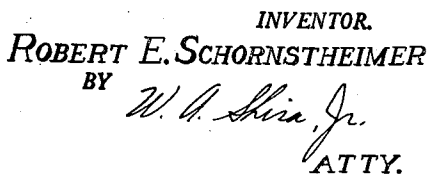


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2 Sheets-Sheet 1

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Nov. 28, 1961

R. E. SCHORNSTHEIMER
METHOD AND APPARATUS FOR DECORATING WEB
OR SHEET MATERIAL WITH GLITTER

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2 Sheets-Sheet 2

FIG. 2

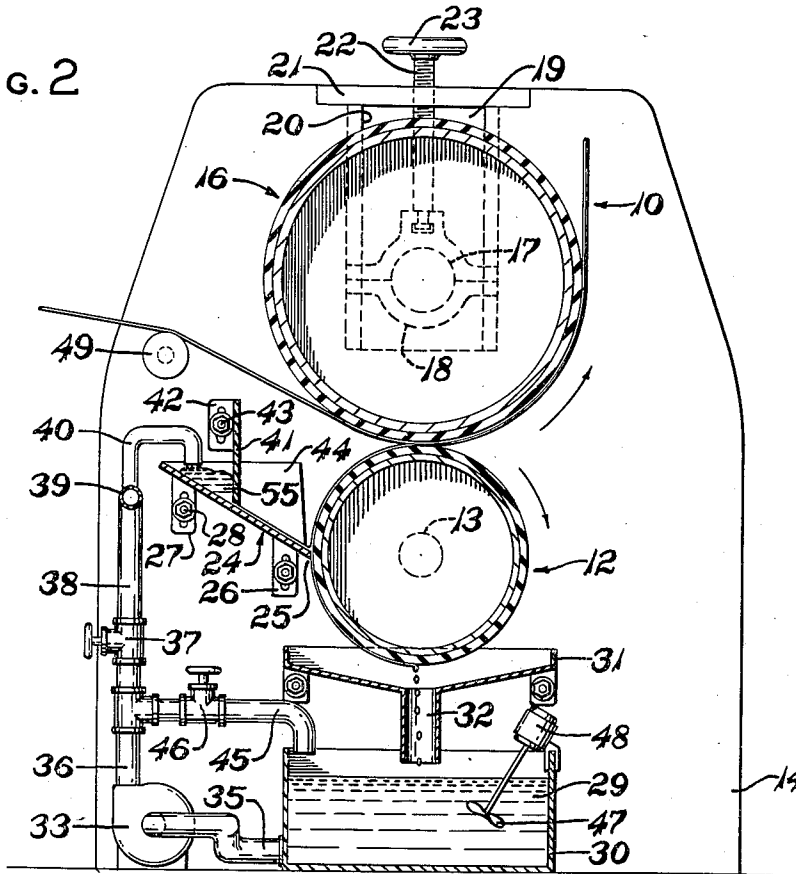
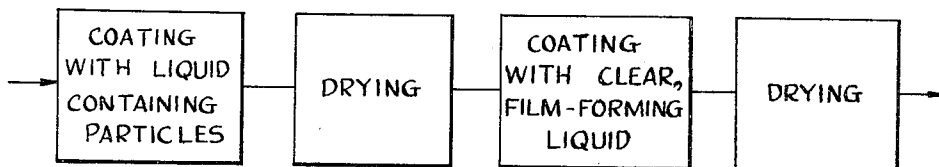


FIG. 5

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3,010,845

METHOD AND APPARATUS FOR DECORATING WEB OR SHEET MATERIAL WITH GLITTER

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17 Claims. (Cl. 117-71)

This invention relates to decoration of sheet or web material and, more particularly, to the application thereto of finely divided particles in random distribution.

It is frequently desirable to apply to the surface of sheet or web material flecks of colored or reflective particles of the type which are known as "glitter" or "flitter." Preferably the distribution of such particles should be random, although the density or number of particles in adjacent areas of like size should not vary greatly. However, the very small size of the particles which makes them desirable as decorative flakes on the material also makes it difficult to achieve the desired distribution of the particles as discrete units. It has been especially difficult to apply such particles rapidly and inexpensively to the surface of plastic material, both unsupported and fabric-backed film, when the material is in the form of sheets or continuous webs.

