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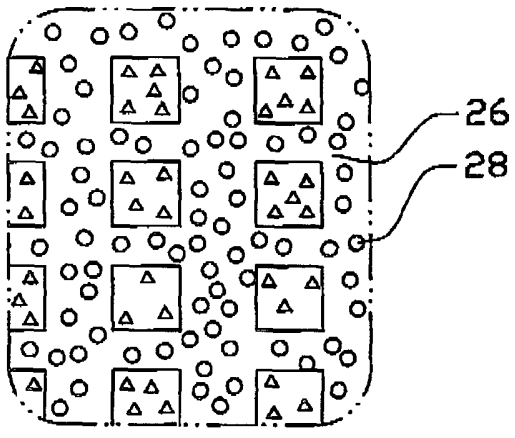
(54) Title: METHOD FOR PRODUCING A PLASTIC-BASED, PATTERNED SURFACE MATERIAL, A DEVICE FOR ACCOMPLISHING THE METHOD AND A SURFACE MATERIAL BEING PRODUCED BY MEANS OF THE METHOD



(57) Abstract: Method and device for producing a plastic-based, patterned surface material. The method comprises forming an adhesive plastic layer on a substrate and then laying down particles (27,28) in the plastic layer in predetermined formations (25) by means of a template method omitting uncovered sections (26) of the surface of the plastic layer between said formations. In a subsequent step of procedure, particles (28) of another character than those in the first-mentioned are scattered over the surface being provided with the particle formations (25). The scattered particles stick to the uncovered areas (26) being formed between the formations, but not within the formations where additional particles will not stick. The method is completed by integration of the particles into the surface by pressure and heat to form a solid wear layer on the surface material. The patterning of the finished material is formed by the formations (25) of the particles (26) being provided by means of template laying-down and the particles (28) being laid down by means of scattering in areas between said formations.

TITLE:

Method for producing a plastic-based, patterned surface material, a device for accomplishing the method and a surface material being produced by means of the method.

TECHNICAL FIELD:

The present invention relates to production of a plastic-based, patterned surface material, wherein a floor covering material primarily is intended, and a device for accomplishing the method and a coating material being produced by means of the method.

BACKGROUND ART:

A surface material such as floor covering and at least to its main part consisting of plastic is often provided with some form of patterning. This may be one of the following basic types: on the one hand printed patterns, where the pattern design is formed by means of some form of known pattern printing technique, on the other hand "material patterns", where plastic masses of different colour or character are positioned against each other. The first-mentioned type is characterised in a great freedom as regards the selection of pattern, wherein imitating patterns as well as figure patterns and even diffuse images can be obtained. The drawback as regards this technique is that the pattern layer must be protected against wear and tear by means of application of a transparent wear layer. A wear layer - especially if it is thick - will disturb the outlook of the printed pattern and also influence some functional characteristics negatively.

The second basic type is obtained by means of fragmentary mixture of differently coloured plastic masses or by means of admixing of granules or flakes with differing colour in a plastic mass of uniform colour. Heat compression and application of differently coloured thermoplastic granules and also aggregates forms part of this technique. The advantage as regards this technique is that a wear layer with a continuous pattern depth is obtained, where the product characteristics are not limited by any demands for a transparent wear layer. The drawback is a restriction to randomly created pattern designs with a limited range of variation.

In order to produce surface materials of the last mentioned type having wear layer consisting of particles without said limitation to randomly created patterns, some methods are developed by means of which it is possible to create figural pattern elements.

From the US patent No. 4 212 691 (Potosky et al), a method and a device is previously known for producing a surface coating material comprising patterning by means of laying down particles such as flakes in an adhesive plastic layer and then pressing down the particles in the layer and curing the same. From the European patent No. 0 64 516 A1 (Bottet et al), a device is previously known for laying down particles on a plastic layer in pattern formations by means of a specially designed template, said particles being part of the wear layer of the surface material.

Other methods and apparatuses for controlled forming of pattern elements by laying down particles on an adhesive layer of a substrate are known from WO 9942288 A1 (Bibby) and DE 2037740 (Knobel).

The present invention comprises a step of procedure in which laying down of pattern-forming particles by means of a template method is utilized together with additional steps of procedure.

The patent document SE 428 449 (Johnard) mentions a plastic surface material with figurative granule deposits. The application of the granules is limited to predetermined areas which are covered by an adhesive plastic layer where the granules stick. Thus, the application of the adhesive layer must take place by means of a printing method before the granules are scattered over the surface. The granules which do not stick in the adhesive layer are removed by means of, for example, a suction effect. The step of procedure which involves application of an adhesive plastic layer on limited areas does not occur in the invention.

DISCLOSURE OF THE INVENTION:

The present invention relates to plastic-based surface materials with all-through patterns in the wear layer being provided with a pattering being formed by means of applying of particles to a basic mass. In accordance with what has been described above, similar materials as well as methods and devices for the production of said materials are previously known. However, these types of material have a limitation. If only random patternings are used, the possibilities are limited for various manufacturers to provide an individual appearance character to the material.

