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(71) Applicant: **Geveko Markings Denmark A/S**
5900 Rudkobing (DK)

(72) Inventors:
- **FAGE-PEDERSEN, Anders Michael**
  5700 Svendborg (DK)
- **LEHMANN CARLSEN, Morten**
  5270 Odense N. (DK)

(74) Representative: **Awapatent AB**
P.O. Box 5117
200 71 Malmö (SE)

(54) SURFACE COVERING, METHOD FOR APPLICATION AND KIT OF PARTS

(57) Surface covering (1) adapted for application on surfaces (4), such as road surfaces, side walk surfaces, foot and bicycle way surfaces, playground surfaces, parking lot surfaces, parking house floor surfaces, or sports ground surfaces, the surface covering (1) comprising:
a thermoplastic sheet (2) having a first density (p1); and an indicator (3) being located at an intended lower surface (2a) of the thermoplastic sheet (2) and having a second density (p2) being lower than the first density (p1), the surface covering (1) being adapted to be attached to the surface (4) by application of heat to the surface covering (1), thereby at least partly melting the thermoplastic sheet (2) allowing the indicator (3) to rise through the thermoplastic sheet (2).

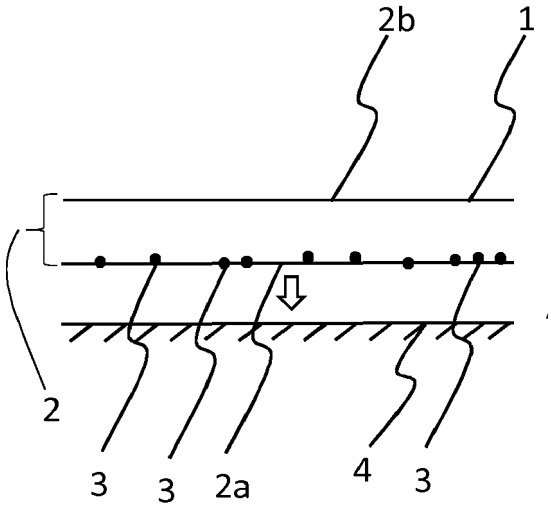

Fig. 1A

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Description

Technical field

[0001] The invention relates to a surface covering adapted for application on surfaces, such as road surfaces, side walk surfaces, foot and bicycle way surfaces, playground surfaces, parking lot surfaces, parking house floor surfaces, or sports ground surfaces, the covering comprising a thermoplastic sheet.

[0002] The invention also relates to a method for application of a surface covering to a surface, such as road surfaces, side walk surfaces, foot and bicycle way surfaces, playground surfaces, parking lot surfaces, parking house floor surfaces, or sports ground surfaces.

[0003] The invention also relates to a kit of parts for application of a surface covering on surfaces, such as road surfaces, side walk surfaces, foot and bicycle way surfaces, playground surfaces, parking lot surfaces, parking house floor surfaces, or sports ground surface.

Background of the invention

[0004] It is known to produce pre-manufactured thermoplastic markings having the shape of the total intended marking or having the shape of a part of the intended marking. Such pre-manufactured thermoplastic markings may e.g. be adapted to be placed on road surfaces or the like and then be subjected to heat, e.g. by the use of a blow torch, until it reaches an almost liquefied state sufficient for it to adhere to the road surface. Pre-manufactured thermoplastic markings are e.g. known from GB-A-2 030 586, SE-B-399 575, SE-B-341 873, and US-4 708 518.

[0005] It is known to provide pre-manufactured thermoplastic markings with so-called temperature indicators, e.g. by providing colour changing indicators or by providing deformations in the surface of the pre-manufactured thermoplastic markings by scoring or punching. Such a pre-manufactured thermoplastic marking is e.g. known from EP 0 882 159 B1, in which it is disclosed to provide deformations on the upper surface of the preformed thermoplastic marking. When the road worker applies heat to the preformed thermoplastic marking, the temperature indicators are intended to indicate to the road worker when the pre-formed thermoplastic marking has been heated sufficiently to adhere to intended extent to the road surface. The deformations may e.g. be considered to indicate sufficient heating when they become flush with the surrounding portions of the upper surface of the pre-formed thermoplastic marking. This will be true if the road worker uses the correct heating equipment and the correct heating process and the heat will have time to be internally transferred down through the preformed thermoplastic marking. However, if the road worker e.g. uses too much local heat, e.g. by holding the blow torch way too close to the pre-formed thermoplastic marking or by using a blow torch producing too much heat, there is a risk that the pre-formed thermoplastic material is locally heated to such an extent that the deformations will become flush with the surrounding portions of the upper surface even though the lower portions of the pre-formed thermoplastic marking have not reached sufficient temperature to adhere sufficiently to the road surface.

Summary of the invention

[0006] It is an object of the invention to provide an improved solution to the problem of indicating that intended heating of a thermoplastic surface covering has been achieved.

[0007] This object has been achieved by a surface covering adapted for application on surfaces, such as road surfaces, side walk surfaces, foot and bicycle way surfaces, playground surfaces, parking lot surfaces, parking house floor surfaces, or sports ground surfaces, the surface covering comprising:

a thermoplastic sheet having a first density; and
an indicator being located at an intended lower surface of the thermoplastic sheet and having a second density being lower than the first density,
the surface covering being adapted to be attached to the surfaces by application of heat to the surface covering, thereby at least partly melting the thermoplastic sheet allowing the indicator to rise through the thermoplastic sheet.

