

(19)



(11)

EP 2 801 276 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
12.11.2014 Bulletin 2014/46

(51) Int Cl.:
A44B 19/06 (2006.01)

(21) Application number: **14166251.0**

(22) Date of filing: **28.04.2014**

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**
Designated Extension States:
BA ME

(71) Applicant: **YKK Corporation**
Chiyoda-ku, Tokyo 101-8642 (JP)

(72) Inventor: **Hitchen, Alicia Dawn**
Runcorn, Cheshire WA7 3BW (GB)

(74) Representative: **Stevenson-Hill, Jack Patrick**
Marks & Clerk LLP
1 New York Street
Manchester, M1 4HD (GB)

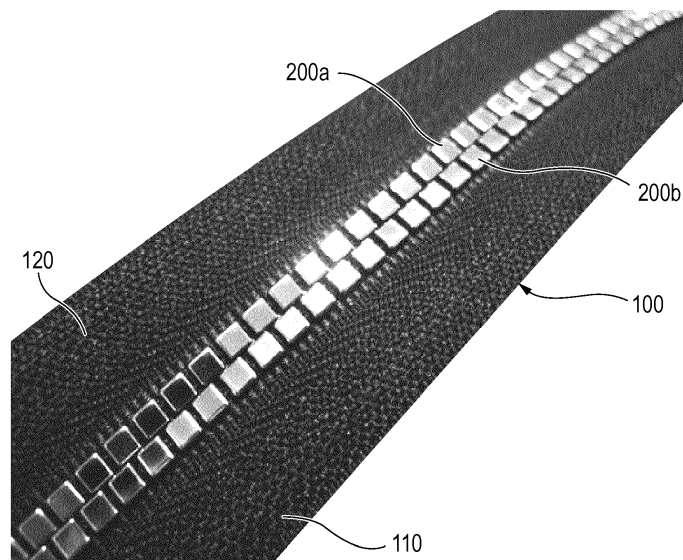
(30) Priority: **07.05.2013 GB 201308181**

(54) **Coated slide fastener and method of preparation**

(57) The present invention relates to a slide fastener stringer comprising a first tape comprising a first edge, the tape further comprising a cord extending along the first edge of the tape; and wherein the tape further comprises a row of coupling elements located along the first edge of the tape and fixed thereto about the cord in a manner enabling the coupling elements on the tape to interdigitate with coupling elements on a second analo-

gous tape; and wherein each coupling element comprises a first surface and wherein a decorative layer is applied to the first surface of at least one coupling element; and wherein a protective layer is applied atop the decorative layer and extends over and beyond the decorative layer to contact a region of the at least one coupling element not covered by the decorative layer and to a method of preparing same.

FIG. 2



EP 2 801 276 A1

Description

Technical Field

[0001] The present invention relates to a slide fastener with coupling elements coated with a decorative layer and to a method of preparing a slide fastener with coupling elements coated with a decorative layer.

Background

[0002] Slide fasteners are well known. A conventional slide fastener comprises a pair of stringers and an opening and closing means commonly referred to as a slider. Each stringer comprises a tape and a plurality of coupling elements. The coupling elements extend along one edge of each tape and when the slide fastener is in the closed position, the coupling elements on one tape co-operate in an interdigitating relationship with the coupling elements on the second tape. Consequently, when each tape of the slide fastener is attached to a piece of material, the pieces of material may be joined by closing the slide fastener using the slider, thereby bringing the coupling elements into the interdigitating relationship.

[0003] Slide fasteners are therefore extremely useful and versatile and are employed in a wide range of applications including clothing, luggage, home furnishings and upholstery.

[0004] Decorated slide fasteners are also well known, particularly those with a decorative coating layer. Decorative slide fasteners are employed in numerous decorative articles in both the home furnishing and clothing industries.

[0005] Coated slide fasteners are also known. Indeed, the application of a range of coloured coatings to slide fasteners has enabled new designs to be created for the fashion and home furnishing markets. A coating layer may be applied to each tape comprising the slide fastener stringers and/or to the coupling elements. The coating layer is typically applied by means of a conventional printing device whereby the coating layer and the slide fastener are passed through printing rollers under pressure in order to transfer the coating layer to, the slide fastener coupling elements.

[0006] For example, in WO 2009/069728 there is described a slide fastener, in which a high quality coloured pattern is applied to the entire ground fabric or slide fastener tape, including the tape between each member of a row of coupling elements. The coloured pattern is transferred to the tape from a transfer layer having a coloured pattern printed in advance with a sublimation dye or ink. There is no portion of the slide fastener tape without any coloured pattern applied thereto and the coloured pattern is precisely applied to the slide fastener by means of an enhanced transfer process using heat and pressure.

[0007] In EP 0384 318 there is described a slide fastener comprising a pair of stringer tapes carrying rows of discrete coupling elements along their respective longi-

tudinal inner edges and a slider movable along the rows of elements to open and close the fastener. A decorative coating is deposited with heat and pressure upon the coupling elements. The decorative coating extends at least partially into a rear end region of each coupling element to ensure freedom of separation of the coating from the coupling element.

[0008] In JP 4-367603 there is described a process for obtaining a slide fastener with decorated coupling elements. In this application an under-coat layer consisting of a curable resin is provided on the surface of each coupling element and a decorative layer is transferred to the under-coat layer. The decorative layer is subsequently coated with an over-coat layer consisting of a curing resin to produce high quality coupling elements and slide fasteners. In JP 4-367603, although the over-coat layer extends beyond the decorative layer, the over-coat layer does not directly contact the coupling element but does exist only on the under-coat layer. As the over-coat layer is applied on the semi-cured under-coat layer with a dispenser device, a discontinuous surface is unintentionally created between the over-coat layer and the under-coat layer. In addition, with using the dispenser, although it is easy to apply the coat layer on the upper surface of the coupling element, it is difficult to apply the coat layer on the side surface which is adjacent to the upper surface. Thus, when extending the decorative layer to the side surface which is adjacent to the upper surface, there is a problem that the adjacstment for extending the over-coat layer and the under-coat layer beyond the decorative layer is very difficult,

[0009] In JP 8-126503 there is provided a method in which a transfer film is smoothly applied to the whole face of a slide fastener chain using a heat-processing technique over a set time frame. The film is secured by pressing the slide fastener chain and transfer film uniformly onto the surface of a heated roller by means of a drum-shaped moving roller, with heating, at a specified time in the process.

