

Sept. 26, 1939.

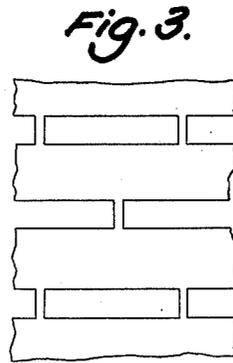
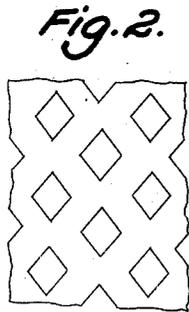
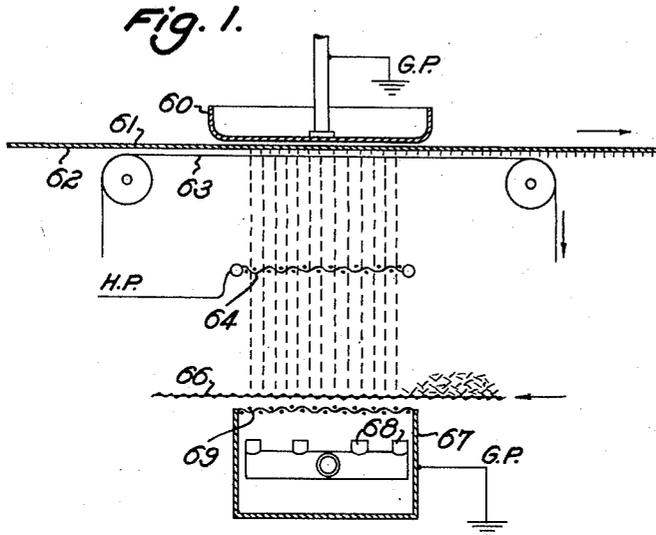
A. F. MESTON ET AL