[0008] By providing an indicator at the intended lower surface and by choosing the materials such that the indicator has a density lower than the density of the thermoplastic sheet, the indicator will, in response to the thermoplastic sheet being heated to an at least partly molten state, rise through the thermoplastic sheet and form a visible indication. By providing the indicator at the intended lower surface of the thermoplastic sheet, the indicator will thereby indicate that the intended lower surface actually has reached the intended temperature, or otherwise the indicator would still be stuck in the thermoplastic material.

[0009] The thermoplastic sheet may be basically any kind of thermoplastic material suitable for use as surface coverings adapted for application on road surfaces, side walk surfaces, foot and bicycle way surfaces, playground surfaces, parking lot surfaces, parking house floor surfaces, or sports ground surfaces. The thermoplastic material is preferably chosen from the group consisting of thermoplastic resins and thermoplastic polymers. Such materials are suitable for mixing with filler and pigments to provide a wear resistant road marking. The resin may e.g. be petrochemical based and/or colophony based. The thermoplastic sheet may be formed e.g. from so-called C5 based, C9 based and alkyd based thermoplastic materials. The polymers may e.g. be EVA or SIS.

[0010] The indicators may provide a visible indication

by having a shape providing contrast to the upper surface of the thermoplastic sheet. This may e.g. be accomplished by the indicator being formed of bodies rising through the thermoplastic sheet. Examples of such bodies are e.g. solid or hollow glass beads having a density lower than the density of the thermoplastic sheet. Such indicators may be arranged to be worn off for example by applying active wear on the surface covering, or by normal wear after a short period of time relative to the lifetime of the surface covering.

[0011] The indicators may use a contrasting colour providing contrast to the upper surface of the thermoplastic sheet. The indicators may as such have the contrasting colour. The indicators may alternatively or as a complement use a separate pigment providing the contrasting colour.

[0012] The indicators may be formed of materials melting before they begin rising through the thermoplastic sheet. The indicators may be formed of materials melting during their rising through the thermoplastic sheet. The indicators may be formed of a material which rises through the thermoplastic sheet as a body and which begins melting by further application of heat.

[0013] It may be noted that the above alternatives concerning bodies providing a contrast, colours providing a contrast, and the different melting points may be combined in any suitable way.

[0014] It may be noted that the material as such from which the low density indicator is formed may as such have a high density. A hollow body of such a material may still result in an indicator having a low density.

[0015] It may also be noted that the low density indicator need not be provided alone on the intended lower side of the thermoplastic sheet; the low density indicator may be mixed with or mixed into other substances. Such other substances may be provided for facilitating the rise and/or for other purposes. The rise of low density bodies may e.g. be facilitated by mixing them into a low density wax that melts and facilitates the rise of the bodies through the thermoplastic sheet. Such a wax may be transparent or may be pigmented to provide a contrast in itself.

[0016] It may also be noted that, although it is preferred, it is not necessary that the piece of material at the intended lower side of the thermoplastic sheet has a low density. The low density indicator may be mixed into or mixed with heavy materials serving other purposes as long as the low density indicators are released and allowed to rise through the thermoplastic sheet when the thermoplastic sheet is subjected to the above mentioned heating. A low density indicator in the form of low density bodies, such as glass beads, may be mixed into a heavy substance, where the heavy substance is adapted to melt and release the low density indicators.

[0017] A low density indicator in the form of a low density material melting and rising through the thermoplastic sheet may e.g. be mixed with heavy particles, which particles will be left behind when the low density melting material, such as wax and pigments, rise as a low density indicator through the thermoplastic sheet.

[0018] Preferred embodiments appear in the dependent claims and in the description.

[0019] The indicator may comprise pigment providing contrast between the indicator and the thermoplastic sheet. The use of a pigment is a robust manner of providing a distinct contrast that is clearly visible to the user. The pigment may have colour contrasting to the colour of the thermoplastic sheet. The contrast may be in the form of the pigment having a different gloss. The pigment may e.g. be ultramarine blue. The pigment may be an integral part of the indicator.

[0020] The indicator further may comprise a carrier substance mixed with the pigment. The carrier substance may be a wax, resin, oil, lubricant and/or polymer.

[0021] The indicator may comprise, preferably as a major constituent comprises, a material having a melting temperature within a temperature range reached by the indicator during application of heat to the surface covering for attachment of the surface covering to the surfaces. By having a melting temperature within this temperature range, the material of the indicator will melt during the heating of the thermoplastic sheet. Such melting may be used to facilitate the indicator rising through the thermoplastic sheet. The thermoplastic sheet may e.g. have a melting temperature that is slightly higher than a melting temperature of the above mentioned material of the indicator. With such a choice of melting temperatures, the indicator will melt shortly before the thermoplastic sheet reaches its melting temperature and as soon as the thermoplastic sheet reaches an at least partly molten state, the indicator may rise through the thermoplastic sheet. This also allows for the indicator to rise through the thermoplastic sheet even if the thermoplastic sheet have a relatively large content of fillers. Other alternatives are contemplated; the thermoplastic sheet may e.g. have a melting temperature slightly lower than the melting temperature of the indicator. This may be used to provide small indicators rising through the thermoplastic sheet as bodies and which indicators then melts and flows out and forms a relatively large spot of contrasting colour on the upper surface of the thermoplastic sheet.

[0022] The material of the indicator may be a carrier substance or a material forming an indicator body. The material with the melting temperature may e.g. be a glass material or plastic material out of which beads may be formed. Such indicators maintain its shape to a certain temperature threshold. Such indicator may be with or without pigment.