[0010] Also, in CN2348647 there is described a plastic slide fastener, and a method for the application of a metallic layer to the upper surface of slide fastener coupling elements. The coupling elements are comprised of plastic material and the surface of the coupling elements are provided with a metallic film obtained from a gold foil paper strip. The gold foil paper is printed onto the coupling elements producing a slide fastener with a refractive metallic gloss effect.

[0011] Whilst these prior art processes enable coated slide fasteners to be produced with the coating lying evenly over the slide fastener coupling elements there are problems associated with preparing decorative slide fasteners which are capable of meeting the demands of normal washing of the articles to which the slide fasteners are applied. For example, when a slide fastener coupling element is printed with a decorative metallic layer, the layer requires further protection if it is to withstand washing and general wear of the article to which the slide fas-

tener is applied. In order to address this problem slide fastener coupling elements have therefore also been coated with a lacquer layer as noted in EP 0384318 above. In this application the lacquer layer is applied to the decorative layer and creates a hardened surface on top of each of the coupling elements to which it is applied. Whilst the hardened layer does to some extent improve the wear resistance of the slide fastener in general, the hardened upper surface has a tendency to chip and be eroded over time or during further processing thereby reducing the overall aesthetic appearance of the coupling elements and slide fastener.

Summary

[0012] The present invention therefore seeks to overcome the problems associated with prior art methods for producing decorated slide fasteners in which a decorative coating is applied to the surface of coupling elements.

[0013] That is, with the method of the present invention it is now possible to prepare improved slide fasteners with for example, decorative layers, such as foil layers, applied to the surface of plastic coupling elements, and in which the quality and appearance of the slide fastener stringer is not impaired whilst still achieving the desired aesthetic appearance and rapid processing times.

[0014] Furthermore, the method of the present invention allows the preparation of slide fasteners comprising plastic coupling elements coated with a layer of metallic foil in which the wear resistance of the slide fasteners is improved and for which the quality of the slide fastener is not impaired.

[0015] Therefore according to a first aspect of the present invention there is provided a slide fastener stringer comprising:

a first tape comprising a first edge, the tape further comprising a cord extending along the first edge of the tape; and

wherein the tape further comprises a row of coupling elements located along the first edge of the tape and fixed thereto about the cord in a manner enabling the coupling elements on the tape to interdigitate with coupling elements on a second analogous tape; and wherein each coupling element comprises a first surface and wherein a decorative layer is applied to the first surface of at least one coupling element; and wherein a protective layer is applied atop the decorative layer and extends over and beyond the decorative layer to contact a region of the at least one coupling element not covered by the decorative layer.

[0016] In the present invention the decorative layer may cover the first surface of at least one coupling element in part or entirely. Preferably, the decorative layer covers the first surface of at least one coupling element entirely. In addition, the first surface of each coupling

element may be substantially flat. Also, the first surface of each coupling element may be substantially parallel to the plane of the tape.

[0017] It is preferred that the protective layer is an acrylate based lacquer.

[0018] In addition, in the slide fastener of the present invention the protective layer may be adhered to the decorative layer. Likewise, the decorative layer may be adhered to the first surface of at least one coupling element.

[0019] Furthermore the decorative may comprise one or more foil layers and the foil layers may be metallic foil.

[0020] In relation to the present invention the protective layer may extend over and beyond the decorative layer contacting the at least one coupling element in at least two discrete regions not covered by the decorative layer.

[0021] Preferably, the protective layer extends over and beyond the decorative layer and encases the decorative layer by contacting the coupling element at the periphery of all regions covered by the decorative layer.

[0022] Also in relation to the present invention each coupling element may comprise a second surface encircling the edge of the first surface and extending away from the first surface in the direction of the plane of the tape and wherein the protective layer extends over the decorative layer and contacts one or more areas of the second surface of at least one coupling element in a region of the second surface not covered by the decorative layer. The first surface of the at least one coupling element may be a quadrilateral.

[0023] In addition the decorative layer preferably covers the first surface of the at least one coupling element completely. It is preferred that the coupling elements are comprised of plastic material.

[0024] The decorative layer may be comprised of two or more foil layers. In addition, one or more of the foil layers may be comprised of metallic foil.

[0025] In addition it is preferred that for at least one coupling element, more than one surface substantially parallel to the plane of the tape is coated with a decorative layer and a metallic layer.

[0026] According to a second aspect of the present invention there is provided a method of preparing a slide fastener stringer the slide fastener stringer comprising:

a first tape comprising a first edge, the tape further comprising a cord extending along the first edge of the tape; and

wherein the tape further comprises a row of coupling elements located along the first edge of the tape and fixed thereto about the cord in a manner enabling the coupling elements on the tape to interdigitate with coupling elements on a second analogous tape; and wherein each coupling element comprises a first surface and wherein a decorative layer is applied atop the first surface of the at least one coupling element; and wherein a protective layer is applied atop the decorative layer and extends over and beyond the decorative layer to contact a region of the at least

one coupling element not covered by the decorative layer.

[0027] The protective layer and the decorative layer are applied separately and the protective layer is applied after the decorative layer.

[0028] In addition the decorative layer may be adhered to each coupling element.

[0029] The above and other objects and features of the present invention will become clear from the following detailed description of the invention taken in conjunction with the accompanying drawings and which illustrates by way of example preferred embodiments which the invention may assume in practice.

Brief Description of the Drawings

[0030] That is, for a better understanding, the invention is now further described by means of specific, non-limiting embodiments illustrated in the following figures in which like numbers designate like components through all figures, and in which:

Figure 1 is a fragmentary plan view of a traditional slide fastener;

Figure 2 is a perspective view of a slide fastener according to the present invention;

Figures 3A and 3B are cross-sectional views of a coupling element of a slide fastener from Figure 1 according to the present invention;

Figure 4A is a schematic representation of a decorative layer used in the present invention;

Figure 4B is a schematic representation of a protective layer used in the present invention; and

Figure 5 is a schematic representation to illustrate the application of a foil and lacquer layer according to a first embodiment of the present invention.