If, on the other hand, pattering is made by any of the mentioned procedures there are limitations regarding quality, outlook and economy of the final product.

The object of the invention is to provide a controlled patterning procedure based on scattering of granules to a substrate where no risk of a misfit between different pattern elements occur and where an even amount of granules over the whole surface is secured, thus securing an even thickness for the final product.

The object of the invention is achieved by means of particles being applied on the surface of the material in controlled formations, which can be made more or less diffuse to their contours while intermediate areas are provided with particles of another character than the ones which were applied first. The particles can be either embedded in a transparent matrix or applied on a thin tacky layer. In the later case the particles will be pressed together in the finishing operations and will constitute the wear layer of the product.

This pattern formation is accomplished in accordance with the invention in a manner which will be apparent from the following description and claims.

BRIEF DESCRIPTION OF THE DRAWINGS:

An embodiment of the method according to the invention and variations of the same will be described below, as well as the device for accomplishing the method. In this regard, references are made to the enclosed drawings, in which:

Fig. 1 shows a schematic view of a device for accomplishing the method according to the invention;

Figs. 2 and 3 show cross-sections on an enlarged scale through a material, which has been produced in accordance with the method, in two different forms; and

Figs. 4 and 5 show the appearance of the material surface, which is patterned, after various steps of the procedure.

PREFERRED EMBODIMENT:

The device which is shown in Fig. 1 is intended for forming a pattern being accomplished in accordance with the invention on the surface of a produced substrate. Preferably, the substrate is formed by a web with a supporting layer of, for example, glass fibre and on this a gelled plastic layer such as polyvinyl chloride being applied on the supporting layer by means of coating and then gelled by means of heating. However, different methods of producing a substrate in the present context are previously known and the production and the character of the substrate in connection with the material according to the invention shall therefore not be described more in detail here.

In the device shown in Fig. 1, the substrate, here defined with the reference numeral 1, is applied in the form of a long web from a material roll 2 and fed by means of feed rollers 3 to a supporting structure 4. Situated above the supporting structure are in turns, regarded in the direction of motion of the material, see arrow 5, first a coating unit 6 for an adhesive plastic mass such as a plastisol, then a unit 7 being provided for laying down particles in the adhesive layer by means of a template. In that respect, the template shall lay down the particles in an intended pattern formation and to such a quantity that the adhesive surface essentially becomes covered with particles within intended areas so that the adhesive capacity is eliminated there. Next follows a suction unit 8 for removing surplus of

particles from those being laid down by means of the unit 7, after which there follows a unit 9 for scattering particles over the whole surface of the substrate and followed by a unit 10 for suction away of surplus of particles formed in that connection.

From the supporting structure 4 and the units 6-10 being situated above the same, the substrate, now being coated and provided with particles, is fed further over a heated roll 12, which heats up and presses the material against an underlying roll 13. Via a turning roll 14, the material, which now is completed, is fed further to a reeling coil 15 in order to form a material roll 16. In order to provide the material web or the roll with intended final characteristics, the material can be given a finishing treatment in various known manners. Thus, if so is desired, the surface can be lacquered and the material can be reheated and surface embossed.

The coating unit 6 can consist of a trough in which the semi-liquid plastic mass is filled and which has a slit-formed web and a doctor blade being provided over the surface of the substrate and over its full width, which results in an even deposit on the substrate 1 being fed forward.

The template unit 7 can consist of a cylinder 20, which extends over the width of the substrate and which is rotary around an axle 21. The cylinder has a wall which is provided with screened openings 23, by means of which the template is formed. This is designed in order to provide a laying-down of particles in a fixed pattern. In this regard, the particles are fed into the cylinder between the shielding element 22 and are applied on the adhesive layer, which has been coated by means of the

coating unit, within the area of the slit which is formed by the screening elements 22. The cylinder is rotated with a peripherical speed, which corresponds with the feeding speed of the substrate or, alternatively, with a speed difference which is adjusted to provide an increase or a decrease of the dimension of the laid-down particle formations in the direction of motion of the substrate in relation to the respective template opening dimension.

Thus, in the described template device, the particles fall out through the openings 23 in the cylinder's wall, which in form and size are adjusted to provide the desired formation of the particle laying-down.

The scattering unit 9 can be constructed as a trough with a lower opening 24 extending over the width of the substrate, through which particles, which have been fed into the trough, are scattered over the width of the substrate. Preferably, the feeding and the scattering of the particles are facilitated by means of the fact that the trough or a device at its lower opening is provided with a vibrating movement.

By means of the described device, the substrate is formed into the finished surface material through the various steps of procedure, which are accomplished by means of the described units of the device. In the first step, the coating by means of the unit 6, the substrate is provided with a layer of adhesive plastic mass, such as a plastisol, over the entire width of the substrate.