[0023] The indicator may be non heat resistant whereby the indicator is configured to be rendered less visible by application of further heat to the surface covering. This may be provided with an indicator in the form of a body that rises through the thermoplastic sheet and which then melts by application of further heat to the surface covering and loses its shape and/or thereby becomes less visible. This may be provided by the use of a pigment that is

bleached or loses its colour when subjected to further heat. Alternatively, or as a complement, the indicator as such or the pigment may be bleached or changed by sunlight, UV-light, pH, wear and/or chemical reactions. The indicator, the carrier substance and/or the pigment may be non heat resistant at a temperature threshold being slightly greater than the melting temperature of the thermoplastic sheet. This may be used to secure that the thermoplastic sheet has reached the desired molten state before the indicator starts to disappear. By subjecting the indicator, carrier substance or pigment to the heat, sunlight, UV-light, pH, wear and/or chemical reactions over a certain threshold for a certain time period, the visibility will be reduced. Typically, the visibility will be reduced with increased strength of the exposure, such as higher temperature, and/or with increased exposure time. Less visibility in respect of pigments may be referred to as providing a Michelson contrast being less than |90%|, preferably less than |50%|, of the contrast provided when the indicators have risen through the thermoplastic sheet. The Michelson contrast is calculated by the formula (L1-L2)/(L1+L2), where L1 is the luminescence of the indicator when the indicators have risen through the thermoplastic sheet and L2 is the luminescence of the indicator when has been rendered less visible.

[0024] Less visibility may in respect of bodies be referred to as reducing the number of indicators protruding above the upper surface to less than 50%, preferably less than 25%, of the number of indicators protruding above the upper surface when the indicators have risen through the thermoplastic sheet. Preferably the visibility is reduced significantly, i.e. to a Michelson contrast of less than |25%| and/or a number of protruding indicators to less than |10%|.

[0025] The above object has also been achieved with a method for application of a surface covering on surfaces, such as road surfaces, side walk surfaces, foot and bicycle way surfaces, playground surfaces, parking lot surfaces, parking house floor surfaces, or sports ground surfaces, the method comprising:

providing a thermoplastic covering material having a first density;

providing an indicator having a second density being lower than the first density;

applying the indicator and the thermoplastic covering material on the surface such that the indicator is located at a lower surface of the thermoplastic covering material; and

heating the thermoplastic covering material for providing adherence of the surface covering to the surface.

[0026] The advantages associated with this method has been discussed in detail in association with the surface covering above and references is made thereto. It may be noted that when provided as a method the indicator may e.g. be provided as a separate entity which is applied separately to the surface or may e.g. be provided attached to a thermoplastic sheet formed by the thermoplastic covering material. In either case, the indicators will rise through the thermoplastic covering material in the manner discussed above in relation to the surface covering. It may also be noted that preferred embodiments of the surface covering are, unless expressly or by their nature excluded, considered as suitable preferred embodiments also in respect of the method for application.

[0027] The step of applying the indicator and the thermoplastic covering material may comprise: applying the indicator on the surface; and applying the thermoplastic covering material onto the surface where the indicator has been applied. The indicator is applied e.g. by distributing "free" separate indicators onto the surface. The indicator may be applied by applying a carrier comprising and distributing the indicators. The carrier may e.g. be a carrier substance, such as a primer.

[0028] The method may further comprise: forming a thermoplastic sheet of the thermoplastic covering material and attaching the indicator to the thermoplastic sheet before the indicator and thermoplastic sheet is applied on the surface. Such a pre-attachment may be used to provide a controlled application with respect to positioning and concentration and distribution of indicators.

[0029] The indicator is preferably attached to the thermoplastic sheet on the manufacturing site, i.e. before transport of the surface covering to the site of application. This facilitates the distribution of the surface covering including the indicator.

[0030] The method may further comprise further heating of the surface covering to a temperature above a temperature threshold above which the indicator is non heat resistant. Thereby the visibility of the indicators may be reduced such that they, after serving their purpose of indicating the sufficient heating, will not have an undesired impact on the appearance of the surface covering.

[0031] The above object has also been achieved with a kit of parts for application of a surface covering on surfaces, such as road surfaces, side walk surfaces, foot and bicycle way surfaces, playground surfaces, parking lot surfaces, parking house floor surfaces, or sports ground surfaces, the kit of parts comprising: a thermoplastic covering material; and an indicator; wherein the thermoplastic covering material has a first density and wherein the indicator has a second density being smaller than the first density, wherein the indicator is configured to be positioned underneath the thermoplastic covering material and to rise through the thermoplastic covering material in response to the thermoplastic covering material being at least partly melted by heating.

[0032] The advantages associated with this kit of parts has been discussed in detail in association with the surface covering above and references is made thereto. It may be noted that when provided as a kit of parts the indicator are provided as a separate entity which is intended to be applied separately to the surface before the

thermoplastic sheet or thermoplastic material is applied to the surface on top of the indicators. The indicators will rise through the thermoplastic covering material in the manner discussed above in relation to the surface covering. It may also be noted that preferred embodiments of the surface covering are, unless expressly or by their nature excluded, considered as suitable preferred embodiments also in respect of the kit of parts.

[0033] The indicators may e.g. be provided as granules or as granules mixed into a primer or the like.

[0034] The thermoplastic covering material may in the kit of parts be provided as granules configured to be melted on site of application. It may be noted that it is preferred that not only the indicators but also the pieces of materials forming or including the indicators have a density lower than the density of the thermoplastic sheet and/or the density of the material forming the granules.

[0035] It may be noted that throughout the description there is mentioned an indicator. In practice however there will be a plurality of indicators, typically spread out over the area of the surface covering.