An object of this invention is, therefore, to provide an improved method and apparatus for rapidly and inexpensively applying to the surface of sheet or web material finely divided particles in random distribution by suspending the particles in a liquid, circulating the liquid and suspended particles in a path including the surface of an applicator roller, and moving the material relative to the applicator roll while the latter is rotating at a speed different from the speed of movement of the material, so that the liquid and particles are wiped onto the surface of the material with the particles spaced from each other.

A more specific object of the invention is to provide an improved method for decorating the surface of plastic material, such as vinyl resin sheets or web material, by suspending finely divided decorative particles in a solution of vinyl resin to distribute the particles in discrete units substantially uniformly throughout the liquid, continuously circulating the liquid and suspending particles in a path including the surface of an applicator roll thereby maintaining the particles in suspension, and contacting the material to be decorated with said roll so that the particles are deposited on the material in spaced random distribution.

A further object of the invention is to provide an improved apparatus which is of simple construction, easy to clean and adjust, and which is capable of applying decorative particles to sheet or web material, either with or without wiping action, and which will maintain the finely divided particles substantially uniformly distributed in liquid-suspended condition both during application of the liquid and particles to the sheet or web material and while no material is being so decorated.

Further objects and advantages of this invention will be apparent to those skilled in the art to which it pertains from the following description of the presently preferred embodiment thereof, and certain modifications described with respect to the accompanying drawings, forming part of this application, in which:

FIG. 1 is a front elevational view of an apparatus embodying the invention and operating to perform the method;

FIG. 2 is a transverse sectional view taken substantially on the section indicated line 2-2 of FIG. 1;

FIG. 3 is a fragmentary plane view of a piece of em-

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bossed sheet or web material before it has been decorated by the method and apparatus of this invention;

FIG. 4 is a view similar to FIG. 3, but showing the material after it has been decorated by applying thereto finely divided particles in accordance with this invention, the size and number of particles being exaggerated; and

FIG. 5 is a chart illustrating the procedural steps in one embodiment of the invention.

Briefly stated, the procedure of this invention comprises suspending finely divided decorative particles in liquid which is then applied to the surface of the material to be decorated by an applicator roll, the liquid being continuously circulated through a path including the surface of the applicator roll so that the particles are maintained in substantially uniform distribution throughout the liquid. The material to be decorated is moved in contact with the applicator roll at a speed which is preferably different from the surface speed of the roll so that the liquid and circulating particles are applied with a wiping action. Consequently, the surface of the material decorated should not be glossy, glazed, or polished, but should have portions thereof of different elevations. For example, when the material to be decorated is a sheet or web of plastic, either supported or unsupported by fabric, excellent results are achieved when the surface has a textured or embossed finish. Preferably, the liquid in which the finely divided particles are suspended is adhesive with respect to the surface of the material being decorated so that, when the material is dried, the particles deposited thereon adhere thereto. Subsequent loosening and loss of the deposited particles from the material may be prevented by applying a clear liquid to the material over the deposited particles which liquid, when dry, forms a protective film. The details of the manner in which the method is performed can be most clearly understood from consideration of the following specific example.

FIG. 3 of the drawing depicts the surface of a portion of a film or sheet of plastic material which is to be decorated by providing thereon finely divided particles of the type known as "flitter" or "glitter." The material 10 illustrated is a portion of a continuous web or sheet of polyvinyl chloride the surface of which has been embossed or otherwise treated to give a desired pattern with portions of different elevations, the specific design here shown being that which may be termed a simulated basket weave. The particles used for decoration upon this material are finely divided flakes of metal as, for example, aluminum flakes such as that sold by the Metals Disintegrating Company as "flitter" powder, MD-1100. In accordance with the procedure of this invention, these particles are suspended in a solution which is compatible with, and adhesive relative to, the surface of the material 10. For example, the liquid in which the particles are suspended may contain a vinyl resin, a plasticizer, and a solvent with or without the addition of a substance or substances which serve as a binder for adhering the particles to the material and also prevent migration of the plasticizer. One satisfactory composition was prepared as follows:

Substance:	Parts by weight
Resin -----	64.71
Plasticizer -----	68.18
Solvent -----	837.22
Binder and plasticizer migration inhibitor----	81.97

The resin may be a vinyl halide or a copolymer containing predominantly polyvinyl chloride with from 0 to 10 parts by weight of vinylidene chloride. One suitable material is that sold by the B. F. Goodrich Chemical Company as "Geon" 202. The plasticizer may be di-

octyl phthalate. The solvent may be methyl-ethyl ketone. The binder and plasticizer migration inhibitor may be cellulose acetate butyrate such as that sold by Eastman Chemical Products, Inc., as "Half-second Butyrate," or may be a solution comprising methyl methacrylate and methacrylate similar to the substance sold by the Rohm & Haas Company as "Acryloid A-110."

