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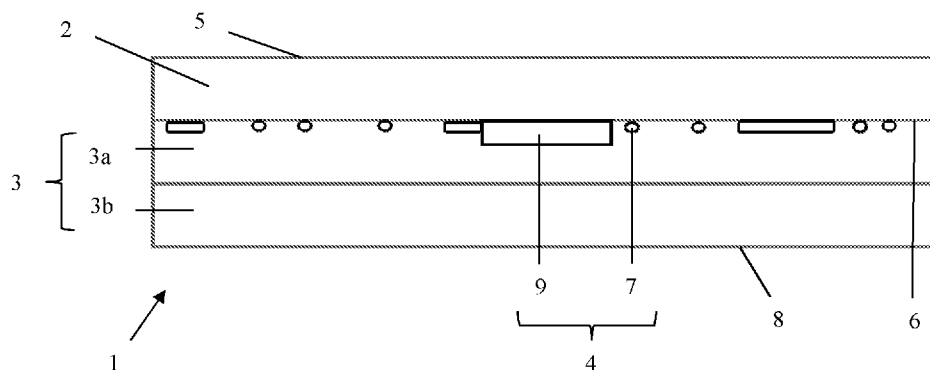


Fig. 1

(57) Abstract: A marking element (1) for the labelling of a textile, wherein said marking element (1) comprises at least a first layer (2), a second layer (3) and an electronic device (4), wherein the first layer (2) forms a first outer surface (5) of the marking element (1) and wherein the electronic device (4) is situated upon the first layer (2) at a location (6) opposite to the first outer surface (5) and in that the second layer (3) is connected to the first layer (2) at the height of the said location (6) opposite to the first outer surface (5) and wherein the electronic device (4) is embedded between the first layer (2) and the second layer (3), wherein the first outer surface (5) is thermal transfer printable and/or digital printable.



MARKING ELEMENT COMPRISING AN ELECTRONIC DEVICE**BACKGROUND**

This invention concerns a marking element for the labelling of a textile, wherein said
5 marking element comprises at least a first layer, a second layer and an electronic device
for comprising readable electronically stored information, wherein the first layer forms
a first outer surface of the marking element and wherein the electronic device is
situated upon the first layer at a location opposite to the first outer surface and in that
the second layer is bonded to the first layer at the height of the said location opposite
10 to the first outer surface and wherein the electronic device is embedded between the
first layer and the second layer.

Marking elements are used to mark textiles, such as clothes, sheets, towels, etc. They
are specifically used for the labelling of working clothes, uniforms, sheets and/or
15 towels in hotels, hospitals, retirement homes, factories, companies etc. These marking
elements are normally meant to stay attached to a said textile even after several
industrial and/or domestic washing cycles. Industrial washing cycles, are washing
cycles with a maximum temperature of approximately 95 °C. Domestic washing cycles
for clothes often do not reach temperatures higher than 60 °C. With several washing
20 cycles, more than 50 washing cycles are meant.

These textiles are usually washed in laundries. A laundry can be part of the company,
the hospital, the hotel, etc. who own the textiles, but in many cases external companies
are used to wash the textiles. For identification and traceability of the textiles, marking
25 elements are used. In the past these marking elements typically comprised a logo, a
barcode, a name. These marking elements all have to be read/scanned one by one, so
that the identification of the textiles takes some time. To speed up the identification
and simplify the traceability, many laundries are now switching to marking elements
comprising electronic devices. Already, some laundries exclusively use marking
30 elements comprising electronic device. These electronic devices comprise readable
electronically stored information and can for example comprise a chip, such as a RFID

chip (Radio-frequency identification chip), and electronical wires connected to the chip such that the information stored in the chip can be read. With the aid of electronic devices, the identification and traceability are accelerated, because one does not have to read/scan every marking element one by one. Several marking elements can be read
5 together. The investment of machines which can read the said electronic devices, the readers, is relatively high, but since laundries process many textiles a year, this investment is worthwhile.

For the owners of the textiles, being the companies, the hotels, the hospitals, the
10 retirement homes, it is not always interesting to invest in the said readers. Often the owners only have a barcode reader and/or a person manually sorts the washed textiles to make sure that the washed textiles end up at the right place. For this, the owners make use of marking elements comprising a logo, a barcode, a name, etc. This means that, if the laundry uses marking elements with electronic devices, every textile then
15 has to comprise two marking elements, which is not comfortable for the user and is also not esthetically. Another problem is, that not all laundries can read the electronic devices and that there are also different electronic devices which require different readers. This causes problems when one wishes to change to another laundry or if one wants to make use of several laundries.

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SUMMARY

It is therefore an object of the invention to provide a marking element which can be easily read by different parties, for example different laundries, the owners of the textiles comprising the marking elements, etc. and which do not require additional
25 investments of the different parties.

This object is achieved by providing a marking element for the labelling of a textile, wherein said marking element comprises at least a first layer, a second layer and an electronic device for comprising readable electronically stored information, wherein
30 the first layer forms a first outer surface of the marking element and wherein the electronic device is situated upon the first layer at a location opposite to the first outer

surface and in that the second layer is bonded to the first layer at the height of the said location opposite to the first outer surface and wherein the electronic device is embedded between the first layer and the second layer, wherein the first outer surface is thermal transfer printable and/or digital printable and in that the first outer surface is provided to form the visible side of the marking element when the marking element is attached to a textile.

This marking element comprises an electronic device for comprising readable electronically stored information. The parties which comprise a reader capable of reading the said electronic device, for example the laundries, can thus easily identify the textiles comprising the said marking elements, and can thus ensure that the identification and traceability will not take up too much time. Because the first outer surface is thermal transfer printable and/or digital printable, a barcode, a logo, a name, etc. can be printed upon the first outer surface. The barcode, the logo, the name, etc. is then visible because the first outer surface forms the visible side of the marking element, such that the barcode, the logo, the name, etc. can then be used to identify the textile. Parties which are not able to read the electronic devices, can still identify the textiles. Therefore it is not necessary to provide an additional marking element.