Brief description of drawings

[0036] The invention will by way of example be described in more detail with reference to the appended schematic drawings, which shows a presently preferred embodiment of the invention.

Figure 1A discloses in cross-section the application of a thermoplastic sheet onto a surface, the thermoplastic sheet being provided with low density indicators at the intended lower surface.

Figure 1B is a cross-section corresponding to figure 1A and shows the indicators having reached the upper surface of the surface covering.

Figure 1C is a top plan view and shows the indicators having reached the upper surface of the surface covering.

Figure 1D is a top plan view showing the surface covering after the indicators have been removed or rendered invisible again.

Figures 2A-D correspond to figures 1A-D, wherein in figures 2A-D the indicators are bodies.

Figure 3A-C discloses different stages of an application procedure where the low density indicators are spread out as separate entities before the thermoplastic material is laid out on top of the low density indicators on the surface.

Figure 3A discloses in cross-section the application of low density indicators onto a surface.

Figure 3B discloses in cross-section the application of a thermoplastic sheet onto the surface onto which the low density indicators has been spread out.

Figure 3C discloses in cross-section the thermoplastic sheet on the surface with the low density at the lower surface of the thermoplastic sheet before the heating for the purpose of attaching the thermoplastic heat to the surface has commenced.

Figure 4 is a schematic representation of a method of application of a surface covering.

Detailed description

[0037] As is shown in figures 1A and 2A, a surface covering 1 comprises a thermoplastic sheet 2 and an indicator 3. The surface covering 1 is adapted for application on surfaces 4, such as road surfaces, side walk surfaces, foot and bicycle way surfaces, playground surfaces, parking lot surfaces, parking house floor surfaces, or sports ground surfaces. As shown in figure 1A there is provided a plurality of indicators 3 at an intended lower surface 2a of the thermoplastic sheet 2. In figure 1A and 2A, the thermoplastic sheet 1 supports the plurality of indicators 3 such that the thermoplastic sheet 2 may be transported and handled by a road worker with the indicators 3 remaining attached to the thermoplastic sheet 2.

[0038] The thermoplastic sheet 2 has a first density $\rho 1$ and the indicators 3 have a second density p2 being lower than the first density $\rho 1$.

[0039] The first density $\rho 1$ may e.g. be within the range of about 1000-5000 kg/m^3. The second density p2 may be within about 1 to 90 percent of the first density $\rho 1$. Preferably, the second density p2 may be within about 10 to 50 percent of the first density $\rho 1$.

[0040] The thermoplastic sheet 2 may be based on basically any kind of thermoplastic material suitable for use as surface coverings 1 adapted for application on road surfaces, side walk surfaces, foot and bicycle way surfaces, playground surfaces, parking lot surfaces, parking house floor surfaces, or sports ground surfaces. The thermoplastic material is preferably chosen from the group consisting of thermoplastic resins and thermoplastic polymers. Such materials are suitable for mixing with filler and pigments to provide a wear resistant road marking. The resin may e.g. be petrochemical based and/or colophony based. The thermoplastic sheet may be formed e.g. from so-called C5 based, C9 based and alkyd based thermoplastic materials. The polymers may e.g. be EVA (Ethylenevinyl acetate) or SIS (Styrene Isoprene Styrene). Such materials should be heated to a temperature of about 50-200°C to provide sufficient adherence to the surface 4.

[0041] The surface covering 1 is adapted to be attached to the surface 4 by application of heat to the surface covering 1, thereby at least partly melting the thermoplastic sheet 2 allowing the indicator 3 to rise through the thermoplastic sheet 2 as is schematically indicated by the arrow indicated A in figure 1B and in figure 2B.

[0042] As is shown in figures 1C and 2C, once the indicators 3 have risen through the thermoplastic sheet 2, they will become visible on the upper surface 2b of the thermoplastic sheet 2. These visible indicators are denoted as 3' in figure 1B and 3" in figure 2B.

[0043] In figures 1A-D, the indicators 3 comprises as a major constituent a material having a melting temper-

ature within a temperature range reached by the indicator 3 during application of heat to the surface covering 1 for attachment of the surface covering 1 to the surface 4. This material may e.g. have a melting temperature of about 10-210°C.

[0044] As indicated in figures 1B and 1C, the indicators 3 have melted and risen through the thermoplastic sheet 2 and have formed small visible spots 3' at or on top of the upper surface 2b of the thermoplastic sheet 2. This kind of indicator 3 preferably comprise pigment providing contrast between the risen and molten indicator 3' and the thermoplastic sheet 2. The pigment may have colour contrasting to the colour of the thermoplastic sheet 2, such as a red or blue colour contrasting e.g. a white thermoplastic sheet 2. The melting material may be considered to form a carrier substance into which the pigment is mixed. The carrier substance may be a wax, resin, oil, lubricant and/or polymer.

[0045] As indicated in figures 2A-D, the indicators 3 may be formed of a material that keeps its shape during application of heat to the surface covering 1 for attachment of the surface covering 1 to the surface 4. The indicators 3 may provide a visible indication by having a shape providing contrast to the upper surface 2b of the thermoplastic sheet 2. This may e.g. be accomplished by the indicator 3 being formed of bodies 3 rising through the thermoplastic sheet 2. Examples of such bodies 3 are e.g. solid or hollow glass beads having a density p2 lower than the density ρ1 of the thermoplastic sheet 2. As indicated in figures 2B and 2C, the indicators 3 have risen through the thermoplastic sheet 2 and will form protrusions 3" extending upwardly from the upper surface 2b of the thermoplastic sheet 2. The shape may be considered to provide sufficient contrast. The bodies 3 may also be provided with a pigment such that the indicators 3 will have both shape and colour as contrast to the upper surface 2b of the thermoplastic sheet 2. This kind of indicator 3 formed as a body may be arranged to be worn off for example applying active wear on the surface covering 1, or by normal wear after a short period of time relative to the lifetime of the surface covering 1. After the indicators 3 have been worn off, the surface covering 1 will reach the intended state as indicated in figure 2D.