The finely divided metal particles in the amount of 0.90 lb., were added to the above liquid and a suspension formed by suitably agitating the liquid. This suspension was then employed to distribute the metal particles upon the material 10 by the process above-described after which the material was dried. Thereafter the material with the distributed particles thereon was lightly coated with a thin transparent liquid, similar to the liquid described above but without particles suspended therein, and the material dried a second time. The result produced was substantially as shown in FIG. 4 from which it will be seen that the surface of the material has small particles of metal flakes or "flitter" 11 distributed over the surface in random arrangement but with the density of the particles for any given area substantially uniform. The size and number of particles in FIG. 4 are somewhat exaggerated to more clearly show the result.

FIGS. 1 and 2 illustrate an apparatus embodying the essential principles of this invention and capable of practicing the method just described. This apparatus combines an applicator roll 12 which may be a cylindrical metal shell and is preferably covered with an elastomeric material such as Butyl rubber. The roll is provided with journal portions 13 at either end rotatably supported in suitable bearings carried by vertically extending frame members 14 and 15, which may be formed of sheet metal and structural members as is well known in the art of machine design. Positioned above the applicator roll 12 is a counter or backing roll 16 which may, like the applicator roll, be formed of a hollow cylindrical metal shell covered with Butyl rubber or other elastomeric material. The roll 16 is provided with journal portions 17 which are rotatably supported in bearings 18 that are preferably supported for vertical adjustment upon the frame members 14, 15, so that the roll 16 may be raised and lowered relative to the roll 12.

In the construction here shown, vertical movement of the roll 16 is effected by providing each of the frame members 14, 15 with a vertically extending opening or recess 19 (see FIG. 2), the vertical edges of which are provided with guideways 20, which slidably receive the end portions of the bearings 18. Extending transversely of each recess 19 at the upper end thereof is a plate member 21, each of which is provided with a threaded insert serving as a nut for an adjustment screw 22. The upper end of each screw 22 is provided with a handwheel 23 while the lower end of each screw is rotatably received in the corresponding bearing 18 and is held from axial movement relative to the latter. The construction is such that, by rotating the handwheels 23, the bearing 18 may be raised or lowered thus changing the position of the roll 16 relative to the roll 12. When the apparatus is adjusted for effecting decoration of material such as 10, the roll 16 is positioned so that the material is backed or supported sufficiently to allow the applicator roll 12 to effect a liquid transfer from its surface to the surface of the material 10.

The liquid, with the suspended particles that are to be deposited upon the material 10, is supplied to the applicator roll 12 in sufficient quantity to form a continuous film over a portion of the roll in advance of contact of the roll with the material 10. Preferably, the liquid and suspended particles are supplied in excess of the quantity which can be carried upon the surface of the roll as a continuous film, the excess being returned to the reservoir or supply container so that the liquid and particles are continuously circulated, thus maintaining the particles in suspension. In the form of apparatus here shown the

delivery of the liquid and suspended particles to the applicator roll is effected by a member 24, which extends transversely of the apparatus and has a planar upper surface, the lower edge 25 of which is adjacent to but spaced from the applicator roll 12 as will be apparent from FIG. 2. The member 24 is supported upon the side members 14 and 15 of the apparatus by vertically extending brackets, such as 26 and 27, which are vertically slotted and receive attaching bolts, such as 28, carried by the side members 14 and 15. The construction is such that, by vertically adjusting the member 24, the space between the lower edge 25 of the member and the applicator roll 12 may be varied thereby providing the selected thickness or depth of film of the liquid and suspended particles upon the surface of the applicator roll 12.

A supply of the liquid with the suspended particles, indicated at 29, is provided in a container 30, conveniently located in the base of the machine and preferably positioned beneath the applicator roll 12. Immediately beneath the applicator roll, and between the latter and the container 30, is a collecting tray or drain pan 31 which receives excess liquid and suspended particles from the roll 12 and returns such excess to the container 30 through a discharge conduit 32. The liquid and suspended particles are supplied to the member 24 for movement thereover to the applicator roll 12 by the pump 33 and suitable conduit means which are so constructed and arranged that the liquid and particles are withdrawn from the container 30 and delivered to the member 24 at a rate in excess of the amount needed for transfer by the roll 12.