Embodiments

[0031] Referring now to the drawings, in Figure 1 there is shown a slide fastener 10 which comprises a pair of stringer tapes 11 and 12 carrying rows of discrete coupling elements 20a and 20b along their respective longitudinal cords formed on inner edges 13 and 14. A slider 15 is also shown. The slider is reciprocally movable along the rows of coupling elements 20a, 20b, to interdigitate the coupling elements so as to close or open the slide fastener 10 in a manner well known in the art.

[0032] In Figure 2 there is illustrated a perspective view of a slide fastener 100 according to a preferred embodiment of the present invention in which a pair of stringer tapes 110 and 120 carry rows of discrete coupling elements 200a and 200b along their respective longitudinal cords formed on a first edge of each tape. The slider is not shown.

[0033] In accordance with the present invention the coupling elements in this preferred embodiment are com-

prised of plastic material and are injection moulded onto the cords of the slide fastener tapes. The coupling elements may be comprised of an appropriate polymer or resin such as polyoxymethylene (POM), polybutylene terephthalate (PBT) or acrylonitrile butadiene styrene (ABS). However, it is preferred that the coupling elements are comprised of polymers which provide a matt appearance rather than a shiny gloss effect when injection moulded as coupling elements such as polybutylene terephthalate (PBT) or acrylonitrile butadiene styrene (ABS). Matt surface coupling elements possess the advantage that the surfaces are rougher and therefore allow greater adhesion when an additional layer is applied to the surface of the coupling elements.

[0034] It can be seen in Figure 2 that the coupling elements 200a, 200b, possess a shiny appearance. The sheen on the coupling elements is provided by a decorative layer or foil. In a preferred embodiment of the present invention the decorative layer comprises a metallic foil layer. A further advantage of using coupling elements as illustrated in Figure 2 in which the coupling elements have a flat upper surface, is that the coupling agents are smooth and attractive and also provide an ideal surface for further printing. An example of such flat coupling elements is described for example in EP 2470043 incorporated herein by reference. Coupling elements with a flat surface enable logos or tradenames to be readily applied to the slide fastener.

[0035] It will be appreciated however that in accordance with the present invention a decorative layer and more especially, a metallic foil layer may be applied to any required shape of coupling element.

[0036] The term 'foil' referred to herein refers to a thin film of material such as polyester which comprises a dye or pigment which may be transferred to a coupling element upon application of heat and/or pressure. The term 'metallic foil' referred to herein therefore applies to a thin film of metallic material such as aluminium which comprises a dye or pigment and which may be transferred to a substrate such as a coupling element upon application of heat and/or pressure.

[0037] In Figures 3A and 3B there is illustrated a cross-sectional view of a coupling element 200a. The tape includes a first edge and a cord 50 extending along the first edge. It can be seen from Figures 3A and 3B that the coupling element 200a is coated on a first surface 15 by a decorative metallic foil layer 16. In this embodiment the decorative metallic foil layer is deposited on the first surface 15 of each coupling element. The first surface 15 of each coupling element has edges 40 each having a curved shape with predetermined roundness to the extent allowed by the mechanical design and the decorative metallic foil layer extends so as to cover the edges 40 of the first surface 15. Preferably, the decorative metallic foil layer further extend completely beyond the edges 40 of the first surface 15. In detail, the metallic foil layer is deposited on the coupling element in a region defined between the dotted lines indicated by 'X' in Figure 3A. In

addition the decorative metallic foil layer also extends beyond the region denoted by 'X' and contacts a second surface 17 on one or more sides of the coupling element. In Figure 3B the second surface 17 is visible on two sides 17a and 17b of the coupling element. A part of the second surface 17 upon which the metallic foil layer is deposited is defined by the dotted lines indicated by region 'Y' in Figure 3B. That is, each coupling element comprises a second surface 17 encircling the edges 40 of the first surface 15 and extending away from the first surface 15 in the direction of the plane of the tape and the protective layer 22 extends over the decorative layer and contacts one or more areas of the second surface of each coupling element in a region of the second surface 17 not covered by the decorative layer.

[0038] Also in accordance with the present invention and disposed atop the decorative metallic foil layer 16 is a protective layer 22 as shown in Figures 3A and 3B. The protective layer 22 is in the form of a lacquer. The protective layer 22 covers the decorative metallic foil layer 16 and extends over the decorative metallic foil layer on the first surface 15 and the second surface 17 to contact the coupling element 200a directly at points 18, 19 of the second surface 17. In this way the protective lacquer layer 22 may in a preferred embodiment of the present invention encapsulate the decorative metallic foil layer 16 completely. The encapsulation of the decorative metallic foil layer 16 serves to improve the wear resistance of the decorative metallic foil layer 16 to washing. In addition, the fact that the protective layer 22 extends over the decorative metallic foil layer 16 to contact each coupling element 200a directly means that the protective layer 22 is less prone to chipping. The protective layer 22 may comprise lacquer, or lacquer in combination with an adhesive, or even just adhesive. However, it is preferred that the protective layer 22 comprises an adhesive and lacquer in combination.

[0039] In the present invention and as illustrated in Figures 3A, and 3B, the decorative metallic foil layer 16 when deposited on the first surface 15 of the coupling element 200a extends over and beyond the first surface 15. The decorative metallic foil layer 16 then extends over a portion of the second surface 17. For example, in Figure 3B, the decorative metallic foil layer 16 extends over a portion of the second surface on two sides 17a and 17b of the coupling element 200a.

[0040] Likewise, as also illustrated in Figures 3A and 3B, the protective layer 22 when deposited on the first surface 15 of the decorative metallic foil layer 16, extends over and beyond the first surface 15. The protective layer 22 then also extends over the portion of the second surface 17 covered by the decorative metallic foil layer 16 and beyond the portion of the second surface 17 covered by the decorative metallic foil layer 16 until the protective layer 22 contacts the coupling element 200a directly at points 18 and 19 on the second surface 17.

[0041] In one embodiment of the present invention the protective layer 22 covers the decorative metallic foil lay-

er 16 completely so that the decorative layer 16 is completely covered by the protective layer 22 thereby providing maximum wear resistance.

