyurethane, Thermoplastic Vulcanizate, Polyvinylidene Fluoride, and Thermoplastic Polyurethane/Polyolefin blends; and
  (ii) a first adhesive on a bottom surface of the first layer;
(b) a second layer having a top surface and a bottom surface, said second layer including a second adhesive on the bottom surface of the second film layer; and
(c) a substantially transparent film layer overlying the top surface of the second layer.

**30**. The elastic and resilient film of claim **29**, further comprising print formed on a top surface of the second layer.

**31**. The elastic and resilient film of claim **30**, wherein the substantially transparent film layer has a third adhesive on a bottom surface thereof.

**32**. The elastic and resilient film of claim **30**, wherein the substantially transparent film layer is tinted, yet renders the print on the second layer visible.

**33**. The elastic and resilient film of claim **30**, wherein the print comprises a pattern repeated at regular intervals along the length of the second layer.

**34**. The elastic and resilient film of claim **29**, further comprising reverse print formed on a bottom surface of the substantially transparent film layer.

**35**. The elastic and resilient film of claim **34**, wherein the substantially transparent film layer has a third adhesive on a bottom surface thereof covering the reverse print.

**36**. The elastic and resilient film of claim **35**, wherein the third adhesive is opaque.

**37**. The elastic and resilient film of claim **35**, wherein the third adhesive is tinted.

**38**. The elastic and resilient film of claim **35**, wherein the third adhesive is clear.

**39**. The elastic and resilient film of claim **34**, wherein the substantially transparent film layer is tinted, yet renders the reverse print visible.

**40**. The elastic and resilient film of claim **34**, wherein the reverse print comprises a pattern repeated at regular intervals along the length of the substantially transparent film.

**41**. The elastic and resilient film of claim **29**, wherein the first layer, the second layer and the substantially transparent film layer are laminated together.

**42**. The elastic and resilient film of claim **29**, wherein the first layer substantially retards transmission of materials blooming from an endless moving handrail, on which said elastic and resilient film is applied.

**43**. The elastic and resilient film of claim **29**, wherein the first layer and second layer have a width dimension which is substantially the same as a width dimension of the substantially transparent film layer.

**44**. The elastic and resilient film of claim **29**, wherein the first layer and second layer have a width dimension which is less than a width dimension of the substantially transparent film layer.

**45**. The elastic and resilient film of claim **29**, wherein the second layer is provided with a substantially solid color and is substantially opaque.

**46**. The elastic and resilient film of claim **29**, wherein the first layer is an elastomeric film comprising thermoplastic polyurethane.

**47**. The elastic and resilient film of claim **29**, wherein the second layer is an elastomeric film comprising thermoplastic polyurethane.

**48**. The elastic and resilient film of claim **29**, wherein the top surface of the second layer is treated with a surface activation technique prior to printing thereon to improve the adhesion of print applied thereto.

**49**. The elastic and resilient film of claim **48**, wherein the surface activation technique is one or more of a print receptive coating, a primer, a flame treatment, and a corona discharge process.

**50**. The elastic and resilient film of claim **29**, wherein said elastic and resilient film is applied to an endless moving handrail.

**51**. The elastic and resilient film of claim **50**, wherein said endless moving handrail is comprised of one or more of Styrene Butadiene Rubber, Natural Rubber, Chloro Sulfonated Polyethylene, and Thermoplastic Polyurethane.

**52**. The elastic and resilient film of claim **50**, wherein the said elastic and resilient film has a width dimension corresponding to the handrail, is elongate and has a length to fit the handrail.

**53**. The elastic and resilient film of claim **50**, wherein said elastic and resilient film has a width dimension enabling the elastic and resilient film to wrap at least partially around the handrail.

**54**. The elastic and resilient film of claim **50**, wherein the elastic and resilient film has a thickness that does not substantially alter the dimensions of the handrail, to enable the handrail to be used with and without the film, and wherein the adhesive is selected to permit removal of a film.

**55**. The elastic and resilient film of claim **29**, wherein the substantially transparent film layer is formed of a UV-curable clear coating.

**56**. An elastic and resilient film for application to a moving handrail comprising:

(a) a first layer having a top surface and a bottom surface and comprising:

(i) one or more materials selected from the group consisting of Thermoplastic Olefin, Thermoplastic Elastomer, Thermoplastic Ionomer Resins, metallized Thermoplastic Polyurethane, Thermoplastic Vulcanizate, Polyvinylidene Fluoride, and Thermoplastic Polyurethane/Polyolefin blends; and

(ii) an adhesive on the bottom surface of the first layer; and

(b) a substantially transparent film layer overlying the top surface of said first layer.

**57**. The elastic and resilient film of claim **56**, further comprising print formed on a top surface of the first layer.

**58**. The elastic and resilient film of claim **57**, wherein the substantially transparent film layer has an adhesive on a bottom surface thereof.

**59**. The elastic and resilient film of claim **58**, wherein the substantially transparent film layer is tinted, yet renders the print on the first layer visible.

**60**. The elastic and resilient film of claim **58**, wherein the print comprises a pattern repeated at regular intervals along the length of the first layer.

**61**. The elastic and resilient film of claim **56**, further comprising reverse print formed on a bottom surface of the substantially transparent film layer.

**62**. The elastic and resilient film of claim **61**, wherein the substantially transparent film layer has a second adhesive on a bottom surface thereof covering the reverse print.

**63**. The elastic and resilient film of claim **62**, wherein the adhesive on the bottom surface of the transparent film layer is opaque.

**64**. The elastic and resilient film of claim **62**, wherein the adhesive on the bottom surface of the transparent film layer is tinted.