As here shown, the pump 33, which is driven by a motor 34, has its intake connected by conduit 35 to the container 30 adjacent the bottom of the latter. The output of the pump 33 is provided with a conduit 36 extending to a regulator valve 37, and the latter is connected by a conduit 38 with a manifold 39 that extends horizontally of the apparatus along approximately the transverse extent of the member 24. The manifold 39 is provided with spaced outlets in the form of short pipes or conduits 40 at spaced locations therealong so that the liquid and suspended particles are distributed along the member 24 adjacent the upper edge thereof. The distribution of the liquid and suspended particles transversely of the member 24 is further facilitated by a vertically disposed plate or doctor blade 41, the ends of which are adjustably supported upon the frame members 14 and 15 by means of vertically slotted brackets 42 which receive attaching bolts 43. The doctor blade 41 is so adjusted that it allows liquid and suspended particles to flow therebeneath in a stream of substantially uniform depth along the entire extent of the planar surface of the member 24, the sides of the stream being defined and flow laterally therefrom being prevented by the vertically extending side portions 44 of the member 24. Between the valve 37 and pump 33 the conduit 36 is also provided with an overflow pipe or conduit 45 communicating with the container 30 and provided with a valve 46. This facilitates continuous circulation of liquid and particles as will be hereinafter explained.

The liquid and finely divided particles may be mixed prior to their introduction into the container 30 or may be mixed therein as may be convenient or desirable. In order to permit such mixing and to further insure that the particles once suspended in the liquid remain in uniformly distributed suspension, the container 30 is provided with suitable agitator means, here shown as a stirrer 47 driven by a motor 48 supported upon the container 30. The stirrer illustrated is of the propeller type but it will be apparent that it may take other forms and more than one agitator may be employed if necessary or desired.

In the illustrated embodiment, the material 10 being decorated is shown as being an elongated sheet or web which is guided into the apparatus by a roll 49 and which

may be led from the apparatus by guide rolls and/or other mechanism moving the material to a suitable drying apparatus not shown. The counter or backing roll 16 is driven to provide a suitable speed of movement of the material by conventional drive mechanism comprising a motor 50 and a power transmission extending between the motor and the roll through the cover 51 (see FIG. 1): The applicator roll 12 is driven independently of the roll 16 from a separate motor 52 through a speed-change mechanism 53 and a power transmission connected between the roll and the change-speed mechanism and enclosed by the cover 54. The power-transmitting means contained in the covers 51 and 54 may be belts, chains, or gearing of suitable type the details of which form no part of this invention. The motor 52 and the speed-change mechanism 53 are preferably such that the speed of the applicator roll 12 can be made the same as or different than that of roll 16, the preferred speed of the roll 12 being 20% to 80% faster than the speed at which the material 10 is moved through the apparatus.

The apparatus here illustrated is employed by starting the several motors and supplying liquid with suspending particles to the container 30. The liquid and particles are removed from the container 30 and carried through the conduits 35, 36, and 38 and manifold 39, to and through the distributing pipes 40, so that the liquid and suspended particles are delivered to the upper end of the member 24. This member is so adjusted relative to the applicator roll 12, and the doctor blade 41 is so adjusted relative to the planar surface of the member 24, that a film of liquid and suspended particles of suitable thickness is supplied to and evenly spread over the surface of the applicator roll 12 as the latter rotates, the direction of rotation being as shown in FIG. 2. Preferably, the adjustment of the parts is such that the liquid and suspended particles are supplied to the surface of the roll 12 somewhat in excess of the amount which can be carried by that roll, the excess being collected by the drain pan 31 and returned to the container 30. This insures complete coverage of the surface of the roll in the region which is to contact the material 10 and also insures maintaining a substantially uniform distribution of the finely divided particles 11 in the liquid and upon the applicator roll.