[0042] It will also be appreciated that the extent to which the decorative metallic foil layer 16 and protective lacquer layer 22 cover each coupling element 200a does not impair the freedom of movement of the slider over the coupling elements 200a and does not impair the interdigitation of the coupling elements 200a even when the slide fastener 100 is repeatedly opened or closed by manipulation of a slider.

[0043] It will be appreciated by one skilled in the art that if desired, the decorative metallic foil layer 16 and protective layer 22 may be applied in a similar manner to both the first surface 15 of each coupling element 200a and also to a third surface 21 of each coupling element 200a as shown in Figures 3A and 3B.

[0044] In another embodiment, the protective layer extends over and beyond the decorative layer contacting the at least one coupling element in at least two regions not covered by the decorative layer. When the first surface of the coupling element is quadrilateral, one coupling element has four sides (second surfaces). The protective layer extends beyond the decorative layer at at least two sides of the four sides.

[0045] In still another embodiment, for the at least one coupling element the protective layer extends over and beyond the decorative layer and encases the decorative layer by contacting the coupling element at all contiguous regions not covered by the decorative layer. The protective layer extends over and beyond the decorative layer so as to surround the whole circumference of the decorative layer.

[0046] As also clearly seen in Figures 3A and 3B, it is important that the protective layer 22 overlaps the decorative metallic foil layer 16 and attaches to the coupling element 200a at a location on the coupling element 200a independent of the metallic foil layer 16.

[0047] In addition, it will also be appreciated that if required, the decorative metallic foil layer 16 may be comprised of one or more layers of the same colour or one or more layers of a different colour. Furthermore, one decorative metallic single or multi-foil layer may be applied to the first surface 15 of the coupling element 200a and an alternative decorative foil layer comprised of a single or multiple layers and of the same or a different colour, may be applied to the third surface 21 of the coupling element. Consequently, this allows slide fasteners to be produced with differing colours of coupling elements and also enable the resulting slide fastener to be applied to for example reversible garments.

[0048] It will also be appreciated that the protective layer 22 may overlap the decorative metallic foil layer 16 at only one position on the coupling element 200a or alternatively, the protective layer 22 may overlap the decorative metallic foil layer 16 at multiple positions. However, it is preferred that the protective layer 22 completely encapsulates the decorative metallic foil layer 16 at all

points peripheral thereto on each coupling element 200a to provide a strong and hard wearing protective coating atop the decorative metallic foil layer 16.

[0049] The inventors have therefore now found that securing a protective layer 22 directly to each coupling elements 200a protects the decorative metallic foil layer 16 inside the protective layer 22 and thereby improves the wear resistance and hence overall appearance of the decorative metallic foil layer 16. That is, the application of the protective layer 22 over and beyond the decorative metallic foil layer 16 to contact the coupling elements 200a at one or more discrete points but preferably entirely, significantly improves the long term quality of an item to which a slide fastener which has been treated in accordance with the present invention has been applied.

[0050] In Figures 4A and 4B there is illustrated a schematic representation of a decorative layer 16 and protective layer 22 to be applied to one or more coupling elements in accordance with the present invention.

[0051] In Figure 4A it can be seen that the decorative layer 16 comprises a number of layers. More specifically, the decorative composite in Figure 4A comprises a carrier layer 30, a release agent layer 29, a colour or tie coat layer 28, a metallic coat layer 27 and an adhesive layer 26. The adhesive layer 26 enables the metallic coat layer 27 to be adhered to one of more coupling elements.

[0052] The metallic coat layer 27 is preferably comprised of aluminium and provides a reflective surface when applied to coupling elements.

[0053] The tie coat layer 28 is carried atop the metallic foil layer 27. The tie coat layer comprises pigments or dyes and affords the metallic coat layer 27 with some protection. The colour of the pigments and dyes in the tie coat layer determines the colour applied to the coupling elements. For example, the tie coat layer may comprise gold fragments in order to produce a slide fastener with coupling elements which appear to be made of gold.

[0054] The metallic coat layer 27 and tie coat layer 28 are protected by a carrier layer 30 with a release agent layer 29 located between the carrier layer 30 and the tie coat layer 28.

[0055] In order to transfer the metallic coat layer 27 and tie coat layer 28 to the coupling elements, the metallic coat layer 27 and tie coat layer 28 are first correctly positioned. Heat and/or pressure are then applied to the carrier layer 30. The application of the heat and/or pressure activates the adhesive layer 26 which bonds the metallic coat layer 27 and tie coat layer 28 to the coupling elements. The release adhesive layer 29 enables the carrier layer 30 to be released from the tie coat layer 28.

[0056] The metallic coat layer 27 and tie coat layer 28 together comprise the decorative layer 16 and when the decorative layer 16 comprises a metallic coat layer 27 it is referred to herein as a decorative metallic foil.

[0057] In Figure 4B it can be seen that the protective layer 22 also comprises a number of layers prior to application to one or more coupling elements. More specifically, the protective composite in Figure 4B comprises

a carrier layer 35, a release agent layer 34, a lacquer layer 22 and an adhesive layer 32. The carrier layer 35 supports the layer of lacquer 22 and is releasably connected thereto by means of a release agent layer 34. The release agent layer 34 enables the carrier layer 35 to be readily removed from the lacquer layer 22. The adhesive layer 32 enables the lacquer layer 22 to be adhered to the decorative layer 16 when heat and/or pressure are applied. Additional decorative elements known as 'flecking' may also be present within the protective layer.

[0058] In order to transfer the lacquer layer 22 to the decorative layer 16 and coupling elements the lacquer layer 22 is first correctly positioned. Heat and/or pressure are then applied to carrier layer 35. The application of the heat and/or pressure activates the adhesive layer 32 which bonds the lacquer layer 22 to the decorative layer 16 and the coupling elements. The release agent layer 34 allows the carrier layer 35 to be readily removed from the lacquer layer 22.

[0059] The lacquer layer 22 is preferably acrylic based. The carrier layers 30 and 35 are preferably comprised of extremely thin films of polyester.

[0060] The release agent layers 29 and 34 in Figures 4A and 4B respectively are preferably comprised of heat sensitive adhesive allowing release of the carrier layers 30 and 35 at a certain temperature, that is, adhesive layers 29 and 34 are thermoplastic adhesives.