[0046] The indicator 3 may be non heat resistant whereby the indicator 3 is configured to be rendered less visible by application of further heat to the surface covering 1. This may be provided with an indicator 3 in the form of a body that rises through the thermoplastic sheet as indicated in figure 2B and which then melts by application of further heat to the surface covering 1 and loses its shape and thereby becomes less visible (such that surface covering 1) reaches the state shown in figure 2D.

[0047] This non heat resistance may be provided by the use of a pigment that is bleached or loses its colour when subjected to further heat. Alternatively, or as a complement, the indicator as such or the pigment may be bleached or changed by sunlight, UV-light, pH, wear and/or chemical reactions.

[0048] The indicator, the carrier substance and/or the pigment is preferably non heat resistant and rendered less visible to the extent noted above, such as a Michelson contrast of less than |90%|, preferably less than |50%|, and most preferably less than |25%|, and/or a reduction in number of visible protrusions to less than 50%, preferably less than 25% and most preferably to less than |10%|, when exposed to heat (e.g. gas flame or IR heating) for a time period of about, preferably shorter than, 2 minutes. Thereby it is possible to render the indicator, the carrier substance and/or the pigment sufficiently less visible and still securing that the thermoplastic covering material is not scorched or discoloured.

[0049] The surface covering 1 may be applied according to the following methods.

[0050] According to a first variant of the method, the indicators 3 are attached to the thermoplastic sheet 2 by forming a thermoplastic sheet 2 of a thermoplastic covering material and attaching the indicator 3 to the thermoplastic sheet 2 before the indicator 3 and thermoplastic sheet 2 are applied on the surface 4. This method is schematically indicated by the series of figures 1A-D and 2A-D.

[0051] According to a second variant of the method, the indicator 3 is provided as a separate entity which is applied separately to the surface 4. The first steps of this method are schematically indicated in the series of figures 3A-C.

[0052] The step of applying the indicator and the thermoplastic covering material may comprise: applying the indicator 3 on the surface 4 (as indicated in figure 3A); and applying the thermoplastic covering material 2 onto the surface 4 where the indicator has been applied (as indicated in figure 3B). The indicator 3 is applied e.g. by distributing "free" separate indicators onto the surface. The indicator may be applied by applying a carrier comprising and distributing the indicators. The carrier may e. g. be a carrier substance, such as a primer.

[0053] As shown in figure 3C, the result is a thermoplastic sheet 2 with indicators 3 sandwiched between the thermoplastic sheet 2 and the surface 4. This material will then be heated and it will act according what is discussed above in relation to the figures 1A-D or 2A-D. The indicators 3 spread out according to figure 3A may be of a material melting as discussed in relation to figures 1A-D or a material that keeps it shape during its rising as discussed in relation to the figures 2A-D.

[0054] The method may also be summarized according to the following with reference to figure 4, disclosing the following steps;

providing 100 a thermoplastic covering material having a first density;

providing 110 an indicator having a second density being lower than the first density;

applying 120 the indicator and the thermoplastic covering material on the surface such that the indicator is located at a lower surface of the thermoplastic covering material; and

heating 130 the thermoplastic covering material for providing adherence of the surface covering to the surface.

[0055] As mentioned above, after the two steps of providing 100 and 110 there may be performed a step 115 of attaching the indicators to the intended lower side of the thermoplastic sheet.

[0056] As mentioned above, the method may further comprise further heating 135 of the surface covering to a temperature above a temperature threshold above which the indicator is non heat resistant.

[0057] As mentioned above, the indicators 3 and the thermoplastic material 2 may be supplied as a kit of parts. The kit of parts is intended to be used together to form a surface covering 1 for application on surfaces 4, such as road surfaces, side walk surfaces, foot and bicycle way surfaces, playground surfaces, parking lot surfaces, parking house floor surfaces, or sports ground surfaces. The kit of parts comprises: a thermoplastic covering material 2 and an indicator 3. The thermoplastic covering material 2 has a first density $\rho 1$ and the indicator 3 has a second density p2 being smaller than the first density $\rho 1$. The indicator 3 is configured to be positioned underneath the thermoplastic covering material 2 and to rise through the thermoplastic covering material 2 in response to the thermoplastic covering material 2 being at least partly melted by heating. The thermoplastic material may be provided as a sheet or as granules configured to be melted on site of application.

[0058] The thermoplastic sheet may be basically any kind of thermoplastic material suitable for use as surface coverings adapted for application on road surfaces, side walk surfaces, foot and bicycle way surfaces, playground surfaces, parking lot surfaces, parking house floor surfaces, or sports ground surfaces. Such thermoplastic materials typically comprises a thermoplastic material, pigment and fillers. The thermoplastic material is preferably chosen from the group consisting of thermoplastic resins and thermoplastic polymers. Such materials are suitable for mixing with filler and pigments to provide a wear resistant road marking. The resin may e.g. be petrochemical based and/or colophony based. The thermoplastic sheet may be formed e.g. from so-called C5 based, C9 based and alkyd based thermoplastic materials. The polymers may e.g. be EVA or SIS.

[0059] The thermoplastic material constitutes between 10-90% by weight of the thermoplastic material composition. More preferably the thermoplastic material constitutes between 10-30% of the thermoplastic material composition.