Preferably, the rate of supply of the liquid and particles to the member 24 is such that an excess or bank of the liquid and particles accumulates behind the doctor blade 41 as indicated at 55 in FIG. 2. This reservoir or bank of liquid should not, however, be so great as to permit particles to settle from the liquid therein and, in fact, is exaggerated in the showing of FIG. 2 for the sake of illustration. Regulation of the rate of delivery of liquid and particles to the member 24 is effected by adjustment of the valves 37 and 46. The amount of opening of valve 46 is selected to provide a rate of circulation of the liquid and particles to and from the container 30 sufficient to preserve the suspended condition of the particles. This rate of circulation may be somewhat in excess of the rate of circulation of the liquid and particles through the path including the member 24 and the applicator roll 12. However, in some operations it is not necessary to divert a portion of liquid and particles through the valve 46 and conduit 45. Instead, the entire output of the pump 33 can be delivered to the member 24 and the excess returned over the applicator roll 12 to the drain pan 31 and container 30. The agitator 47 may be continuously or intermittently operated as is necessary to preserve the desired suspension and distribution of the particles 11 in the liquid.

The material 10 which is to be decorated is introduced into the machine over the guide roll 49, and between the rolls 12 and 16. When the material is in the form of a continuous strip or web it may be led from the machine to suitable wind-up machine, not shown, and may be subjected to a drying operation before wind-up. With the material thus supplied and with the liquid circulat-

ing as aforementioned, the finely divided particles in suspension are applied to the surface of the material 10 by the applicator roll 12 and are randomly distributed by virtue of their suspension in the liquid. The particles adhere to the material 10 and remain in place thereon upon evaporation of the liquid since the latter is adhesive with respect to the surface of the material 10. In some cases no further treatment is needed to insure retention of the particles on the material. However, when the material may be subjected to considerable flexure or rubbing action, it is frequently desirable to apply over the deposited particles a clear, transparent film to further aid in securing the particles to the material 10. To apply such clear covering over the deposited particles the dried material 10 may be passed through an apparatus identical to that shown in FIGS. 1 and 2, but with the liquid supplied to the applicator roll being clear and without suspended particles. Such a liquid may, for example, be similar in formula to that given above for providing the suspension of the particles 11 but the binder and migration preventive material may be omitted if desired. After such second treatment of the material 10, it is again dried and is then ready for use. The sequence of operations just described is illustrated in FIG. 5 with the direction of movement of the material being indicated by arrows.

It has been found that it is generally preferable to effect transfer of the suspended particles to the material 10 by operating the applicator roll 12 so that its surface speed is different from the rate of movement of the material 10 through the apparatus, the optimum conditions being obtained when the roll 12 has a surface speed which is 20% to 80% greater than the rate of movement of the material 10. This effects a wiping action of the applicator roll upon the material facilitating a transfer of the liquid and particles. This wiping action is especially advantageous when decorating material which has a surface with portions of different elevations such as a textured, embossed or similar type of surface finish. The actual difference in speed between the surface of the applicator roll and the material being decorated will, of course, depend to some extent upon the nature of the material, the liquid and particles being applied, and other variable conditions. The variable speed mechanism 53 permits the applicator roll speed to be suitably altered to readily accommodate it to such variables. Likewise, the adjustment of the valves 37 and 46, and the adjustment of the doctor blade 41 as well as the member 24 permit regulation of the rate of circulation of the liquid and suspended particles to achieve the necessary rate of supply of liquid and particles for effecting a desired density of deposited particles on the material.

In the event it is desired to terminate application of liquid and particles to the material 10, it is not necessary to stop the liquid circulation or the rotation of the applicator roll 12. Instead, the roll 16 is elevated through operation of handwheels 23 and the motor driving roll 16 stopped. This is highly advantageous since it prevents drying of the liquid upon the applicator roll and upon or in the various parts of the circulatory system should it be necessary to stop the movement of the material 10 for an interval of time. The continued circulation of the liquid and rotation of the roll 12 maintains the liquid system and roll in condition for immediate resumption of decorating cooperation with the material 10, and this can be again effected by simply starting the motor 50, which drives roll 16, and lowering the roll 16 to contact the material 10 with the roll 12. The construction of the apparatus is further advantageous in that there are no small orifices or other parts which are difficult to clean and hence a change from one liquid to another may be readily made with a minimum of time lost in cleaning the circulatory system and the applicator roll.