[0061] In Figure 5 there is provided a representation of an apparatus for applying the decorative metallic foil layer 16 and protective layer 22 separately to a row of coupling elements of a slide fastener 100. In accordance with the present invention a roll of decorative metallic foil 16 is employed to cover the first surface of one or more coupling elements 200a, 200b at least. This approach therefore serves to provide a slide fastener which appears to be comprised of metal coupling elements when in fact the coupling elements are comprised of plastic material. The present invention therefore also provides a process which has the advantage of preparing decorated slide fasteners rapidly and in a range of colours.

[0062] In Figure 5 a layer of decorative metallic foil 16 is applied to a row of coupling elements on a slide fastener stringer or chain and adhered thereto by means of a suitable adhesive which may be present in the decorative metallic foil. The printed decorative metallic foil is then further printed with a protective layer 22 of for example lacquer which is applied atop the decorative metallic foil layer 16. Both the decorative metallic foil 16 and the protective layer 22 are releasably secured to a carrier layer by means of an adhesive. Once the protective layer is adhered to the metallic foil layer the carrier layer is removed and discarded. The lacquer is preferably an acrylic lacquer.

[0063] The apparatus shown in Figure 5 has a first press roller 61 configured to press the decorative metallic foil layer 16 toward the coupling elements and a second press roller 62 configured to press the protective layer 22 of lacquer toward the coupling elements. The detailed

examples of the first press roller 61 and the second press roller 62 are described in EP 0384 318 which is presented as prior art. The apparatus shown in Figure 5 differs from the prior art in using two press rollers. In the apparatus shown in Figure 5, the elastic modulus of the surface of the first press roller 61 is greater than the elastic modulus of the surface of the second press roller 62. That is, the second press roller 62 is easy to be deformed as compared with the first press roller 61. Consequently, the protective layer 22 of lacquer pressed by the second press roller 62 can be pressed and mounted to the coupling elements with larger protective area than the decorative metallic foil layer 16 pressed by the first press roller 61.

[0064] If required the lacquer layer may then be subsequently further printed with for example additional patterns or motifs. The roll of decorative metallic foil 16 may be further printed using a printing process in which the slide fastener stringer 100 is again propelled through a printing press.

[0065] It will be appreciated that a similar process may be used to apply decorative and protective layers according to the invention to the third surface 21 of an element.

[0066] It will be further understood that whilst this procedure creates the appearance of slide fasteners with metallic coupling elements, if one views the slide fastener from the side one will see the plastic coupling elements clearly.

[0067] A further advantage of the process of the present invention is that the printing procedure may be applied to a range of differently shaped teeth. Also in this regard it will be understood that the slide fastener stringer illustrated in Figure 2 shows an example of just one form of coupling element which may be employed successfully in the present invention.

[0068] It will further be appreciated that a plurality of decorative metallic foil layers, in the form of multiple foil layers may be applied to the coupling elements prior to the application of the protective layer, thereby adding to the variety of decoration provided by this invention and particularly the range of logos and lettering that may be applied to the coupling elements.

[0069] Therefore in accordance with the present invention it is now possible to prepare improved slide fasteners with decorative metallic foil layers applied to the surface of plastic coupling elements and with a further protective layer applied atop the decorative layer to improve the wear resistance of such decorated slide fasteners.

Claims

1. A slide fastener stringer (100) comprising:

a first tape (110) comprising a first edge, the tape further comprising a cord (50) extending along the first edge of the tape; and
wherein the tape further comprises a row of cou-

pling elements (200a) located along the first edge of the tape and fixed thereto about the cord in a manner enabling the coupling elements on the tape to interdigitate with coupling elements on a second analogous tape; and
wherein each coupling element comprises a first surface (15) and wherein a decorative layer (16) is applied to the first surface of at least one coupling element; and
wherein a protective layer (22) is applied atop the decorative layer and extends over and beyond the decorative layer to contact a region of the at least one coupling element not covered by the decorative layer.

2. A slide fastener stringer according to claim 1 wherein the decorative layer covers the first surface (15) of at least one coupling element entirely.

3. A slide fastener stringer according to claim 1 or 2 wherein the first surface of each coupling element is substantially flat.

4. The slide fastener stringer according to claims 1, 2 or 3, the protective layer (22) covers the decorative layer (16) and extends over the decorative layer 16 on the first surface (15) and the second surface (17) to contact the coupling element directly at points (18, 19) of the second surface.

5. The slide fastener stringer according to any of the preceding claims wherein the decorative layer (16) of the at least one coupling element extends so as to cover an edge of the first surface (15).

6. A slide fastener according to any of the preceding claims wherein the protective layer is an acrylate based lacquer.

7. A slide fastener stringer according to any of the preceding claims wherein the decorative layer comprises a metallic foil layer.

8. A slide fastener stringer according to any of claims 1 to 7 wherein the protective layer extends over and beyond the decorative layer contacting the at least one coupling element in at least two discrete regions not covered by the decorative layer.

9. A slide fastener stringer according to any of claims 1 to 7 wherein for the at least one coupling element the protective layer extends over and beyond the decorative layer and encases the decorative layer by contacting the coupling element at all contiguous regions not covered by the decorative layer.

10. A slide fastener stringer according to any of the claims 1 to 7 wherein each coupling element com-

prises a second surface (17) encircling edge (40) of the first surface and extending away from the first surface (15) in the direction of the plane of the tape and wherein the protective layer (22) extends over the decorative layer and contacts one or more areas of the second surface of each coupling element in a region of the second surface not covered by the decorative layer. 5

11. A slide fastener stringer according to any of the preceding claims wherein the first surface of the at least one coupling element is a quadrilateral. 10

12. A method of preparing a slide fastener stringer according to any of claims 1 to 11 the slide fastener stringer (10b) comprising: 15

a first tape (11a) comprising a first edge, the tape further comprising a cord (50) extending along the first edge of the tape; and 20
 wherein the tape further comprises a row of coupling elements (20a) located along the first edge of the tape and fixed thereto about the cord in a manner enabling the coupling elements on the tape to interdigitate with coupling elements on a second analogous tape (11b); and 25
 wherein each coupling element comprises a first surface (15) and wherein a decorative layer (16) is applied atop the first surface (15) of the at least one coupling element; and wherein a protective layer (22) is applied atop the decorative layer and extends over and beyond the decorative layer to contact a region of the at least one coupling element not covered by the decorative layer. 30
 35