[0060] The pigment in the thermoplastic sheet is preferably chosen from the group consisting of TiO_2, organic pigments and inorganic pigments. The organic pigment may e.g. be PY13. The inorganic pigments may e.g. be PB29.

[0061] The filler in the thermoplastic sheet may comprise, preferably mainly comprises, inorganic substances. The filler may e.g. be chosen from the group comprising, and may preferably mainly comprise, Dolomite, $CaCO_3$, sand and/or chalk. These fillers are considered cost-effective and suitable to use when providing a wear resistant road marking.

[0062] It is contemplated that there are numerous modifications of the embodiments described herein, which are still within the scope of the invention as defined by the appended claims.

[0063] The indicators may for instance be a combination of the indicators in figures 1A-D and figures 2A-D. Such a combination of properties of the indicators may e.g. be indicators formed of low density bodies carrying or being provided with a pigment. Another conceivable variant is to have a low density melting material with low density bodies intermixed. In this latter variant, the melting material and/or the bodies may be pigmented or alternatively none of the melting material and bodies are pigmented.

Claims

1. A surface covering (1) adapted for application on surfaces (4), such as road surfaces, side walk surfaces, foot and bicycle way surfaces, playground surfaces, parking lot surfaces, parking house floor surfaces, or sports ground surfaces, the surface covering (1) comprising:

   a thermoplastic sheet (2) having a first density ($\rho 1$); and
   an indicator (3) being located at an intended lower surface (2a) of the thermoplastic sheet (2) and having a second density (p2) being lower than the first density ($\rho 1$),
   the surface covering (1) being adapted to be attached to the surface (4) by application of heat to the surface covering (1), thereby at least partly melting the thermoplastic sheet (2) allowing the indicator (3) to rise through the thermoplastic sheet (2).

2. The surface covering (1) according to claim 1, wherein the indicator (3) comprises pigment providing contrast between the indicator (3) and the thermoplastic sheet (2).

3. The surface covering according to claim 2, the indicator (3) further comprising a carrier substance mixed with the pigment.

4. The surface covering according to any one of claims 1-3, wherein the indicator (3) comprises, preferably as a major constituent comprises, a material having a melting temperature within a temperature range reached by the indicator (3) during application of heat to the surface covering (1) for attachment of the surface covering (1) to the surface (4).

5. The surface covering according to any one of claims 1-4, wherein the indicator (3) is non heat resistant whereby the indicator (3) is configured to be rendered less visible by application of further heat to the surface covering (1).

6. A method for application of a surface covering (1) on surfaces (4), such as road surfaces, side walk surfaces, foot and bicycle way surfaces, playground surfaces, parking lot surfaces, parking house floor surfaces, or sports ground surfaces, the method comprising:

providing a thermoplastic covering material (2) having a first density (ρ1);
providing an indicator (3) having a second density (p2) being lower than the first density (ρ1);
applying the indicator (3) and the thermoplastic covering material (2) on the surface (4) such that the indicator (3) is located at a lower surface (2a) of the thermoplastic covering material (2); and
heating the thermoplastic covering material (2) for providing adherence of the surface covering (1) to the surface (4).

7. The method according to claim 6, wherein applying the indicator (3) and the thermoplastic covering material (2) comprises:

applying the indicator (3) on the surface (4); and
applying the thermoplastic covering material (2) onto the surface (4) where the indicator (3) has been applied.

8. The method according to claim 6, further comprising forming a thermoplastic sheet (2) of the thermoplastic covering material and attaching the indicator (3) to the thermoplastic sheet (2) before the indicator (3) and thermoplastic sheet (2) is applied on the surface.

9. The method according to any one of claim 6-8, wherein the method further comprises further heating the surface covering (1) to a temperature above a temperature threshold above which the indicator (3) is non heat resistant.

10. A kit of parts for application of a surface covering (1) on surfaces (4), such as road surfaces, side walk surfaces, foot and bicycle way surfaces, playground surfaces, parking lot surfaces, parking house floor surfaces, or sports ground surfaces, the kit of parts comprising:

a thermoplastic covering material (2); and
an indicator (3);
wherein the thermoplastic covering material (2) has a first density (ρ1) and wherein the indicator (3) has a second density (p2) being smaller than the first density (ρ1), wherein the indicator (3) is configured to be positioned underneath the thermoplastic covering material (2) and to rise through the thermoplastic covering material (2) in response to the thermoplastic covering material (2) being at least partly melted by heating.

11. A kit of parts according to claim 10, wherein the thermoplastic covering material (2) is provided as granules configured to be melted on site of application.