Raising and lowering of roll 16 has been illustrated and described as effected manually by actuation of handwheels 23. It will be evident, however, that this operation may be effected by power means. Moreover, if desired, raising and lowering of roll 16 may be automatically effected upon stopping and starting of its rotation. For example, the screws 22 and handwheels 23 may be replaced by pneumatic or hydraulic cylinders the operation of which are controlled by the start-stop control for motor 50 so that when the latter is stopped roll 16 is raised and conversely. It will also be apparent that, although the apparatus has been described specifically with respect to the application of finely-divided particles to the material 10, the same apparatus may be employed for operations other than that of applying finely-divided particles to sheet or web material. For example, the ability to vary the surface speed of roll 12 relative to the speed of movement of the material 10 enables the apparatus to be employed to decorate embossed or other material surfaces of different elevations with colored liquids to effects known as "wipe shading" and other related decorative effects.

It will also be apparent that, while the apparatus here shown is particularly well adapted for applying finely-divided particles in suspended condition to sheet or web material, in accordance with the method of this invention, nevertheless, the procedural steps can be effected by apparatus somewhat differently constructed so long as provision is made for maintaining the particles in suspended condition and applying the liquid and suspended particles in the manner heretofore described. Therefore, the invention is not limited to the exact structural details of the apparatus, nor to the precise composition of the liquid and suspended particles set forth in the illustrative example, but variations may be made by those skilled in the art. Consequently, the invention is not to be considered as restricted except as required by the spirit and scope of the appended claims.

Having thus described the invention, I claim:

1. The method of decorating material comprising providing a suspension of finely-divided decorative particles in a liquid, continuously moving the said liquid in a circulating path including the surface of an applicator roll thereby maintaining the said particles in suspension and providing a film of the liquid with the suspended particles in discrete spaced units on at least a portion of the surface of said roll, and moving the material to be decorated in contact with the film of liquid and particles on said roll while rotating the latter in the direction of movement of the material at a rate such that its surface speed is different from that of the material being decorated, whereby the liquid and suspended particles are applied to the material with a wiping action.

2. The method of decorating material having surface portions at different elevations comprising providing a suspension of finely-divided decorative particles in a liquid, continuously moving the said liquid in a circulating path including the surface of an applicator roll thereby maintaining the said particles in suspension and providing a film of the liquid with the suspended particles in discrete spaced units on at least a portion of the surface of said roll, and moving the material to be decorated in contact with the film of liquid and particles on said roll while rotating the latter in the direction of movement of the material at a rate such that its surface speed is greater than that of the material being decorated whereby the liquid and suspended particles are applied to the material with a wiping action.

3. The method as defined in claim 2 wherein the surface speed of said applicator roll is 20% to 80% greater than that of the material being decorated.

4. The method of decorating material comprising providing a suspension of finely-divided decorative particles in a liquid, continuously moving the said liquid in a circulating path including the surface of an applicator roll

thereby maintaining the said particles in suspension and providing a film of the liquid with the suspended particles in discrete spaced units on at least a portion of the surface of said roll, moving the material to be decorated in contact with the film of liquid and particles on said roll while rotating the latter whereby the liquid and suspended particles are applied to the material with the particles disposed in random arrangement, and thereafter applying to the decorated surface of the material a liquid capable of forming a transparent covering over the deposited particles.

5. The method of decorating material having surface portions at different elevations comprising providing a suspension of finely-divided decorative particles in a liquid, continuously moving the said liquid in a circulating path including the surface of an applicator roll thereby maintaining the said particles in suspension and providing a film of the liquid with the suspended particles in discrete spaced units on at least a portion of the surface of said roll, moving the material to be decorated in contact with the film of liquid and particles on said roll while rotating the latter in the direction of movement of the material at a rate such that its surface speed is different from that of the material being decorated whereby the liquid and suspended particles are applied to the material with a wiping action, and thereafter applying to the decorated surface of the material a liquid capable of forming a transparent covering over the deposited particles.

6. The method of decorating a plastic material comprising providing a suspension of finely-divided decorative particles in a liquid adherent to said material, continuously moving the liquid containing the finely-divided particles in a circulating path including the surface of an applicator roll to form a film of liquid and suspended particles thereon with the particles disposed as discrete spaced units, and moving the material in contact with the applicator roll while rotating the latter in the direction of movement of the material at a rate such that the surface speed of the roll is 20% to 80% greater than the speed of movement of the material whereby the liquid and suspended particles are applied with a wiping action to the material with the particles randomly distributed in spaced relationship on the surface of the material.