Thermal transfer can be abbreviated by TTR. Thermal transfer printing is very suitable for the application of a barcode. The first and/or the second layer can be a single layered layer, thus a layer only comprising one sublayer. The first and/or the second layer can be a multi-layered layer, thus a layer comprising two or more sublayers. The first and/or the second layer can also comprise additional elements such as for example a reinforcement fabric to enhance the mechanical strength of the marking element. The electronic device is embedded between the first layer and the second layer and it thus protected by these layers, such that the marking element can withstand one or several domestic and/or industrial washing cycles.

The electronic device preferably comprises a chip, such as a RFID chip. The chip can be an active chip, a semi active chip or a passive chip. Active chips comprise a power

source, such as a battery and may operate more than 100 meters from their readers. For marking elements, active chips are less interesting because one cannot change the power source when it no longer works, without braking the marking element, because the chip is embedded between the first layer and the second layer of the marking element. Also it is not necessary that the chip operates at relatively large distances from the reader. Passive chips use the energy of the reader. For this the electronic device can have an electrical circuit/electrical wires, connected to the chip such that energy of the reader can be transported to the chip. Since passive chips use the energy of the reader, problems of a broken internal power source do not occur.

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The electronic device is situated upon the first layer at a location opposite to the first outer surface and the second layer is bonded to the first layer at the height of the said location opposite to the first outer surface. During the manufacturing of the marking element the different layers are made. One can for example make a sublayer of the first layer and then coat a sublayer of the second layer onto the said sublayer of first layer. One can also make a sublayer of the second layer and then coat a sublayer of the first layer onto the said sublayer of the second layer. During the making of the marking element the different sublayers here connect to each other such that at the height of the attachment of the sublayers, these sublayers are somewhat intertwined, such that one cannot speak of outer surfaces of the sublayers at the height of their attachment. However one can refer to the location opposite to the first outer surface. During the manufacturing, the first layer can thus have a second outer surface which is located opposite the first outer surface, wherein the electronic device is then applied upon the said second outer surface and the second layer is bonded to the said second outer surface. As a result, the electronic device is situated upon the first layer at a location opposite to the first outer surface and the second layer is bonded to the first layer at the height of the said location opposite to the first outer surface.

In a preferred embodiment, the first layer comprises one or more sublayers, wherein at least a first sublayer of the one or more sublayers comprises a polyurethane, preferably a thermoset polyurethane, and wherein the first sublayer comprises the said

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first outer surface. A marking element comprising a polyurethane sublayer can be easily made by coating this sublayer. The coating can be done with the aid of a solvent and/or water or the coating can be done without the addition of water or a solvent. It is also easy to make a sublayer comprising polyurethane, wherein this sublayer is thermal transfer printable and/or digital printable. Preferably the polyurethane is a thermoset polyurethane. A thermoset is a polymer which cannot be melted and reformed and is therefore a durable polymer. A first sublayer comprising a said thermoset thus forms a durable sublayer which will not deteriorate by domestic and industrial washing. When the marking element is meant to be attached to a textile by applying heat and pressure, the first sublayer will also not alter, melt or degrade during the attachment of the element. The thermoset polyurethane preferably has a decomposition temperature of above 205°C, more preferably of above 210 °C, even more preferably of above 220°C. The first layer can for example only comprise the said first sublayer, wherein the electronic device is then located upon the said first sublayer. If the first sublayer comprises several sublayers, the electronic device is not located upon the first sublayer.

In an alternative embodiment the first layer comprises one or more sublayers, wherein at least a first sublayer of the one or more sublayers comprises a thermoset, which is not a thermoset polyurethane, and wherein the first sublayer comprises the said first outer surface.

Preferably the second layer comprises one or more sublayers, wherein one sublayer of the one or more sublayers is an adhesive sublayer, for securing the marking element to a textile by heat and pressure. Such a marking can be easily attached to a textile and can withstand several washing cycles, domestic and industrial. The attachment of a said marking element can be referred to as the patching of the marking element to the textile. This patching is normally done at standard conditions. For example standard conditions can be a temperature between 150 °C and 205 °C, a pressure between 3 and 5 bar and a duration of time between 8 and 15 seconds. Some marking elements can also be applied with the use of an iron, such that the patching is done at temperatures

below 200 °C and at lower pressures. The second layer can only comprise the said adhesive sublayer, but the second sublayer can also comprise one or several sublayers in addition to the adhesive sublayer.

- 5 Further preferably, the adhesive sublayer comprises a thermoplastic polyurethane. The polyurethane can be a polyester based polyurethane. Such urethanes are well suited to attach to a textile. Under the influence of heat, at least part of the thermoplastic polyurethane of the adhesive layer will liquefy. With the aid of pressure, said liquefied thermoplastic polyurethane is then partly pressed into the textile. The thermoplastic urethane then hardens again during the cooling down, with the result that the marking
10 element is attached to the textile. For said attachment a patch machine can be used. Such a patch machine will for example apply a pressure situated between 3 and 5 bar and apply a temperature situated between 190°C and 205°C and this for at least 10 seconds. For certain marking elements sufficient heat and pressure can also be applied
15 by ironing.

- In a very preferred embodiment the second layer comprises at least two sublayers, namely the said adhesive sublayer and a protective sublayer, wherein the protective sublayer is situated between the first layer and the adhesive sublayer and is bonded to
20 the first layer at the height of the said location opposite to the first outer surface, and the electronic device is substantially embedded between the first layer and the protective sublayer. With the aid of a protective sublayer the electronic device is well protected from outside influences, such that the electronic device is well protected from water, detergents, etc. during the washing of the textile upon which the marking
25 element is attached.

- Further preferably the protective sublayer comprises a polyurethane, preferably a thermoset polyurethane. A thermoset is a polymer which cannot be melted and reformed and is therefore a durable polymer. The protective sublayer comprising a said
30 thermoset thus forms a durable sublayer which will not deteriorate by domestic and industrial washing and will also not alter, melt or degrade during the attachment of the

marking element to the textile, when the said marking element is attached with the aid of heat and pressure. The electronic device is thus very well protected.