**65**. The elastic and resilient film of claim **62**, wherein the adhesive on the bottom surface of the transparent film layer is clear.

**66**. The elastic and resilient film of claim **61**, wherein the substantially transparent film layer is tinted, yet renders the reverse print visible.

**67**. The elastic and resilient film of claim **61**, wherein the reverse print comprises a pattern repeated at regular intervals along the length of the substantially transparent film layer.

**68**. The elastic and resilient film of claim **56**, wherein the first layer substantially retards transmission of materials blooming from an endless moving handrail, on which said elastic and resilient film is applied, there through.

**69**. The elastic and resilient film of claim **56**, wherein the first layer and the substantially transparent film layer are laminated together.

**70**. The elastic and resilient film of claim **56**, wherein the first layer has a substantially solid color and is substantially opaque.

**71**. The elastic and resilient film of claim **56**, wherein the first layer has a width dimension which is substantially the same as a width dimension of the substantially transparent film layer.

**72**. The elastic and resilient film of claim **56**, wherein the first layer has a width dimension which is less than a width dimension of the substantially transparent film layer.

**73**. The elastic and resilient film of claim **56**, wherein the top surface of the first layer is treated with a surface activation treatment prior to printing thereon.

**74**. The elastic and resilient film of claim **73**, wherein the surface activation technique is one or more of a print receptive coating, a primer, a flame treatment and a corona discharge process.

**75**. The elastic and resilient film of claim **56**, wherein said elastic and resilient film is applied to an endless moving handrail.

**76**. The elastic and resilient film of claim **75**, wherein said endless moving handrail is comprised of one or more of Styrene Butadiene Rubber, Natural Rubber, Chloro Sulfonated Polyethylene, and Thermoplastic Polyurethane.

**77**. The elastic and resilient film of claim **75**, wherein the said elastic and resilient film has a width dimension corresponding to the handrail, is elongate and has a length to fit the handrail.

**78**. The elastic and resilient film of claim **75**, wherein said elastic and resilient film has a width dimension enabling the elastic and resilient film to wrap at least partially around the handrail.

**79**. The elastic and resilient film of claim **75**, wherein the elastic and resilient film has a thickness that does not substantially alter the dimensions of the handrail, to enable the handrail to be used with and without the film, and wherein the adhesive is selected to permit removal of a film.

**80**. The elastic and resilient film of claim **56**, wherein the substantially transparent film layer is formed of a UV-curable clear coating.

**81**. A method of manufacturing a flexible and resilient film to be applied to an endless moving handrail comprising the steps of:

providing a first layer having sufficient resilience to accommodate strains occurring on the surfaces of the endless moving handrail, an adhesive on a bottom surface of the first layer, the first layer comprising one or more of one or more materials selected from the group consisting of Thermoplastic Olefin, Thermoplastic Elastomer, Thermoplastic Ionomer Resins, metallized Thermoplastic Polyurethane, Thermoplastic Vulcanizate, Polyvinylidene Fluoride, and Thermoplastic Polyurethane/Polyolefin blends;

providing a second layer having sufficient resilience to accommodate strains occurring on the surfaces of the endless moving handrail and an adhesive on a bottom surface of the second layer;

providing a substantially transparent film layer having an adhesive on a bottom surface thereof; and

laminating the first layer, second layer, and substantially transparent film layer together, with the second layer between the first and transparent film layers.

**82**. The method of claim **81**, further comprising a step of applying print to the top surface of the second layer.

**83**. The method of claim **81**, further comprising a step of applying a reverse print to an underside of the substantially transparent film layer.

**84**. A method of manufacturing a flexible and resilient film to be applied to an endless moving handrail comprising the steps of:

providing a first layer having sufficient resilience to accommodate strains occurring on the surfaces of the endless moving handrail, an adhesive on a bottom surface of the first layer, the first layer comprising one or more of one or more materials selected from the group consisting of Thermoplastic Olefin, Thermoplastic Elastomer, Thermoplastic Ionomer Resins, metallized Thermoplastic Polyurethane, Thermoplastic Vulcanizate, Polyvinylidene Fluoride, and Thermoplastic Polyurethane/Polyolefin blends;

providing a substantially transparent film layer having an adhesive on a bottom surface thereof; and

laminating the first layer and substantially transparent film layer together.

**85**. The method of claim **84**, further comprising a step of applying print to the top surface of the first layer.

**86**. The method of claim **84**, further comprising a step of applying a reverse print to an underside of the substantially transparent film layer.

**87**. A method of manufacturing a flexible and resilient film to be applied to an endless moving handrail comprising the steps of:

coextruding a first film having at least first and second layers and sufficient resilience to accommodate strains occurring on the surfaces of the endless moving handrail, and providing an adhesive on a bottom surface of the first layer,

the first layer of the first film comprising one or more of one or more materials selected from the group consisting of Thermoplastic Olefin, Thermoplastic Elastomer, Thermoplastic Ionomer Resins, metallized Thermoplastic Polyurethane, Thermoplastic Vulcanizate, Polyvinylidene Fluoride, and Thermoplastic Polyurethane/Polyolefin blends,

the second layer of the first film having sufficient resilience to accommodate strains occurring on the surfaces of the endless moving handrail and;

providing a substantially transparent film layer having an adhesive on a bottom surface thereof; and

laminating the first film and substantially transparent film layer together.

**88**. The method of claim **87**, further comprising a step of applying print to the top surface of the first layer.

**89**. The method of claim **87**, further comprising a step of applying a reverse print to an underside of the substantially transparent film layer.

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