In the next step of procedure, which is accomplished by means of the template unit 7, formations are formed by particles having been laid down by means of the template. This is illustrated in Fig. 4, which like Fig. 5 shows a

section of the substrate's surface after the respective step of procedure. In that respect, Fig. 4 shows particles 27 having been laid down by means of the template unit as small triangles. Through different designs of the openings 23 in the wall to the cylinder 20 which form the template, the formations which are formed can be provided with different designs.

Fig. 4 shows the formations 25 as squares with intermediate areas 26 forming a grid. When particles are laid down by means of a template, this is normally carried out in such manner that a surplus of particles is laid down, in addition to those which may stick on the surface of the adhesive layer within the limits of the formations 25. As previously mentioned, the suction unit 8 is provided for removing this surplus. In that respect, Fig. 4 shows the step after the passage of the suction unit, which implies that the remaining particles 27 are those which have stuck in a layer in the adhesive plastic mass thereby forming the formations 25.

In the next step of procedure, which is accomplished by means of the scattering unit 9, particles, which are of another colour and/or form than the particles 27 which have been laid down by means of the template unit 7, are laid down on the material course through the opening 24. When the particles have been scattered over the surface and the surplus of particles has been removed, the condition which is shown in Fig. 2 is obtained. Here, the particles which have been coated by means of the scattering unit are shown as small circles. In that respect, it is apparent from the figure that these particles cover the sections 26 lying between the formations 25. This effect occurs by means of the fact that the formations 25 already are covered with the

particles 27, which prevents that the particles 28 being scattered by unit 9 in the areas. However, the particles 28 stick in the areas 27 where the template laying-down has not left any particles 25.

Preferably, the particles are spherical or spheroid thermoplastic particles. Particle diameter is chosen in the range 0.3-5.0 mm. The choice depends on which thickness the pressed particle layer constituting the wear layer of the finished product is aimed to have. Preferably, the particles are coloured but they may also partly be transparent.

A uniform size of the selected spherical particles is preferred. This ensures that the final product will have an even thickness. It is however also possible e.g. to use a smaller particle size in one kind of the pattern areas. In this case the final product thickness will be lower in these areas, thus creating a relief effect to the surface of the finished product.

The various characters regarding the particles which, as has been mentioned above, have been laid down with one or various templates and during the final scattering, can hence comprise various particle sizes but preferably various particle colours. In that respect, a "particle colour" may consist of a mixture of particles in different colour tones. Other particles than thermoplastic plastic particles can also be utilized. Thus, a "particle colour" may contain particles of coloured quartz or carborundum, completely or in a mixture together with thermoplastic plastic particles, if one wishes to provide the finished product with anti-slip characteristics or electrically conducting characteristics by means of particles made of a conductive material.

The adhesive plastisol layer on the substrate 1 can be provided with various thicknesses and will subsequently obtain different significance in the finished product. If the layer is made thin in relation to the particle size, the thermoplastic particles which have stuck during pressing and heating will be deformed so that they meet each other without intervals, see the cross-section through the material in Fig. 2. In this manner, the particles, here defined with the reference numeral 44, form nearly the entire wearing layer and the adhesive mass, here 45, does not contribute at all, or only to an insignificant part, to the appearance of the material.

If, on the other hand, the adhesive layer 45 is made thicker, the particles 44 will be pressed down into this with maintained form during pressing and heating, see Fig. 3. In that respect, the adhesive layer will be visible in the intervals between the particles. Both embodiments are within the scope of the invention. In the last-mentioned case, the adhesive layer is suitably made transparent. In this case, there is also the possibility to enrichen the pattern design by means of a printed pattern on the substrate.

After the suction unit 10, the substrate, together with its coating of plastic mass and particles, is fed around the heated roll 12 after first having passed the nip between this roll and the roll 13. During the compression of the material web between the rolls 12 and 13, the particles are pressed together in the as yet viscous plastic layer and are integrated into this.

During the subsequent feed along the periphery of the heated roll 12, the plastic layer is heated up into curing, so that the material course stretches out from

the chaining roll 14 as a finished coating material in the form of a long course which is reeled up on the coil 15 and gradually can be taken out from the device in the form of a material roll of for possible additional surface treatment in accordance with what has been previously mentioned.

If the particle size is big compared with the thickness of the tacky plastisol layer there may be a need of more pressure rollers 13 along the periphery of the heated roll to melt and flatten the surface. Alternatively this process can be made in a heat air oven followed by an embossing calander in a way that is well known in the trade.