Further preferably the thickness of the protective sublayer is higher than the
5 corresponding measurements of the electronic device such that the electronic device is completely encapsulated by the first layer and the protective sublayer.

Also further in an alternative embodiment, the protective sublayer comprises a thermoset, which is not a thermoset polyurethane.

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In another alternative embodiment the second layer only comprises one sublayer, a protective sublayer, wherein the protective sublayer preferably comprises a polyurethane, more preferably a thermoset polyurethane.

15 In a preferred embodiment, the electronic device comprises a chip and at least one conductive element connected to the chip. A chip has a limited volume and thus can well be embedded between the first layer and the second layer. Also the thickness of the marking element can here be kept sufficiently small, such that a person wearing a textile onto which a said marking element is attached, is not hindered by the marking
20 element. With the aid of a conductive element, one can use a passive chip such that the life time of the chip is not limited by a power source, such as a battery. The conductive element is preferably situated upon the first layer at said location opposite to the first outer surface. The chip can also be situated upon the first layer at said location opposite to the first outer surface or the chip can be situated upon the at least
25 one conductive element.

Further preferably the chip is a RFID chip. RFID chips use electromagnetic fields, such that the RFID chip can easily be read, even if it is embedded between the first layer and the second layer. RFID readers are also common available.

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Also further preferably the at least one conductive element comprises conductive ink. For example the conductive element can be a conductive circuit made out of conductive ink. Conductive ink can be very thin applied, such that the conductive element does not take up much volume. Conductive ink can also easily be applied to a surface which is compatible with conductive ink, for example by printing the conductive ink. The said conductive ink is preferably printed upon the first layer at the height of the said location opposite to the first outer surface.

In a specific embodiment the second layer comprises a pressure sensitive sublayer, wherein the pressure sensitive sublayer forms a second outer surface of the marking element. With the aid of a pressure sensitive sublayer which forms the second outer surface of the marking element, the marking element can be easily positioned with regard to the textile to which the marking element is to be attached. This by placing the second outer surface upon the surface of the textile. In this embodiment the second layer can comprise the said adhesive sublayer, wherein this adhesive sublayer is located between the pressure sensitive sublayer and the first layer, preferably between the pressure sensitive sublayer and the said protective sublayer if present. The second outer surface can be attached to a release paper, to protect the pressure sensitive sublayer before the attachment of the marking element to a textile.

In a specific embodiment the first layer comprises a reinforcement fabric, wherein said reinforcement fabric is situated at a distance from the first outer surface. This reinforcement fabric gives extra mechanical strength and durability to the marking element. This marking element is thus very suitable to be used in industrial washing cycles and is also very suitable to be attached to textiles used for heavy duty in the construction, chemical, metal, etc. industry. Examples of reinforcement fabrics are a knit, such as a warped knit, a non-woven, a net, a scrim, a web, etc. This reinforcement fabric can be a porous fabric having a thickness of at most 1000 μm such that one or both of the surrounding sublayers extend at least partly through the fabric so that the said sublayers are in direct contact with each other and can directly adhere, causing the marking element to be a marking element where the different parts/layers do not

easily come apart during the use of the marking element. Preferably the reinforcement fabric has a thickness of at most 500 μm , more preferably of at most 200 μm . Because of the porosity and the limited thickness of the reinforcement fabric, heat can easily be transferred through the fabric. If such a marking element can be applied to a textile with the aid of heat and pressure, a good heat transfer is important. Preferably at least one of the abovementioned sublayers extends completely through the fabric. This ensures a very good bond between these sublayers. This marking element can therefore withstand many industrial washing cycles.

Further preferably the first layer comprises at least the said first sublayer and a second sublayer, wherein the reinforcement fabric at least partly forms a partition between the first sublayer and the second sublayer. Here the reinforcement fabric is at least partly situated between the first layer and the second sublayer. The reinforcement fabric is preferably an open structure which allows the first sublayer and the second sublayer to come into direct contact with each other for creating a strong bond between the first sublayer and the second sublayer. Here the reinforcement fabric only partly forms a partition between the first sublayer and the second sublayer, such that the first sublayer and the second sublayer are not completely separated from each other by the reinforcement fabric. Preferably the thickness of the reinforcement fabric is limited and at most 1000 μm . There are different ways to attach the marking element to the textile. If heat and pressure is used, one can choose to apply heat only to the upper side of the marking element, thus to the first layer or one can choose to apply heat to the first layer of the marking element and to the lower side of the textile. When one only applies heat to the first layer, it is advantageous that the reinforcement fabric has an open structure and/or is a thin element, such that the heat transfer is fast.

Further, even more preferably the second sublayer comprises a polyurethane, preferably a thermoset polyurethane.

Also further preferably the first layer comprises at least a third sublayer wherein this third sublayer is an adhesive sublayer, wherein the said third sublayer is substantially

located between the said first sublayer and the reinforcement fabric. With the aid of the adhesive sublayer, the reinforcement fabric is well attached to the first sublayer. The marking element can also have a forth sublayer, also being an adhesive sublayer, wherein the said forth sublayer is substantially located between the said second
5 sublayer and the reinforcement fabric.

In an alternative embodiment, wherein the marking element comprises a said reinforcement fabric, the reinforcement fabric at least partly forms the said location opposite to the first outer surface and the electronic device is situated upon the
10 reinforcement fabric. Here the reinforcement surface at least partly forms a surface of the first layer opposite to the first outer surface. Here the reinforcement fabric is compatible with the electronic device. To make the reinforcement fabric compatible, the reinforcement fabric could have undergone a calendaring action.

15 BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 presents a schematic cross-section of a first embodiment of a marking element according to invention;

Figure 2 presents a schematic cross-section of a second embodiment of a marking element according to invention;

20 Figure 3 presents a schematic cross-section of a third embodiment of a marking element according to invention;

Figure 4 presents a schematic cross-section of a fourth embodiment of a marking element according to invention;

25 Figure 5 presents a schematic cross-section of a fifth embodiment of a marking element according to invention;

Figure 6 presents a schematic cross-section of a sixth embodiment of a marking element according to invention.