7. The method of decorating vinyl resin material comprising providing a suspension of finely-divided decorative particles in a liquid solution of vinyl resin, continuously moving the liquid containing the finely-divided particles in a circulating path including the surface of an applicator roll to form a film of liquid and suspended particles thereon with the particles disposed as discrete spaced units, and moving the material in contact with the applicator roll while rotating the latter in the direction of movement of the material at a rate such that the surface speed of the roll is different from the speed of movement of the material whereby the liquid and suspended particles are applied with a wiping action to the material with the particles randomly distributed in spaced relationship on the surface of the material.

8. The method of decorating embossed vinyl resin material comprising providing a suspension of finely-divided decorative particles in a liquid solution of vinyl resin, continuously moving the solution containing the finely-divided particles in a circulating path including the surface of an applicator roll to form a film of liquid and suspended particles thereon with the particles disposed as discrete spaced units, and moving the material in contact with the applicator roll while rotating the latter in the direction of movement of the material at a rate such that the surface speed of the roll is 20% to 80% greater than the speed of movement of the material whereby the solution and suspended particles are applied with a wiping action to the material with the parti-

cles randomly distributed in spaced relationship on the surface of the material.

9. The method of decorating vinyl resin material comprising providing a suspension of finely-divided decorative particles in a liquid solution of vinyl resin, continuously moving the solution containing the finely-divided particles in a circulating path including the surface of an applicator roll to form a film of liquid and suspended particles thereon with the particles disposed as discrete spaced units, moving the material in contact with the applicator roll while rotating the latter whereby the solution and suspended particles are applied to the material with the particles randomly distributed on the surface of the material, and thereafter applying to the material a solution of vinyl resin capable of forming a clear transparent covering over the deposited particles.

10. The method of decorating embossed vinyl resin material comprising providing a suspension of finely-divided decorative particles in a liquid solution of vinyl resin, continuously moving the solution containing the finely-divided particles in a circulating path including the surface of an applicator roll to form a film of liquid and suspended particles thereon with the particles disposed as discrete spaced units, moving the web material in contact with the applicator roll while rotating the latter in the direction of movement of the material at a rate such that the surface speed of the roll is 20% to 80% greater than the speed of movement of the material whereby the solution and suspended particles are applied with a wiping action to the material and with the particles randomly distributed in spaced relationship on the surface of the material, and thereafter applying to the material a solution of vinyl resin capable of forming a clear transparent covering over the deposited particles.

11. An apparatus for decorating the surface of material by depositing thereon decorative particles in random arrangement, the said apparatus comprising an applicator roll for rotation on a horizontal axis, means to rotate said roll, means to move the material in contact with a portion of the circumference of said roll, a member having a planar surface, means supporting said member with said surface extending axially of said roll and at an incline to the horizontal so that the lower edge of the surface is adjacent to but spaced from the surface of said roll in advance of the region of contact of the material with said roll, a doctor blade extending transversely of the upper surface of said member spaced rearwardly from the said lower edge of the latter and a selected distance above the member to regulate the passage of liquid and particles thereover, and means for supplying a liquid containing finely-divided decorative particles to the planar surface of said member including a container for said liquid and particles, means for moving liquid and particles from the container to the portion of said planar surface at the side of said doctor blade which is remote from said roll, means to regulate the rate of delivery of liquid and particles to said planar surface, and means to collect and return to said container liquid and particles supplied to said roll in excess of that transferred to said material by the roll.

12. An apparatus for decorating the surface of material by depositing thereon decorative particles in random arrangement, the said apparatus comprising an applicator roll supported for rotation on a horizontal axis, means to rotate said roll, means to move the material in contact with a portion of the circumference of said roll, a member having a planar surface, means supporting said member with said surface extending axially of said roll and at an incline to the horizontal so that the lower edge of the surface is adjacent to but spaced from the surface of said roll in advance of the region of contact of the material with said roll, means for supplying a liquid containing finely-divided decorative particles to the planar surface of said member including a container for said liquid and particles, means for agitating the liquid and

particles in said container to provide a substantially uniform distribution of the particles in the liquid, means for moving liquid and particles from the container to said planar surface, valve and liquid by-pass means to regulate the rate of delivery of liquid and particles to said planar surface, a doctor blade extending transversely of said planar surface intermediate the said lower edge and location of delivery of liquid and particles to said surface, means to adjust the doctor blade relative to said surface to thereby control passage over the latter of a film of liquid and particles of selected depth, and means to collect and return to said container liquid and particles supplied to said roll in excess of that transferred to said material by the roll.