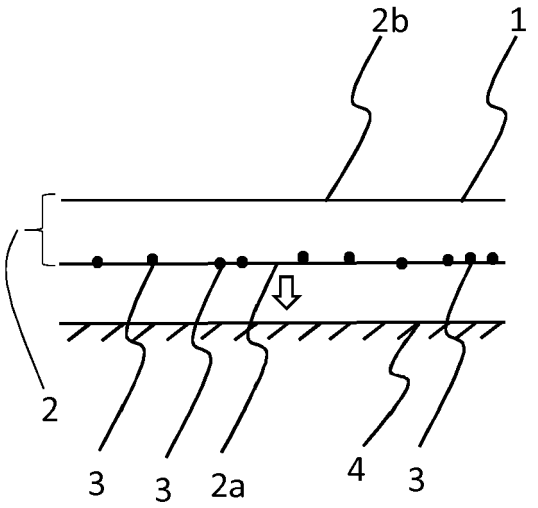


Fig. 1A

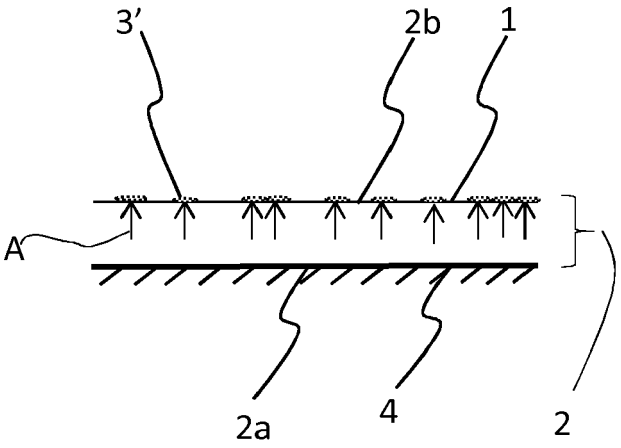


Fig. 1B

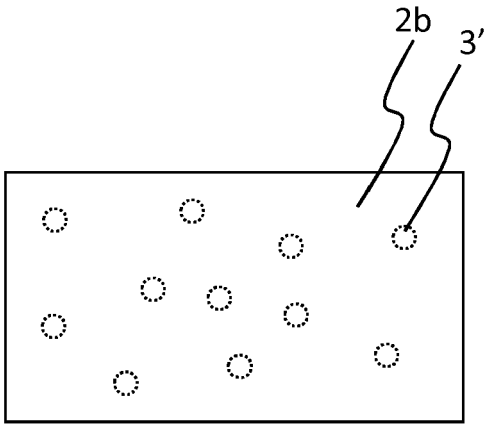


Fig. 1C

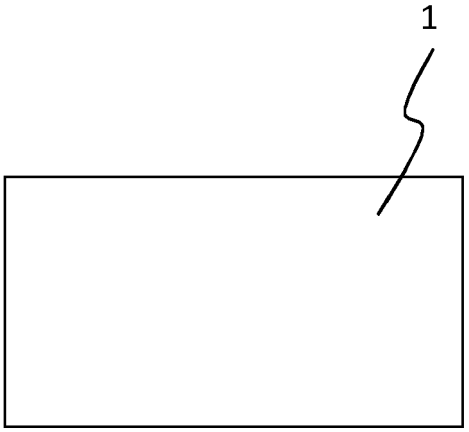


Fig. 1D

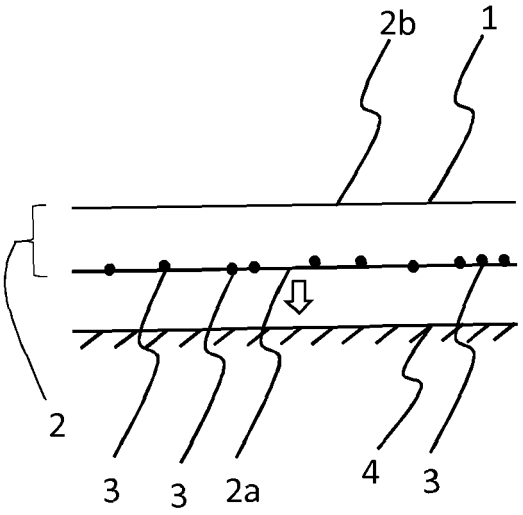


Fig. 2A

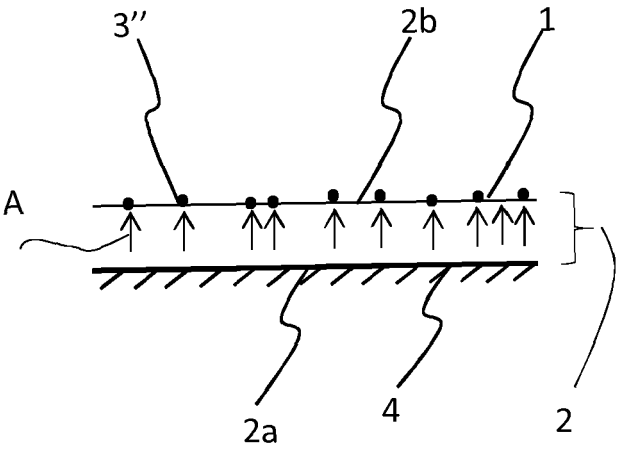


Fig. 2B

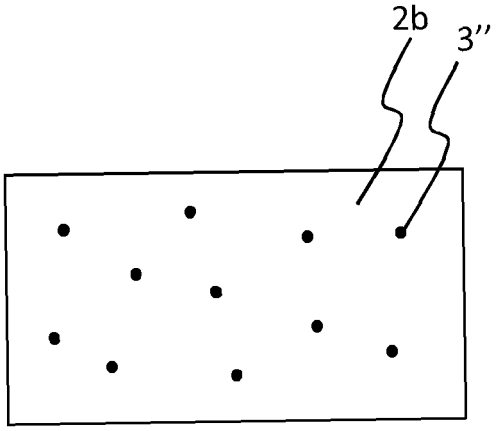


Fig. 2C

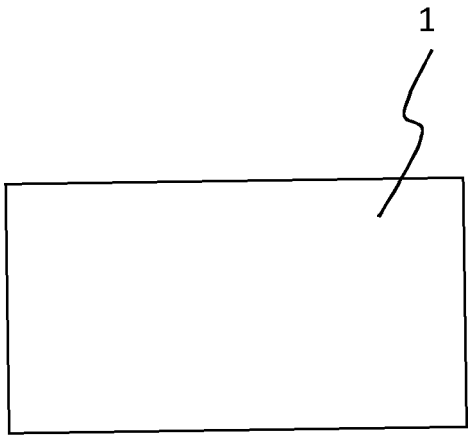


Fig. 2D

Fig. 3C

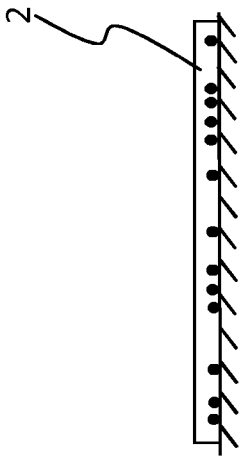


Fig. 3B

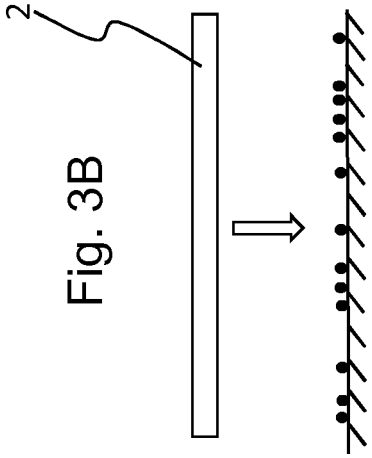
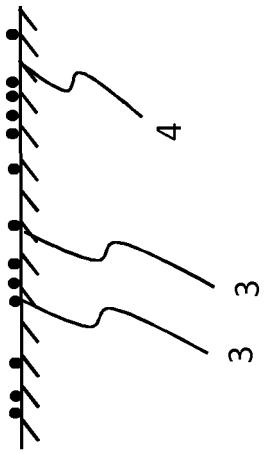


Fig. 3A



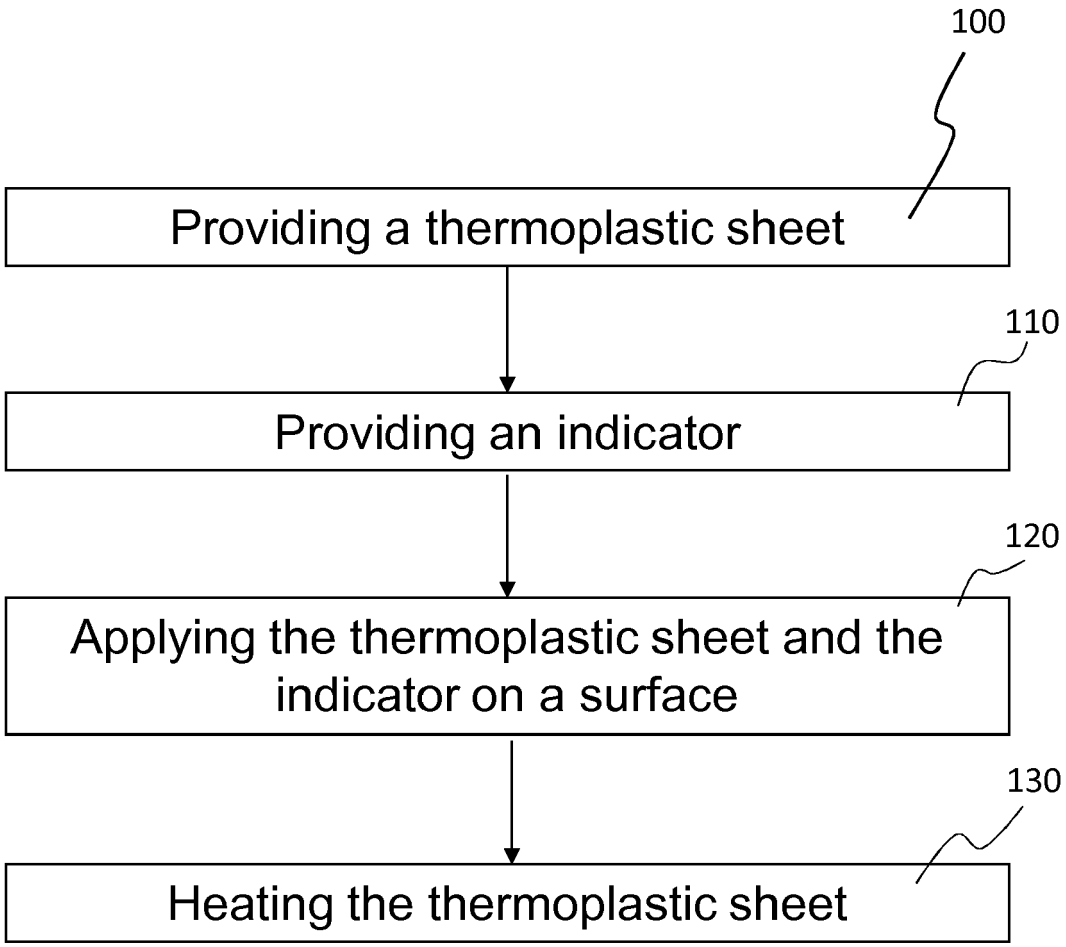

100
Providing a thermoplastic sheet
110
Providing an indicator
120
Applying the thermoplastic sheet and the indicator on a surface
130
Heating the thermoplastic sheet

Fig. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 16 19 6284

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 2014/165435 A1 (GREER ROBERT W [US] ET AL) 19 June 2014 (2014-06-19) * paragraphs [0002], [0005], [0038], [0039], [0041], [0042], [0068] * * figure 1 *	1-11	INV. E01F9/512
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	3 April 2017	Kremsler, Stefan

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