DETAILED DESCRIPTION OF THE DRAWINGS

30 The invention will now be described in greater depth based on the following detailed description of six embodiments of marking elements according to the invention. The

purpose of this description is to give illustrative examples and to indicate further advantages and special features of preferred embodiments according to this invention and should not be interpreted as a limitation of the scope of the application of the invention or of the patent rights requested in the claims. This detailed description
5 employs reference numerals to refer to the appended drawings.

The marking elements (1) described in the figures all comprise a first layer (2), a second layer (3) and an electronic device (4) for comprising readable electronically stored information. This electronic device (4) comprises a RFID chip (9) and
10 conductive ink which forms an electronic circuit (7). Each first layer (2) forms a first outer surface (5) of the marking element (1) and the electronic device (4) is situated upon the first layer (2) at a location (6) opposite to the first outer surface (5). The second layer (3) is connected to the first layer (2) at the height of the said location (6) opposite to the first outer surface (5). The electronic device (4) is embedded between
15 the first layer (2) and the second layer (3). The first outer surface (5) is thermal transfer printable and/or digital printable and the first outer surface (5) forms the visible side of the marking element (1) when the marking element (1) is attached to a textile.

In the embodiment described in figure 1, the first layer (2) only comprises one first
20 sublayer (2). This first sublayer (2) comprises a thermoset polyurethane with a decomposition temperature of above 220 °C. The second layer (3) comprises two sublayers (3a, 3b), namely a protective sublayer (3a) and an adhesive sublayer (3b). The electronic device (4) is completely embedded between the first layer (2) and the protective sublayer (3a). The adhesive sublayer (3b) forms a second outer surface (8)
25 of the marking element (1). The protective sublayer (3a) comprises a thermoset polyurethane with a decomposition temperature of above 220 °C. The adhesive sublayer (3b) comprises a thermoplastic polyurethane such that the marking element (1) can be attached to a textile with the aid of heat and pressure. Here the conductive ink has been printed upon the first layer (2) as such forming a conductive circuit (7)
30 directly applied upon the first layer (2). Here the chip (9) is also directly applied upon the first layer (2).

In figure 2 a second embodiment of a marking element (1) according to the invention is shown: The first layer (2) only comprises one first sublayer (2). This first sublayer (2) comprises a thermoset polyurethane with a decomposition temperature of above 220 °C. The second layer (3) comprises two sublayers (3a, 3b), namely a protective sublayer (3a) and an adhesive sublayer (3b). The electronic device (4) is completely embedded between the first layer (2) and the protective sublayer (3a). The adhesive sublayer (3b) forms a second outer surface (8) of the marking element (1). The protective sublayer (3a) comprises a thermoset polyurethane with a decomposition temperature of above 220 °C. The adhesive sublayer (3b) comprises a thermoplastic polyurethane such that the marking element (1) can be attached to a textile with the aid of heat and pressure. Here the conductive ink has been printed upon the first layer (2) as such forming a conductive circuit (7). The chip (9) is applied upon the conductive circuit (7) and thus is substantially embedded between the conductive circuit (7) and the protective sublayer (3a).

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The embodiment shown in figure 3 is made up as following: The first layer (2) only comprises one first sublayer (2). This first sublayer (2) comprises a thermoset polyurethane with a decomposition temperature of above 220 °C. The second layer (3) only comprises one sublayer (3), which has a protective function and an adhesion function. The electronic device (4) is completely embedded between the first layer (2) and the second layer (3). The second layer (3) forms a second outer surface (8) of the marking element (1). The second layer (3) comprises a thermoplastic polyurethane such that the marking element (1) can be attached to a textile with the aid of heat and pressure. Here the conductive ink has been printed upon the first layer (2) as such forming a conductive circuit (7). The chip (9) is applied upon the conductive circuit (7) and thus substantially embedded between the conductive circuit (7) and the second layer (3).

Figure 4 shows the following embodiment: The first layer (2) only comprises one first sublayer (2). This first sublayer (2) comprises a thermoset polyurethane with a decomposition temperature of above 220 °C. The second layer (3) comprises three

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sublayers (3a, 3b, 3c), namely a protective sublayer (3a), an adhesive sublayer (3b) and a pressure sensitive sublayer (3c). The electronic device (4) is completely embedded between the first layer (2) and the protective sublayer (3a). The pressure sensitive sublayer (3c) forms a second outer surface (8) of the marking element (1).

5 The protective sublayer (3a) comprises a thermoset polyurethane with a decomposition temperature of above 220 °C. The adhesive sublayer (3b) comprises a thermoplastic polyurethane such that the marking element (1) can be attached to a textile with the aid of heat and pressure. The pressure sensitive sublayer (3c) is a very thin sublayer which helps to position the marking element (1) during the attachment of the marking
10 element (1) to a textile. Here the conductive ink has been printed upon the first layer (2) as such forming a conductive circuit (7) directly applied upon the first layer (2). Here the chip (9) is also directly applied upon the first layer (2).

In the embodiment described in figure 5, the first layer (2) comprises four sublayers
15 (2a, 2b, 2d, 2e) and a reinforcement fabric (2c). The first sublayer (2a) comprises a thermoset polyurethane with a decomposition temperature of above 220 °C and forms the said first outer surface (5) of the marking element (1). The second sublayer (2e) comprises a thermoset polyurethane with a decomposition temperature of above 220 °C and the third and the fourth sublayer (2b, 2d) comprise a thermoplastic
20 polyurethane. The third sublayer (2b) is substantially situated between the first sublayer (2a) and the reinforcement fabric (2c). The fourth sublayer (2d) is substantially situated between the reinforcement fabric (2c) and the second sublayer (2e). The third and fourth sublayer (2b, 2d) ensure that the reinforcement fabric (2c) is well attached to the first sublayer (2a) and the second sublayer (2e) such that the first
25 layer (2) does not fall apart. The reinforcement fabric (2c) is a porous fabric with a thickness of less than 1000 µm. The reinforcement fabric (2c) is for example a mesh, a net, a web, a knit or a non-woven. Because of the permeability of the reinforcement fabric (2c) the third and fourth sublayer (2b, 2d) at least partly penetrate the reinforcement fabric (2c) in such a way that the third and the fourth sublayer (2b, 2d)
30 are in direct contact with each other, as such ensuring a strong bound between the different sublayers (2a, 2b, 2d, 2e) of the first layer (2). The second layer (3) comprises