13. The method according to claim 12, wherein the decorative layer (16) is applied atop the first surface (15) by being pressed toward the coupling elements by a first press roller (61) and the protective layer (22) is applied atop the decorative layer by being pressed toward the coupling elements by a second press roller (62), and 40
 wherein the elastic modulus of a surface of the first press roller (61) is greater than the elastic modulus of a surface of the second press roller (62). 45

50

55

FIG. 1

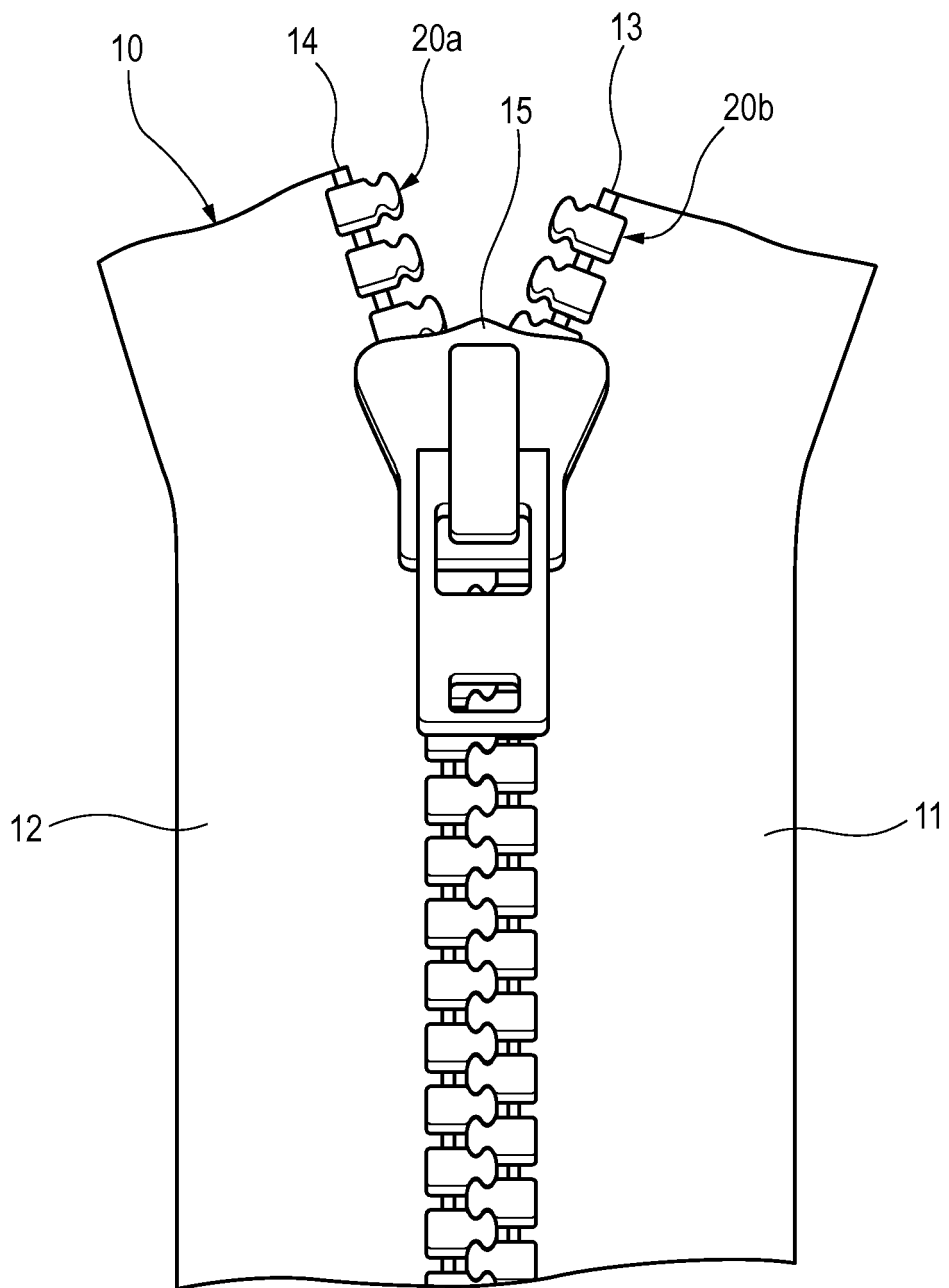


FIG. 2

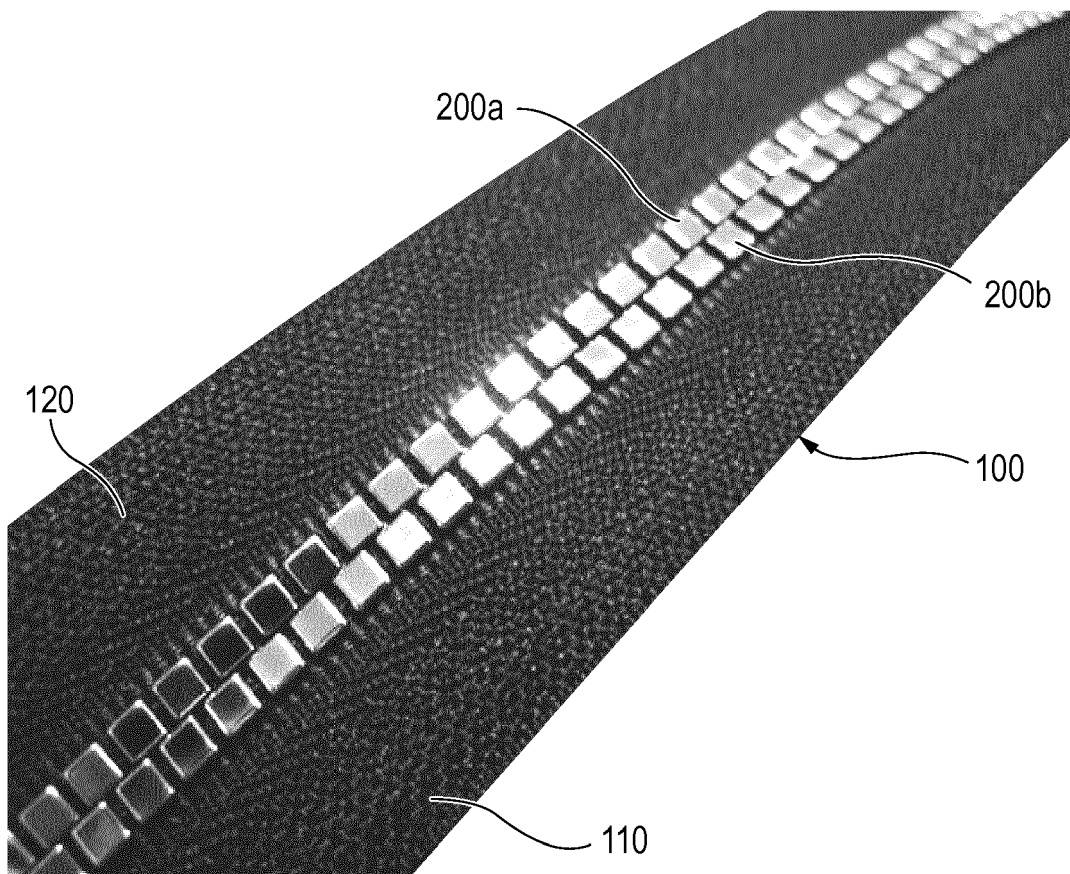


FIG. 3A

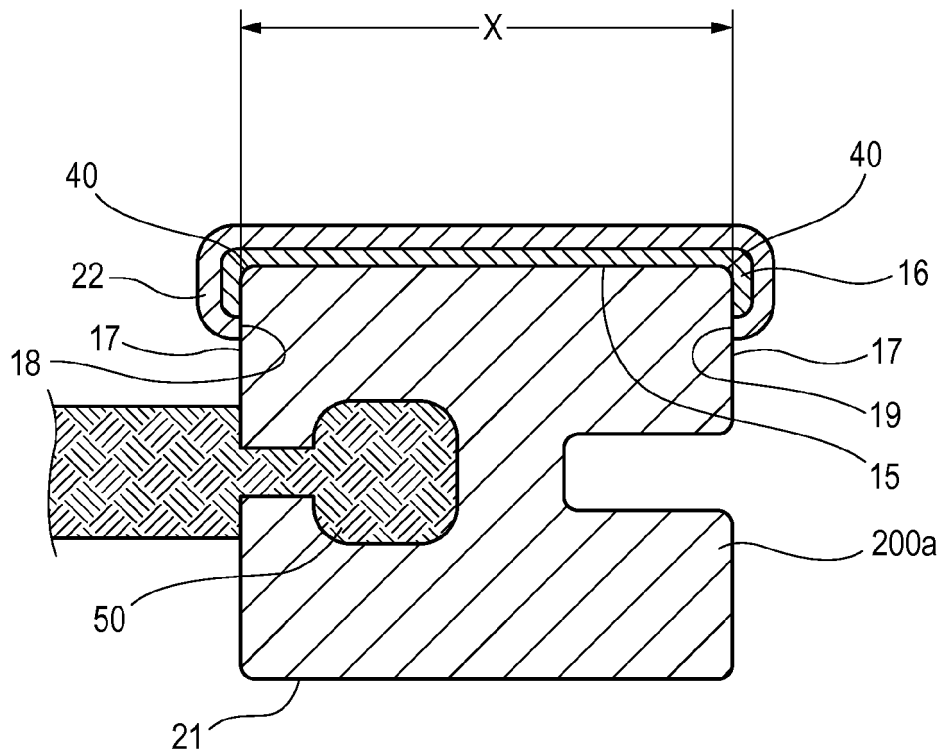


FIG. 3B

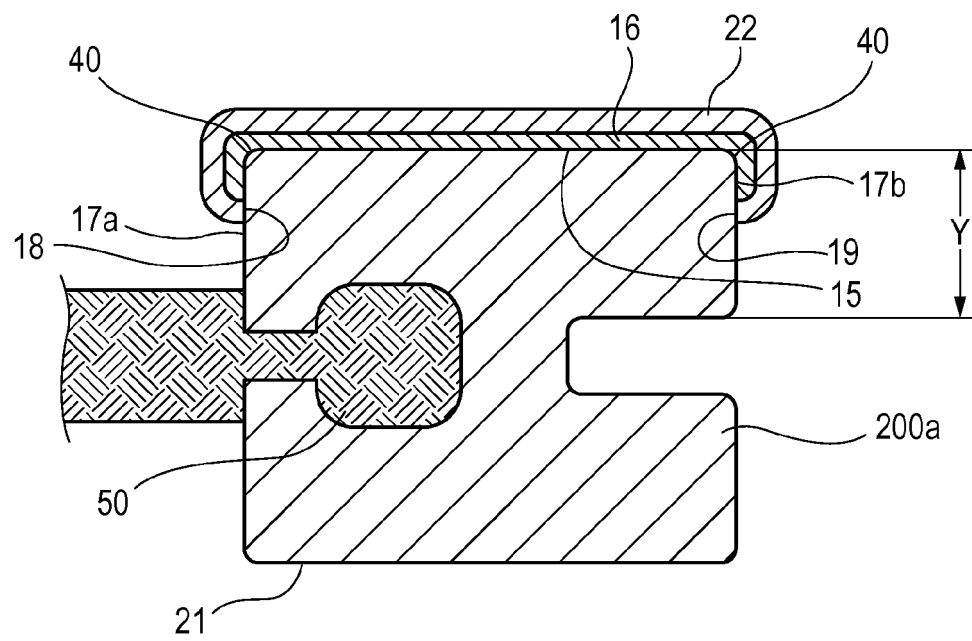


FIG. 4A

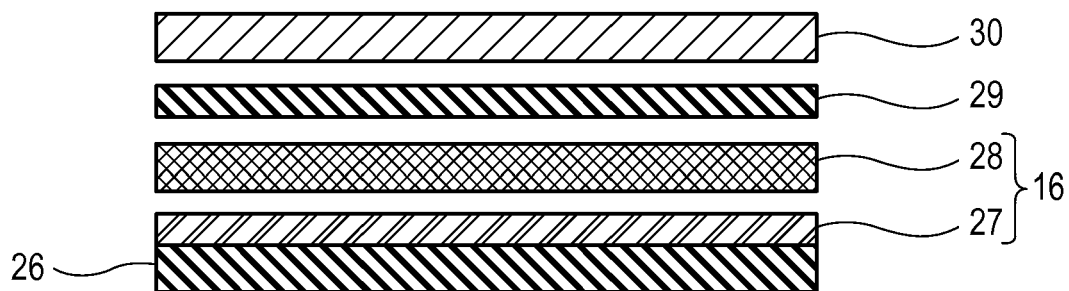


FIG. 4B

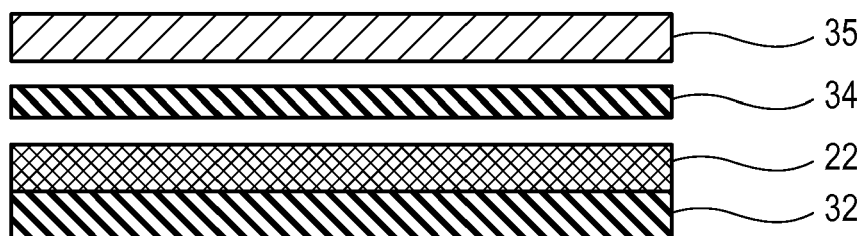
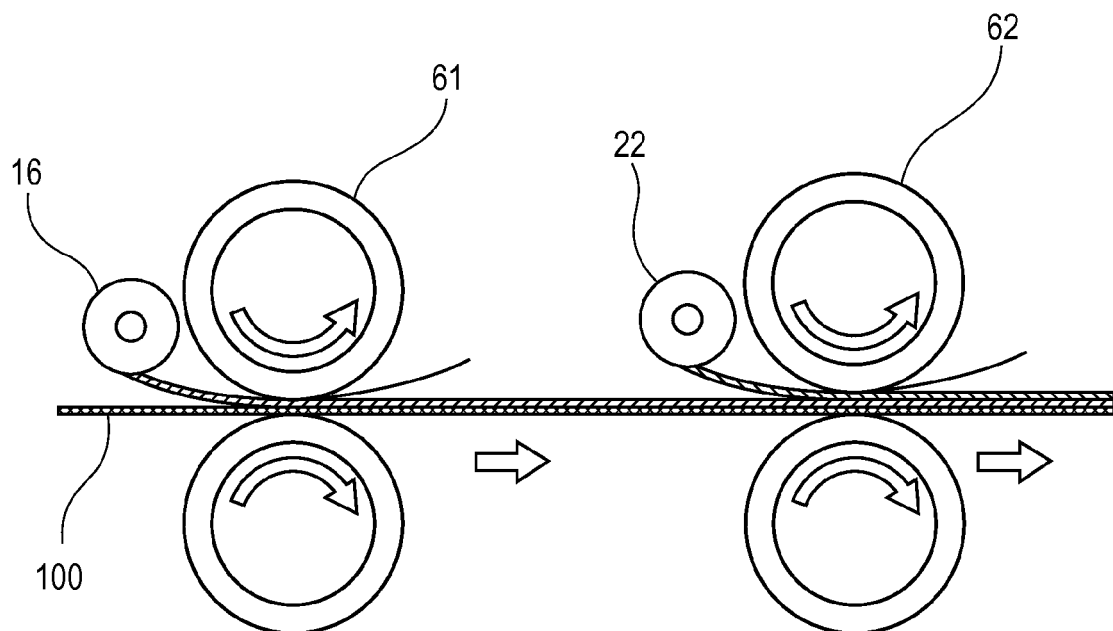


FIG. 5





EUROPEAN SEARCH REPORT

Application Number