2,174,328

PILED SURFACE IN PATTERN FORM

Original Filed Feb. 6, 1935

2 Sheets-Sheet 1



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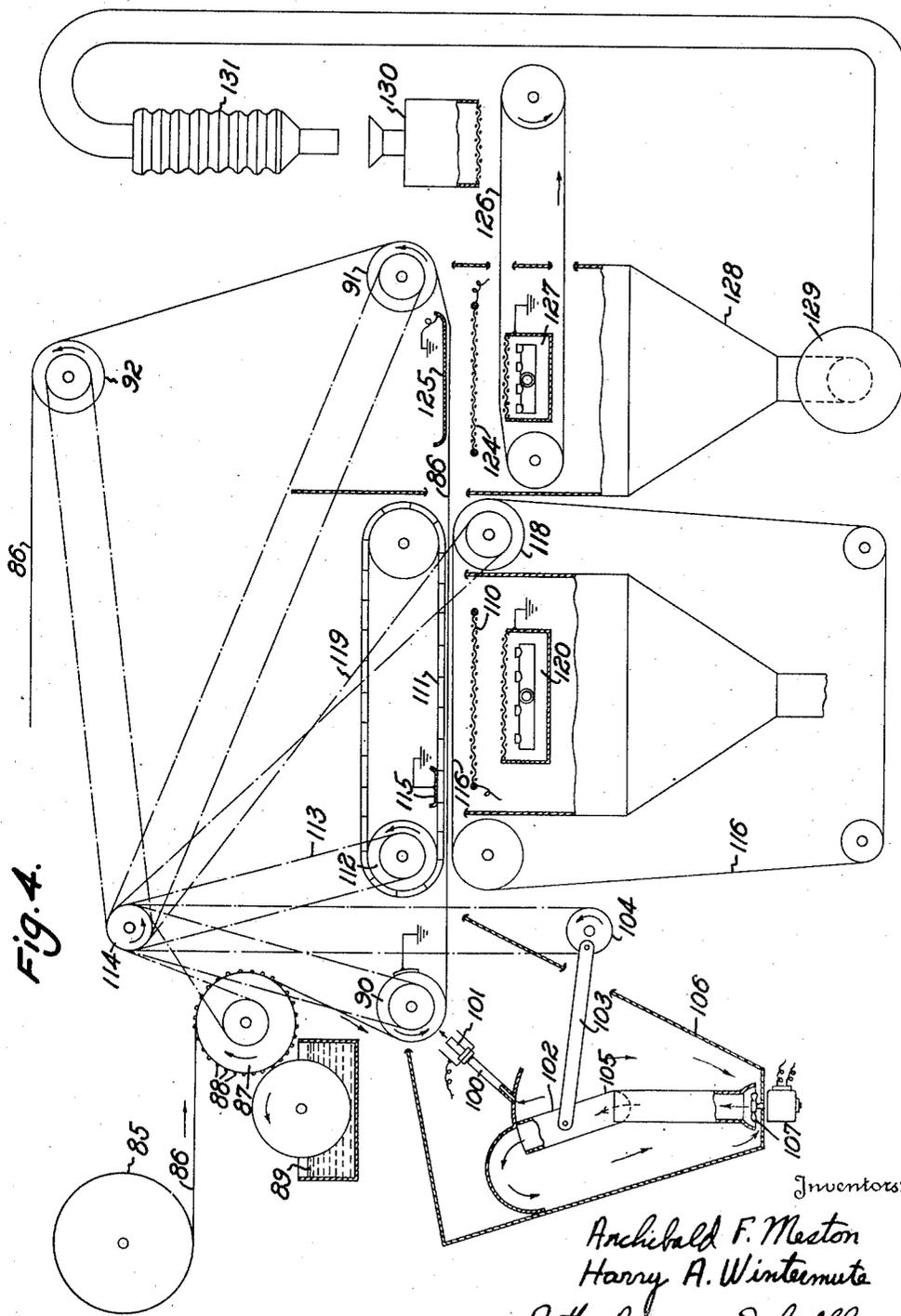
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UNITED STATES PATENT OFFICE

2,174,328

PILED SURFACE IN PATTERN FORM

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Original application February 6, 1935, Serial No. 5,288. Divided and this application March 20, 1937, Serial No. 132,170

5 Claims. (Cl. 91—8)

This invention relates to coating and/or decorating surfaces with simulated piles in pattern form. It has to do in particular with apparatus and methods for making and controlling a non-uniform electric field used in the deposition of elongated particles on adhesive covered surfaces for the purpose of effecting a topical arrangement of the particles on the surfaces, for example, in pleasing patterns.

5 Fibers, such as rayon flocks, can be deposited in oriented position upon an adhesive covered surface if the surface is positioned in an electric field and fibers are introduced into the electric field in unrestrained manner. The conditions required for satisfactory deposition of fibers in the piling of surfaces are described in copending applications Serial No. 692,201, A. F. Meston, filed October 4, 1933; and Serial No. 699,456, H. A. Wintermute, filed November 23, 1933.

10 The piles made with the apparatus and methods used and described in the applications just mentioned are quite uniform in composition and appearance. Most of the fibers stand erect, perpendicular to the surface, making piles of monotonous evenness from a decorative standpoint. It has now been found that by suitable control of the electric field by means of which the fibers are deposited, and particularly by the use of a deliberately warped or discontinuous electric field, pleasing variations and definite patterns can be obtained in the pile.

Apparatus useful in carrying out the invention and several embodiments of the invention, including novel methods and products, are hereinafter described with particular reference to the appended drawings, in which:

Fig. 1 is a diagrammatic view, in side elevation, of apparatus for depositing fibers in pattern formation by utilizing a moving field stencil;

40 Figs. 2 and 3 show typical forms of field stencils used with the invention; and

Fig. 4 is a diagrammatic view in side elevation of apparatus for the production of material having a piled surface in pattern form, including the features of the present invention together with features more particularly described and claimed in our application Serial No. 5,288, filed February 6, 1935, of which the present application is a division.