two sublayers (3a, 3b), namely a protective sublayer (3a) and an adhesive sublayer (3b). The electronic device (4) is completely embedded between the second sublayer (2e) of the first layer (2) and the protective sublayer (3a). The adhesive sublayer (3b) forms a second outer surface (8) of the marking element (1). The protective sublayer (3a) comprises a thermoset polyurethane with a decomposition temperature of above 220 °C. The adhesive sublayer (3b) comprises a thermoplastic polyurethane such that the marking element (1) can be attached to a textile with the aid of heat and pressure. Here the conductive ink has been printed upon the second sublayer (2e) of the first layer (2) as such forming a conductive circuit (7) directly applied upon the second sublayer (2e) of the first layer (2). Here the chip (9) is also directly applied upon the second sublayer (2e) of the first layer (2).

Figure 6 shows the following embodiment: The first layer (2) comprises two sublayers (2a, 2b) and a reinforcement fabric (2c). The first sublayer (2a) comprises a thermoset polyurethane with a decomposition temperature of above 220 °C and forms the said first outer surface (5) of the marking element (1). The second sublayer (2b) comprises a thermoplastic polyurethane. The reinforcement fabric (2c) is applied upon the second sublayer (2b) and is here mainly situated between the second sublayer (2b) of the first layer (2) and the second layer (3). The reinforcement fabric (2c) is a porous fabric with a thickness of less than 1000 µm. The reinforcement fabric (2c) is for example a mesh, a net, a web, a knit or a non-woven. Because of the permeability of the reinforcement fabric (2c) the said second sublayer (2b) and the second layer (3) are in direct contact with each other, as such ensuring a strong bound between the two layers (2, 3). The second layer (3) comprises two sublayers (3a, 3b), namely a protective sublayer (3a) and an adhesive sublayer (3b). The electronic device (4) is substantially embedded between the reinforcement fabric (2c) of the first layer (2) and the protective sublayer (3a). The adhesive sublayer (3b) forms a second outer surface (8) of the marking element (1). The protective sublayer (3a) comprises a thermoset polyurethane with a decomposition temperature of above 220 °C. The adhesive sublayer (3b) comprises a thermoplastic polyurethane such that the marking element (1) can be attached to a textile with the aid of heat and pressure. Here the conductive ink has been printed upon

the reinforcement fabric (2c) as such forming a conductive circuit (7) directly applied upon the reinforcement fabric (2c). Here the chip (9) is also directly applied upon the reinforcement fabric (2c).

C L A I M S

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1. A marking element (1) for the labelling of a textile, wherein said marking element (1) comprises at least a first layer (2), a second layer (3) and an electronic device (4) for comprising readable electronically stored information, wherein the first layer (2) forms a first outer surface (5) of the marking element (1) and wherein the electronic device (4) is situated upon the first layer (2) at a location (6) opposite to the first outer surface (5) and in that the second layer (3) is bonded to the first layer (2) at the height of the said location (6) opposite to the first outer surface (5) and wherein the electronic device (4) is embedded between the first layer (2) and the second layer (3), **characterized in that** the first outer surface (5) is thermal transfer printable and/or digital printable and in that the first outer surface (5) is provided to form the visible side of the marking element (1) when the marking element (1) is attached to a textile.
2. A marking element (1) according to claim 1, characterized in that the first layer (2) comprises one or more sublayers, wherein at least a first sublayer of the one or more sublayers comprises a polyurethane, preferably a thermoset polyurethane, and wherein the first sublayer comprises the said first outer surface (5).
3. A marking element (1) according to claim 1 or 2, characterized in that the second layer (3) comprises one or more sublayers, wherein one sublayer of the one or more sublayers is an adhesive sublayer, for securing the marking element (1) to a textile by heat and pressure.
4. A marking element (1), according to claim 3, characterized in that the adhesive sublayer comprises a thermoplastic polyurethane.
5. A marking element (1) according to claim 3 or 4, characterized in that second layer (3) comprises at least two sublayers (3a, 3b), namely the said adhesive sublayer (3a) and a protective sublayer (3b), wherein the protective sublayer

(3a) is situated between the first layer (2) and the adhesive sublayer (3b) and is bonded to the first layer (2) at the height of the said location (6) opposite to the first outer surface (5), and wherein the electronic device (4) is substantially embedded between the first layer (2) and the protective sublayer (3a).

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6. A marking element (1) according to claim 5, characterized in that the protective sublayer (3a) comprises a polyurethane, preferably a thermoset polyurethane.

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7. A marking element (1) according to claim 5 or 6, characterized in that the thickness of the protective sublayer (3a) is higher than the corresponding measurements of the electronic device (4) such that the electronic device (4) is completely encapsulated by the first layer (2) and the protective sublayer (3a).

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8. A marking element (1) according to any of the preceding claims, characterized in that the electronic device (4) comprises a chip (9) and at least one conductive element (7) connected to the chip (9).

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9. A marking element (1) according to claim 8, characterized in that the chip (9) is a RFID chip (9).

10. A marking element (1) according to claim 8 or 9, characterized in that the at least one conductive element (7) comprises conductive ink.

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11. A marking element (1) according to claim 10, characterized in that said conductive ink is printed upon the first layer (2) at the height of the said location (6) opposite to the first outer surface (5).

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12. A marking element (1) according to any of the preceding claims, characterized in that the second layer (3) comprises a pressure sensitive sublayer (3c), wherein the pressure sensitive sublayer (3c) forms a second outer surface (8) of the marking element (1).