An important basic principle of the invention is the fact that formations of a first particle type are deposited by means of the template on limited surface sections of the adhesive plastic layer, which results in that the capacity of the adhesive layer in these formations to retain additional particles is essentially revoked. In this manner, the effect is obtained that a particle layer which has been scattered over the entire surface only will stick in areas between the areas which already have been covered with particles. Thus, the formations of the particles which have been applied lastly are formed without the need of having to take any particular measures for distributing the particles over the surface, which makes the method as well as the device for its accomplishment simpler than if it had been necessary to put on various formations of particles with repeated template laying-down with the maintenance of necessary pattern fit. The method also secures that, the entire surface becomes covered by one even layer of particles without any variations. Furthermore, the object which is

associated with the invention is achieved, namely that the controlled particle laying-down in certain sections results in said advantages of continuously patterned wear layers with their favourable qualities as regards wear and tear without being reduced to the pattern limitation, which this type of flooring previously has had.

It is also within the scope of the invention that the pattern design can be made more or less diffuse until it approaches completely random patterns or, alternatively, that it can be made more distinct. This can be achieved by selecting particles for, on the one hand, the template laying-down and, on the other hand, the scattering with more ore less distinct difference in appearance and form and dimension within the scope of accommodation in the thickness of the finished layer. Another way of obtaining a less prominent pattern design is to deposit particles by means of the template in a large surplus, in addition to the quantity of particles which can stick in the mass within the surface sections being defined by the template, and to some extent let these particles be spread outside the contour which has been formed by the template. In that respect, it is possible to influence the accumulation of particles by means of air currents before the surplus is finally exhausted. Another way of spreading the particles being laid down by means of the template may be to vibrate the substrate. To some extent, said suction of surplus of particles which is achieved by means of the unit 8, counteracts diffusion. However, the influence of the suction operation can be controlled by adjustment of suction power, the direction of the air current and placing of suction openings with adjusted distance from the template unit 7. An exclusion of the suction operation is also possible. Furthermore, the contours can be provided with a more or less diffuse

character already in the scattering process, for example by means of the fact that the template, i.e. the wall to the cylinder 20, is kept at a certain distance from the substrate with the adhesive layer. The diffusion is also influenced by which type of template unit, i.e. the types represented by the unit 7, that is selected.

Furthermore, it is possible to obtain more complex patterns by means of the template deposit taking place in several steps with various surfaces being deposited in each step and with variously coloured particles, before the final particle laying-down takes place by scattering remaining uncovered areas of the plastic mass. In that respect, the methods which have described above can be utilized. It is important to see to that a between the particle formations being laid down with various templates exists, so that fields remain for final scattering of particles.

As regards the accomplishment of the method and the device for the accomplishment, this can be varied within the scope of the invention and the appended patent claims. Thus, there are known devices for template laying-down of particles which utilize other template forms than the cylinder, which is described in the foregoing. For arrangement of scattering of particles, several methods and devices are previously known. Removal of surplus of particles can, apart from suction, take place by means of picking-up by electrostatic forces or by means of turning the substrate upside down. All such variations of the accomplishment of the invention, and others as well, are within the scope of the invention.

As regards the substrate, which has been described above as a supporting layer forming part of the finished

material, variations are also possible. One such variation may be to form the plastic layer on a so-called release paper, which is removed from the plastic layer and does not form part of the finished product, which in that respect may consist entirely of one or several plastic layers.

Example 1

A glass-fibre non-woven (about 50g/m^2) is chosen as a carrier substrate. The carrier is coated with a layer of PVC plastisol with the following composition:

- E-PVC 100 parts
- Plasticizer (DINP) 40 parts
- Epoxidized Soya Bean Oil 2 parts
- Stabilizer (Ba-Zu type) 3 parts
- Filler (Dolomite) 140 parts
- Pigment 3 parts

The plastisol amount is adjusted so that the total thickness of the substrate after coating will be 0.7 mm. The coated substrate is forwarded in contact with a heated cylinder with a temperature of about 160°C.

A second plastisol coat is then applied on top of the smooth surface, composition being the following:

- E-PVC 100 parts
- Plasticizer (DINP) 25 parts
- Epoxidized Soya Bean Oil 3 parts
- Stabilizer (Ba-Zu type) 4 parts
- Pigment 2 parts

The thickness of this coat is adjusted to substantially 0.4 mm. The tacky substrate is then forwarded horizontally under a screen scatter equipment where a coloured mix of spherical PVC-particles with a diameter of substantially 1.0 mm are deposed onto the tacky substrate in controlled figurations as by means of a template unit according to what is here described.

After the scattering a suction device will remove the excess of particles.

The substrate will afterwards be moved to reach a scattering device provided as here described to depose spherical particles, the same type as above but in another colour mix and scattered in excess over the whole surface. A second suction device will afterwards remove all particles that have not adhered to the tacky substrate.