13. An apparatus for decorating the surface of material by depositing thereon decorative particles in random arrangement, the said apparatus comprising an applicator roll supported for rotation on a horizontal axis, means to rotate said roll, means to move the material in contact with a portion of the circumference of said roll, a member having a planar surface, means supporting said member with said surface extending axially of said roll and at an incline to the horizontal so that the lower edge of the surface is adjacent to but spaced from the surface of said roll in advance of the region of contact of the material with said roll, means for supplying a liquid containing finely-divided decorative particles to the planar surface of said member including a container for said liquid, a pump and conduit means for moving liquid and particles from the container to said planar surface, a doctor blade extending transversely of said planar surface intermediate the place of supply of liquid and particles thereto and the said applicator roll, means adjustably supporting said doctor blade to provide a selected space between it and said planar surface to thereby permit passage over the latter of a film of liquid and particles of selected depth, and means to collect and return to said container liquid and particles supplied to said roll in excess of that transferred to said material by the roll.

14. An apparatus for decorating the surface of material by depositing thereon decorative particles in random arrangement, the said apparatus comprising an applicator roll supported for rotation on a horizontal axis, means to rotate said roll, means to move the material in contact with a portion of the circumference of said roll, a member having a planar surface, means supporting said member with said surface extending axially of said roll and at an incline to the horizontal so that the lower edge of the surface is adjacent to but spaced from the surface of said roll in advance of the region of contact of material with said roll, the said supporting means including means to adjust the position of said member to thereby vary the space between the said member and roll, means for supplying a liquid containing finely-divided decorative particles to the planar surface of said member including a container for said liquid and particles, a pump and conduit means for moving liquid and particles from the container to said planar surface, means to regulate the rate of delivery of liquid and particles to said planar surface, a doctor blade extending transversely of said planar surface intermediate the place of supply of liquid and particles thereto and the said applicator roll, means adjustably supporting said doctor blade to provide a selected space between it and said planar surface to thereby permit passage over the latter of a film of liquid and particles of selected depth, and means to collect and return to said container liquid and particles supplied to said roll in excess of that transferred to said material by the roll.

15. An apparatus as defined in claim 14 wherein the means to regulate the rate of delivery of liquid and particles to said planar surface includes valve means in said conduit means and a by-pass opening communicating with said container for return thereto of liquid and

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particles removed from said container in excess of the quantity delivered to said surface.

16. An apparatus for decorating the surface of material by depositing thereon decorative particles in random arrangement, the said apparatus comprising an applicator roll supported for rotation on a horizontal axis, means to rotate said roll, means to move the material in contact with a portion of the circumference of said roll at a speed independent of the speed of rotation of the roll, a member having a planar surface, means supporting said member with said surface extending axially of said roll and at an incline to the horizontal so that the lower edge of the surface is adjacent to but spaced from the surface of said roll in advance of the region of contact of the material with said roll, the said supporting means including means to vertically adjust the position of said member relative to said roll to thereby regulate the spacing between the said edge of the member and the roll, means for supplying a liquid containing finely-divided decorative particles to the planar surface of said member including a container for said liquid and particles, a pump and conduit means for moving liquid and particles from the container to said planar surface, valve and by-pass means connected to said conduit regulating the amount of liquid and particles delivered to said member and returning excess liquid and particles to said container, a doctor blade extending transversely of said planar surface intermediate the place of supply of liquid and particles thereto and the said applicator roll, means adjustably supporting said doctor blade to provide a selected space between it and said planar surface to thereby permit passage over the latter of a film of liquid and particles of selected depth, and means to collect and re-

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turn to said container liquid and particles supplied to said roll in excess of that transferred to said material by the roll.

17. An apparatus as defined in claim 16 wherein the means to rotate said roll includes a change speed mechanism and the means to move said material includes drive means independent of said change speed mechanism whereby the surface speed of said roll may be different from that of said material.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,010,845

November 28, 1961

Robert E. Schornstheimer

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 3, line 57, for "bearing" read -- bearings --;
column 7, line 21, after "to" insert -- create --.

Signed and sealed this 15th day of May 1962.

(SEAL)

Attest:

ERNEST W. SWIDER

Attesting Officer

DAVID L. LADD

Commissioner of Patents