13. A marking element (1) according to any of the preceding claims, characterized in that the first layer (2) comprises a reinforcement fabric (2c) wherein said reinforcement fabric (2c) is situated at a distance from the first outer surface (5).
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14. A marking element (1) according to claim 2 and 13, characterized in that the first layer (2) comprises at least the said first sublayer (2a) and a second sublayer (2e), wherein the reinforcement fabric (2c) at least partly forms a partition between the first sublayer (2a) and the second sublayer (2e).
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15. A marking element (1) according to claim 14, characterized in that the second sublayer (2e) comprises a polyurethane, preferably a thermoset polyurethane.
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16. A marking element (1) according to claim 15, characterized in that, the first layer (2) comprises at least a third sublayer (2b) wherein this third sublayer (2b) is an adhesive sublayer, wherein the said third sublayer (2b) is substantially located between the said first sublayer (2a) and the reinforcement fabric (2c).
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17. A marking element (1) according to claim 13, characterized in that the reinforcement fabric (2c) at least partly forms the said location (6) opposite to the first outer surface (5) and wherein the electronic device (4) is situated upon the reinforcement fabric (2c).

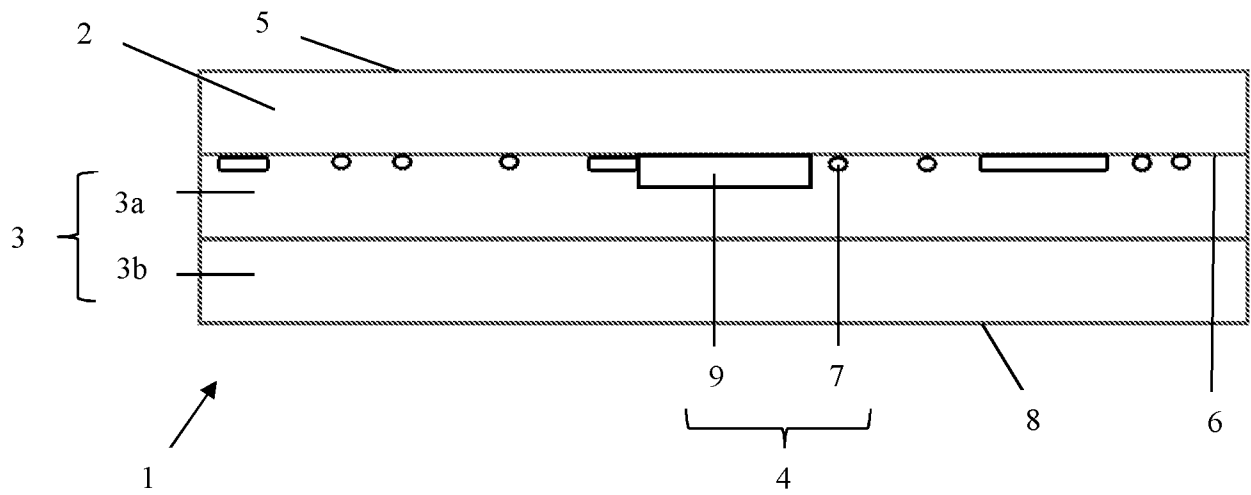


Fig. 1

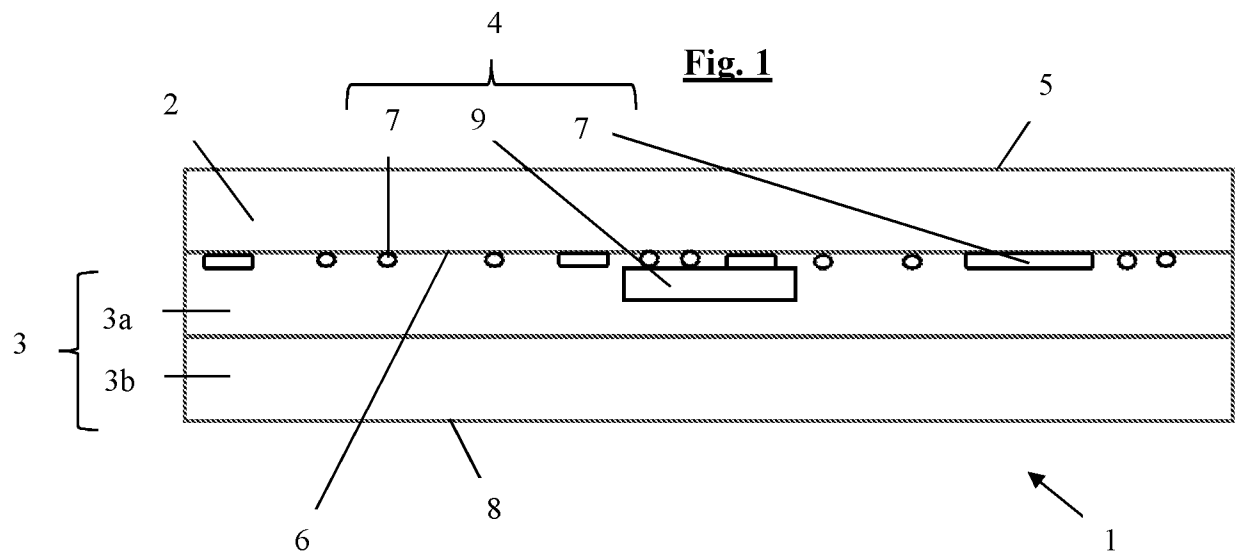


Fig. 2

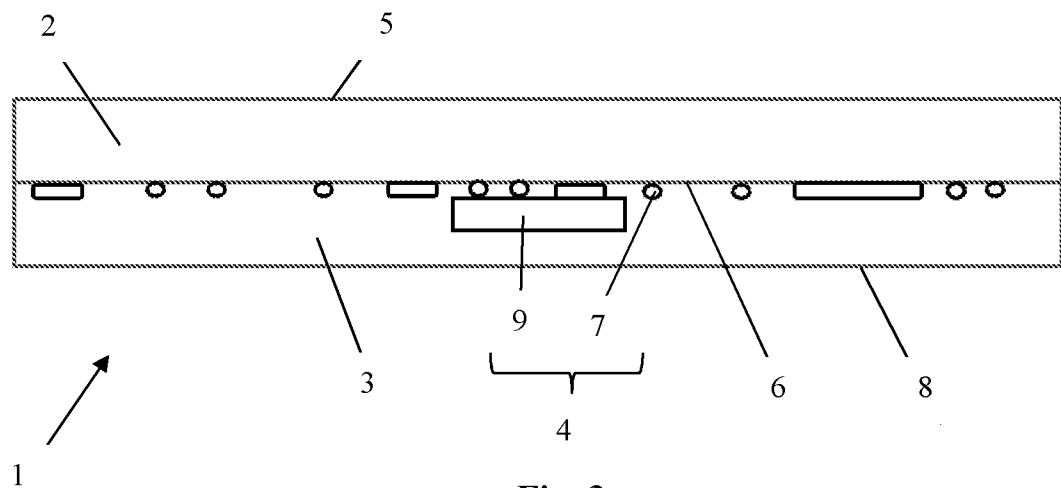
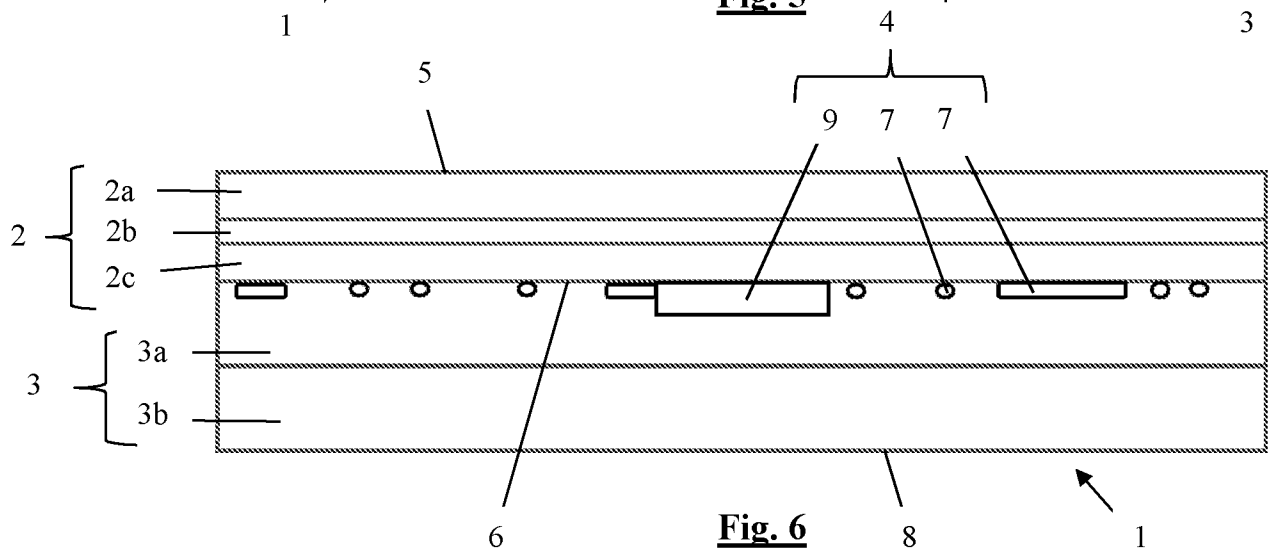
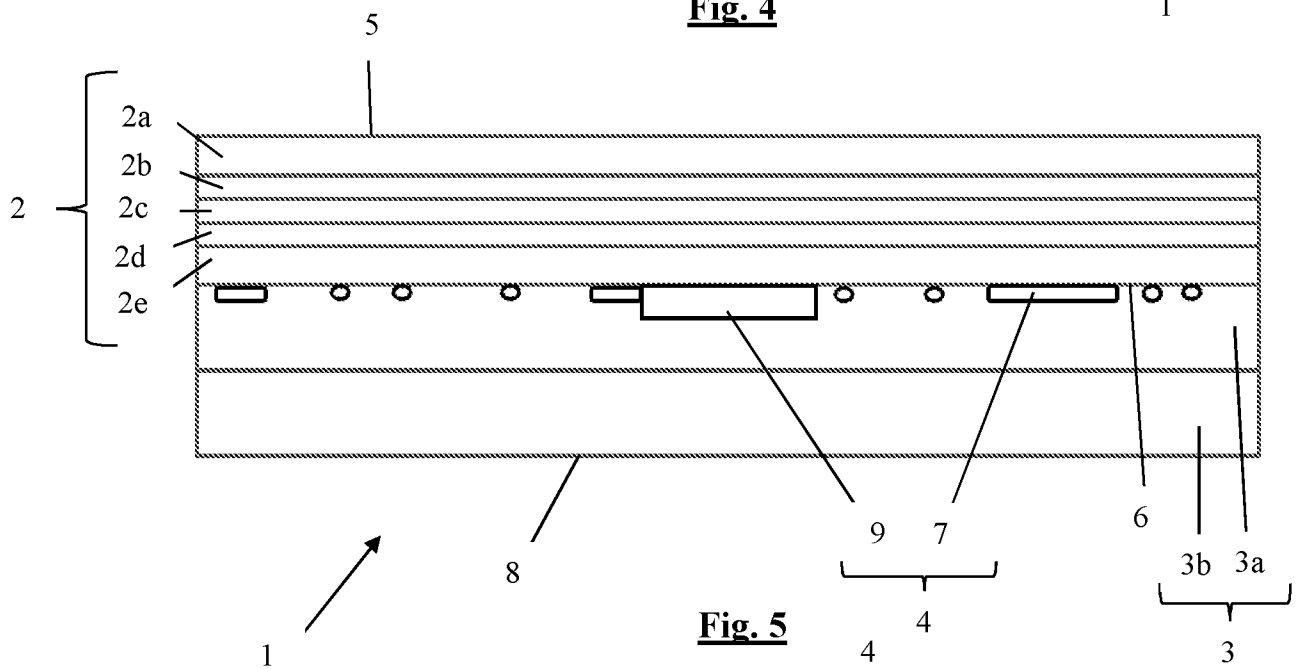
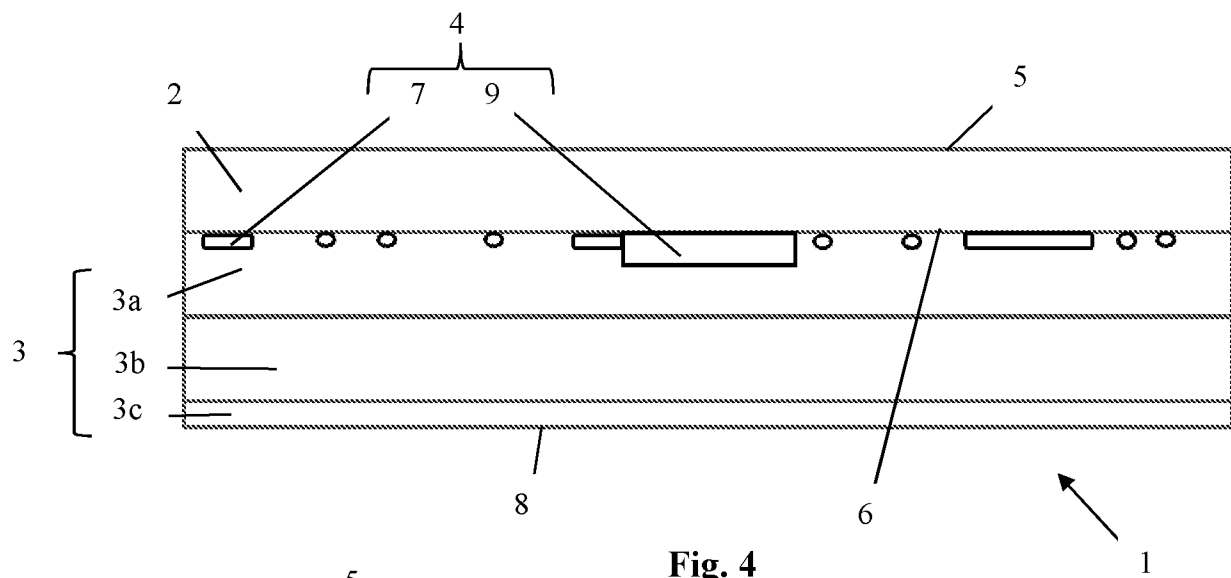