As the second colour mix can only adhere to the areas not covered by the first colour mix in controlled figurations the substrate will now have a surface with figurative areas with different colour impression. The whole surface is covered with one excess layer of particles of equal size and no uncovered areas will occur. After the scattering the substrate is brought to an hot-air oven at about 200°C where the tacky plastisol will gel and the whole construction will be soft and formable. After the oven a flat embossing calander will press the granules to an even layer. As the first coat and the tacky coat are applied under controlled thickness and the granules are of equal size and evenly distributed in one layer the product will after embossing have a flat surface and an even thickness. The flat embossed particles together with

the tacky plastisol layer will form the wear layer of the finished product. With the parameters chosen for tacky plastisol thickness and particle diameter the wear layer thickness will be substantially 0.7 mm.

After the flat embossing the product is basically finished. Optionally a surface lacquer of a normal floor covering type can be applied. Optional is also to apply a plastisol coat an the backside of the product to influence total thickness and to gel this layer.

Example 2

A release paper is coated with a PVC-plastisol of the following composition:

- E-PVC 100 parts
- Plasticizer (DINP) 40 parts
- Epoxidized Soya Bean Oil 2 parts
- Stabilizer (Ba-Zu type) 3 parts
- Filler (Dolomite) 140 parts
- Pigment 3 parts

Thickness of the coat is substantially 1.3 mm.

After coating the substrate is forwarded to pass a heated cylinder with surface temperature about 160°C where the coated plastisol will pregel.

A second plastisol coat will now be applied with the following composition:

- E-PVC 100 parts
- Plasticizer (DINP) 25 parts

- Epoxidized Soya Bean Oil 3 parts
- Stabilizer (Ba-Zu type) 4 parts
- Pigment 2 parts

Thickness of the coat is adjusted to substantially 0.4 mm.

The tacky substrate is then forwarded horizontally under a screen scatter equipment where a coloured mix of spherical PVC-particles with a diameter of substantially 1.0 mm are deposed onto the tacky substrate in a controlled figuration as by means of a template unit according to what is here described.

A suction device will remove excess of particles.

The substrate will then pass a scattering device where the whole surface is scattered in excess with spherical particles of another colour mix and with a particle diameter of 0.5 mm. A second suction device will remove particles that have been deposed on already particle covered areas and have not adhered.

Afterwards the product is heated in the same way as described in Example 1.

After the flat embossing the product will now have a different material amount in the areas scattered with 0.5 mm particles compared with the areas scattered with 1.0 mm particles. The difference will show up as a thickness difference which will give a regular relief to the surface.

In addition the pressed particle structure in the areas with small particles will look different than areas with large particles.

Both the surface relief and the difference in outlook are optional ways to influence the outlook of the finished product.

Example 3

This example describes a way to make spherical particles of uniform size.

A dry blend with the following composition is produced:

▪ S-PVC	100 parts
▪ Plasticizer (DINP)	25 parts
▪ Epoxidized Soya Bean Oil	5 parts
▪ Stabilizer (Ba-Zu type)	4 parts
▪ Lubricant	2 parts
▪ Pigment	2 parts

The dry blend is fed to an extruder which has in the outlet a micro granulating device. The device consists of a plate with fine holes and a high-speed rotating knife. Fine PVC-strings are extruded via the hole plate and cut by the rotating knife. By choosing the hole diameter and knife speed the size of the particles are influenced. The cut particles are cooled in water and will spontaneously get a spherical form. After cooling the particles are dried and ready for use.

Such particles having an exact spherical form will, as a mass, have a low viscosity and will be very advantageous

to the use in deposition of the particles in controlled figurations e.g. by means of a template unit and especially in scattering operations.

CLAIMS:

1. A method for producing a plastic-based, patterned surface material comprising forming an adhesive plastic layer on a substrate (1) and then laying down particles (27,28) in the plastic layer, pressing down the particles in the layer under heat into a solid form in order to constitute the wear layer of the material,
c h a r a c t e r i s e d i n that particles (27) are laid down in one or several steps in predetermined formations (25) by means of a template method omitting uncovered sections (26) of the surface of the adhesive plastic layer between said formations, and that particles (28) of another character than the first-mentioned in a subsequent step of procedure are scattered over the surface being provided with said particle formations (25), wherein the scattered particles stick in said uncovered sections (26) being formed between the formations but essentially not within the formations where additional particles will not stick, so that the patterning of the finished material in its wear layer at least to a substantial part is formed by the formations (25) of the particles being applied by means of template depositing and the particles (29) being laid down by means of scattering in the areas between the formations.

2. A method according to claim 1,
c h a r a c t e r i s e d i n that laying-down of the particles (27) by means of the template method is accomplished in several steps with reciprocally different templates (20) and with particles of reciprocally different character.

3. A method according to claim 1 or 2, characterised in that the adhesive plastic layer will be applied in such an adapted low thickness compared to the dimension of the particles (44, 45) that these under the heat pressure operation deform and adhere to each other thereby forming a wear layer essentially consisting of said particles.

4. A method according to claim 3, characterised in that the adhesive plastic layer is applied to a thickness of substantially 0.4 mm and that the dimension of the particles is substantially 1.0 mm.