EP 14 16 6251

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	US 544 109 A (RADO LEOPOLD) 6 August 1895 (1895-08-06) * page 1, line 86 - line 100; figures 1-10 *	1-13	INV. A44B19/06
Y	US 1 902 416 A (NORTON SAMUEL H) 21 March 1933 (1933-03-21) * page 1, line 66 - line 74 *	1-13	
Y	US 5 512 126 A (KANNABIRAN RENGAN [US] ET AL) 30 April 1996 (1996-04-30) * abstract; figure 10 *	13	
A	WO 2005/118293 A1 (DEMAXZ L L C [US]; ZAHER MAXIMILIAN [US]) 15 December 2005 (2005-12-15) * page 2, line 17 - line 19 *	13	
A,D	EP 0 384 318 A1 (YOSHIDA KOGYO KK [JP]) 29 August 1990 (1990-08-29) * figures 1-6 *	1-13	
			TECHNICAL FIELDS SEARCHED (IPC)
			A44B B41M
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 16 September 2014	Examiner van Voorst, Frank
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

EPO FORM 1503 03/02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 14 16 6251

5

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

16-09-2014

10

15

20

25

30

35

40

45

50

55

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 544109	A	06-08-1895	NONE	
US 1902416	A	21-03-1933	NONE	
US 5512126	A	30-04-1996	CA 2162719 A1	14-09-1995
			EP 0697962 A1	28-02-1996
			JP H08510702 A	12-11-1996
			US 5512126 A	30-04-1996
			WO 9524311 A1	14-09-1995
WO 2005118293	A1	15-12-2005	NONE	
EP 0384318	A1	29-08-1990	AU 624477 B2	11-06-1992
			AU 4998290 A	30-08-1990
			BR 9000892 A	13-02-1991
			CA 2009865 A1	20-08-1990
			DE 69013029 D1	10-11-1994
			EP 0384318 A1	29-08-1990
			ES 2064502 T3	01-02-1995
			HK 104597 A	15-08-1997
			JP H02218303 A	31-08-1990
			JP H07100041 B2	01-11-1995
			US 4987658 A	29-01-1991

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- WO 2009069728 A [0006]
- EP 0384318 A [0007] [0011] [0063]
- JP 4367603 A [0008]
- JP 8126503 A [0009]
- CN 2348647 [0010]
- EP 2470043 A [0034]