Fig. 3



INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2018/056583

A. CLASSIFICATION OF SUBJECT MATTER
INV. G06K19/02 G06K19/077
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
G06K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EP0-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2011/150000 A2 (AVERY DENNISON CORP; CHIAO YI-HUNG [US]; KREKIAN SHARIS [US]; DANG CHR) 1 December 2011 (2011-12-01) paragraphs [0033], [0040], [0057]; figure 1	1-17
X	WO 2004/050262 A1 (AVERY DENNISON CORP [US]; TSAI KUOLIH [US]; HSEIH DONG-TSAI [US]; SHU) 17 June 2004 (2004-06-17) figures 13-16	1-11
X	US 2003/136503 A1 (GREEN ALAN [US] ET AL) 24 July 2003 (2003-07-24)	1,8-11
A	paragraph [0064] - paragraph [0069]; figures 4,5	2-7, 12-17



Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2018/056583

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 2011150000	A2	01-12-2011	BR 112012029997 A2	27-06-2017
			CN 103025613 A	03-04-2013
			CN 107031263 A	11-08-2017
			EP 2576358 A2	10-04-2013
			EP 2695991 A2	12-02-2014
			MX 338331 B	12-04-2016
			TW 201206719 A	16-02-2012
			US 2011289647 A1	01-12-2011
			WO 2011150000 A2	01-12-2011

WO 2004050262	A1	17-06-2004	AU 2003297620 A1	23-06-2004
			CA 2508202 A1	17-06-2004
			EP 1578542 A1	28-09-2005
			EP 2267218 A1	29-12-2010
			EP 2270277 A1	05-01-2011
			ES 2438529 T3	17-01-2014
			ES 2599061 T3	31-01-2017
			ES 2676522 T3	20-07-2018
			HK 1087376 A1	12-09-2008
			JP 4700651 B2	15-06-2011
			JP 5409661 B2	05-02-2014
			JP 2006507962 A	09-03-2006
			JP 2007276486 A	25-10-2007
			JP 2008120086 A	29-05-2008
			JP 2008207558 A	11-09-2008
			JP 2011126281 A	30-06-2011
			MX PA05005811 A	18-08-2005
			TR 201808896 T4	23-07-2018
			US 2005100689 A1	12-05-2005
			US 2007009732 A1	11-01-2007
			US 2007275319 A1	29-11-2007
			US 2011079651 A1	07-04-2011
			US 2014110042 A1	24-04-2014
			WO 2004050262 A1	17-06-2004

US 2003136503	A1	24-07-2003	AT 326734 T	15-06-2006
			AU 2003267938 A1	22-12-2003
			BR PI0306992 A2	12-07-2016
			CA 2473729 A1	18-12-2003
			CA 2816158 A1	18-12-2003
			CA 2816180 A1	18-12-2003
			CA 2816324 A1	18-12-2003
			CN 1628321 A	15-06-2005
			CN 101159036 A	09-04-2008
			DE 03748885 T1	29-09-2005
			DE 20321502 U1	25-10-2007
			DE 60305295 T2	18-01-2007
			EP 1470528 A2	27-10-2004
			EP 1693792 A1	23-08-2006
			EP 2306372 A1	06-04-2011
			ES 2270072 T3	01-04-2007
			ES 2551274 T3	17-11-2015
			ES 2588207 T3	31-10-2016
			JP 4860918 B2	25-01-2012
			JP 2005520266 A	07-07-2005
			JP 2009048662 A	05-03-2009
			KR 20040075095 A	26-08-2004
			MX PA04006913 A	15-10-2004

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2018/056583

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		US 2003136503 A1	24-07-2003
		US 2005252605 A1	17-11-2005
		US 2006213609 A1	28-09-2006
		US 2008142154 A1	19-06-2008
		US 2012297609 A1	29-11-2012
		W0 03105063 A2	18-12-2003