5. A method according to claim 1 or 2, characterised in that particles chosen to be laid down with the template device have a dimension of substantially 1.0 mm and the particles chosen to be laid by means of scattering have a dimension of substantially 0.5 mm.

6. A method according to claim 1 or 2, characterised in that particles chosen to be laid down with the template device have a dimension of substantially 0.5 mm and the particles chosen to be laid by means of scattering have a dimension of substantially 1.0 mm.

7. A method according to any one of the preceding claims, characterised in that for the laying down spherical particles are chosen.

8. A method according to any of claims 1 or 2,

characterised in that the adhesive plastic layer will be applied in such an adapted large thickness compared to the diameter of the particles (44, 55) that these under the heat pressure operation will integrate with the adhesive layer without essentially deforming and that the adhesive layer will be partly visible and being adapted to the character of the finished wear layer to contribute to its outlook by colouring or shading.

9. A method according claim 8, characterised in that for the adhesive layer is chosen a transparent plastic type and that the substrate (1) is provided with a patterning by means of a printing method, so that the same is partly visible in the finished material and together with the laid-down particles (27/28) will contribute to the patterning of the material.

10. A method according to any one of the preceding claims, characterised in that the particles (27), which are laid down in predetermined formations (25) by means of the template method, are applied in a surplus of particles, in addition to the quantity of particles which can stick in the mass within the surface sections being defined by the template element (20), and that said surplus of particles is influenced to be spread outside the contours to the formations (25) being defined by the template, by means of, for example, influence from air currents or vibration of the substrate (1).

11. Device for accomplishing the method according to any of claims 1-10 for producing a plastic-based, patterned surface material comprising forming an adhesive plastic layer on a substrate (1) and then laying down particles

(27,28) in the plastic layer, pressing down the particles in the layer under heating into a solid form, wherein the device comprises a unit (2,3) for feeding the substrate (1) to pass a first unit (6) provided for coating the substrate with an adhesive plastic mass and then unit (7,9) for laying down particles (27,28/35) in the plastic mass and then a unit (12,13) for pressing down the particles in the mass and curing the mass in order for it to form part of the finished coating material,

c h a r a c t e r i s e d i n that the unit for laying down the particles (27,28) comprises at least one device (7) being provided for laying down particles (27/35) on the adhesive layer by means of a movable template element (20), and then, regarded in the direction of motion of the substrate (5), a unit (9) being provided for laying down particles (28) by means of scattering, so that the patterning of the finished material will be composed of formations (25) of the particles (27/35) being laid down by means of the template method and the particles (28) being laid down by means of the scattering, which particles essentially will stick in uncovered areas (26) between the particles (27/35) being laid down in formations (25) by means of the template method, wherein a unit (10) is provided for removing the surplus of the particles being laid down by means of scattering, which has not stuck.

12. A device according to claim 11,

c h a r a c t e r i s e d i n the combination of a unit (1,2) for feeding the substrate (1), a structure (4) with a support surface for the substrate, a unit (6) being provided over the support surface for coating the substrate with a layer of an adhesive plastic mass during its movement in the fixed direction of motion (5), a unit (7) after the coating unit, regarded in the direction of

motion, being provided with a movable template device (20/23) for laying down particles (27/35) on the adhesive layer during the movement of the substrate, after this unit (7/35), regarded in the direction of motion, a suction unit (8) being provided for removing the surplus of particles (27), which has not stuck in the adhesive layer, after this unit (8), regarded in the direction of motion, a unit (9) being provided for scattering particles (28) of another character, than the particles (27) being laid down in the adhesive layer by means of the template unit (7), and a device after the structure (4) with the support surface, adapted for pressing down the laid-down particles in the plastic layer between rolls (12/13) and gelling the plastic through its passage around a heated roll (12), and then a unit (15) for reeling up the finished surface coating material including its gelled plastic layer.

13. A device according to claim 11 or 12, c h a r a c t e r i s e d i n that the template device is constituted by a cylinder (20) the wall of which is provided with openings (23), which in shape are corresponding to the shape of the intended formations (25), to an inner cavity into which the particles are intended to be fed for said laying down through the openings.

14. Coating material being produced in accordance with the method according to any of claims 1-10 and comprising a gelled plastic layer being patterned by means of particles (27,28) being encased into the same, with the particles partly forming predetermined formations (25), c h a r a c t e r i s e d i n that the material is additionally patterned by means of particles (28) of another character than the particles (27) being laid down

in the formations (25) and randomly distributed in sections (26) between said formations (25).

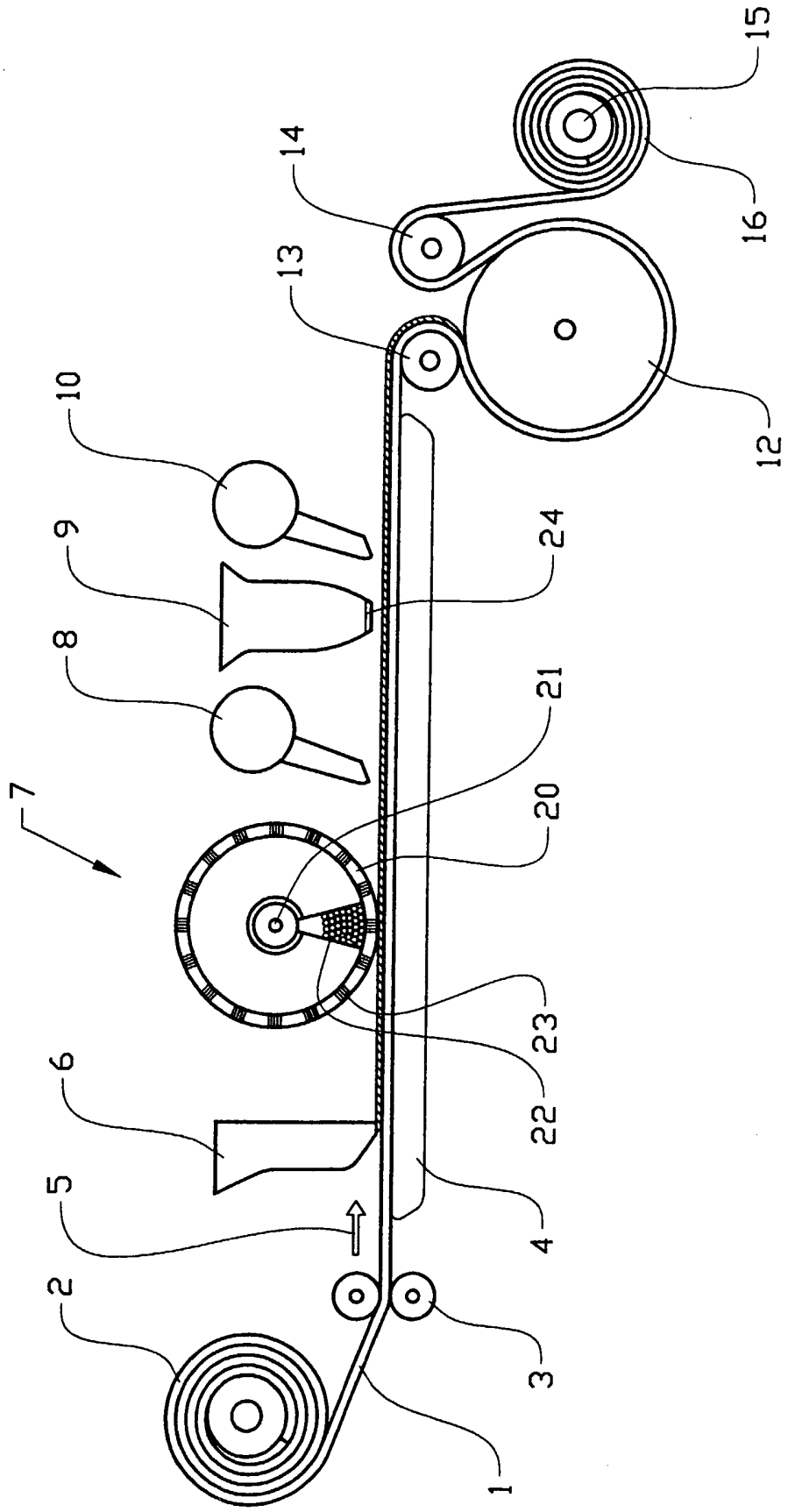


FIG. 1

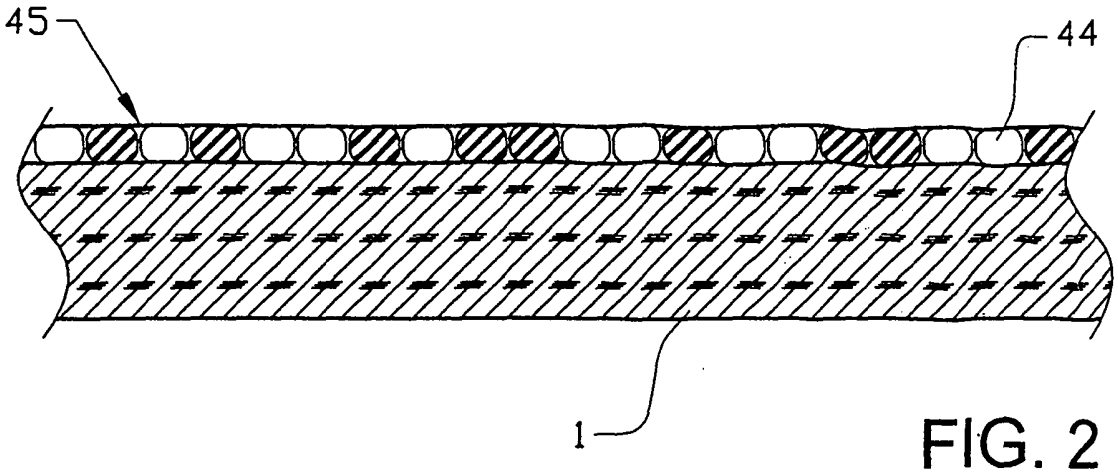


FIG. 2

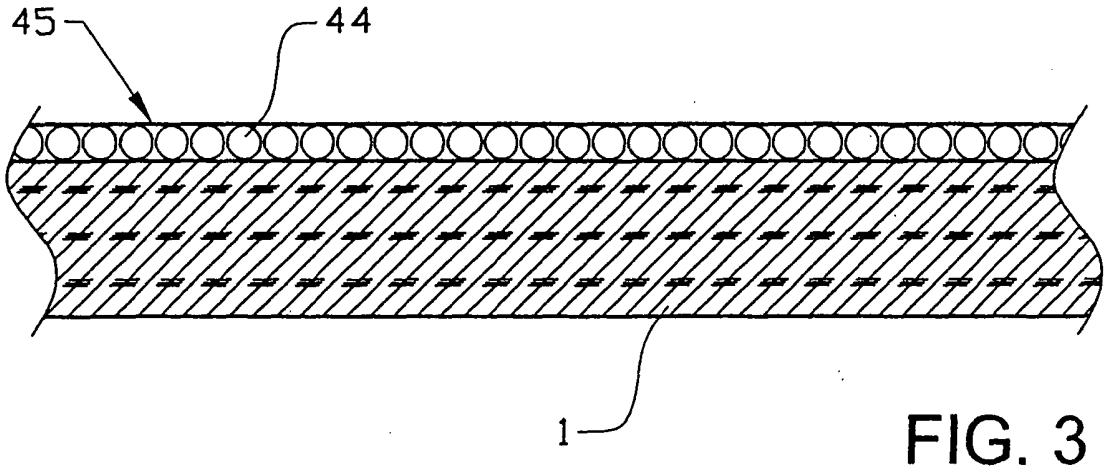


FIG. 3

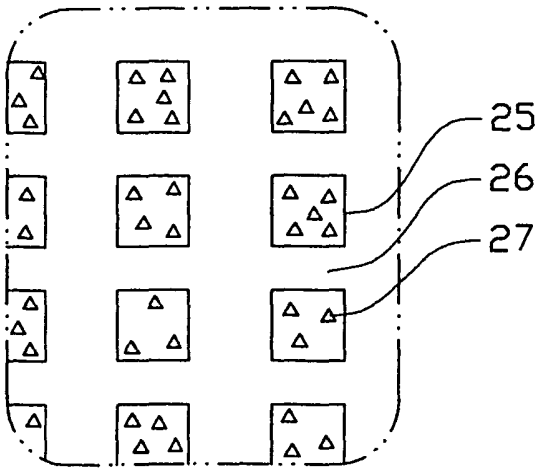


FIG. 4

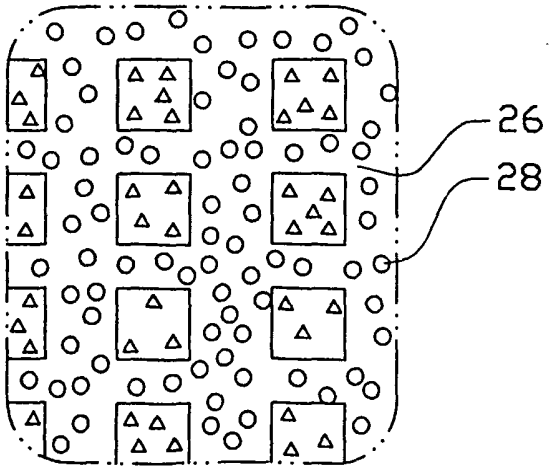


FIG. 5

INTERNATIONAL SEARCH REPORT

International Application No
PCT/CH 03/00460

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B44C1/18 B32B5/02

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)
IPC 7 B44C B32B

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 practical, search terms used)
EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 212 691 A (POTOSKY MILTON J ET AL) 15 July 1980 (1980-07-15) cited in the application column 5, line 25 -column 5, line 62; figures 1A,1C	1-14
A	US 3 017 714 A (EDWARD NAKONIECZNY ET AL) 23 January 1962 (1962-01-23)	
A	US 3 049 761 A (YAKUBIK MICHAEL A) 21 August 1962 (1962-08-21)	
A	US 3 239 364 A (CARLISLE ROBERT A ET AL) 8 March 1966 (1966-03-08)	

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
11 November 2003	28/11/2003

Name and mailing address of the ISA	Authorized officer
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INTERNATIONAL SEARCH REPORT

Information on patent family members

Interna[redacted]nal Application No
PCT/CH 03/00460

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