50 In the apparatus of Fig. 1 a field controlling member is supported in an electric field established between a high potential electrode and a ground electrode. The field control or field stencil member is positioned in front of the surface being piled and is preferably at the same or nearly

the same potential as the electrode just back of the sheet with the surface being piled. In the figure electrode 60 is preferably flat and is at ground potential. Electrode 64 is of reticulated construction or the like and is maintained at high potential. Sheet 61, the under side 62 of which is to be piled, is moved through the electric field between electrodes 60 and 64, preferably just under and touching electrode 60, as shown. A member 63, advantageously formed as a belt with stencil-like perforations such as the diamond design shown in Fig. 2 or the slots shown in Fig. 3, is moved parallel with and at the same speed as sheet 61. It is held a short distance, for example, one-fourth inch, in front of adhesive covered surface 62. The fibers to be deposited are brought into the apparatus on a moving porous belt 65. When the fibers are carried by belt 66 over the top of wind box 67, compressed air issuing from nozzles 68 and passing through regulating means 69 blows through the interstices of belt 66 and blows the fibers up through electrode 64 and into the electric field for deposition on surface 62. Very definite patterns are made with the apparatus shown in Fig. 1 and they can be made very colorful if the sheet to be piled is passed through several partially shielded fields, each one depositing fibers of a different color.

Belt 63 can be made of wire or other attenuated members woven into a pattern and it will influence the deposition of the fibers comprising the pile by altering the electric field. Or belt 63 can be made up as a stencil and cause a pattern to be made by definitely covering portions of surface 62 and permitting flocks to be deposited only behind openings in the stencil. Besides the diamond pattern shown in Fig. 2, decorative designs, such as flowers, and commercial outlines comprising names, can be formed. Such stencil-like members effect the pattern not only mechanically but also effect it by locally altering the characteristics and intensity of the electric field and therefore they may be designated as "field stencils."

Fig. 4 is a diagrammatic view in side elevation of apparatus which may be used in successively applying the several embodiments of the invention which have been described in this application and our application Serial No. 5,288, filed February 6, 1935. A sheet 86 of the material to be piled, for example, a light weight, flexible but closely woven textile, is unwound from supply roll 85, passed over an adhesive applying roll 87, over positioning and tensioning rolls 90, 91 55

and 92, and through means, not shown, for finishing and storing the piled product. Roll 87 is shown with raised portions 88 to apply the adhesive from vessel 89 to the surface of sheet 86 in restricted areas only. Where the surface of the sheet is to be completely piled, a smooth roll to spread adhesive over the entire surface of the sheet is used.

As the adhesive coated sheet goes over roll 90, it may be sprayed with fibers from one or more spray electrodes 101 in accordance with the practice described in application Serial No. 5,288. The fibers for sprays 101 are supplied through conduit 102 and this can be made to move away from the entrance of sprays 101 by reciprocating means, for instance, crank 104 acting, preferably with a quick return movement, through connecting rod 103 will make conduit 102 articulate at joint 105 at the chosen intervals when deposition of particles is to be interrupted. During the period of interruption the fibers blow out the end of conduit 102 and fall to the bottom of casing 106 to be lifted again by blower 107. If electrode 101 is maintained at high potential connecting tube 100 is made of insulating material.

Sheet 86 next passes through an electric field established between screen electrode 110 and control electrode 111. The latter electrode can be in the form of any of the control electrodes shown in application Serial No. 5,288, but is made into or is attached to an endless band. If electrode 111 is to cause the fibers to deposit in a closed pattern or one with transverse marks, it must move at the same speed and in the same direction as sheet 86 while sheet 86 is moving through the electric field above electrode 110. This is accomplished by turning pulley 112, over which electrode 111 passes, by a positive drive 113 such as a chain from a source of power 114 which also turns pulley 90 over which sheet 86 passes, in positive manner. Positive synchronous movement of belt and electrode can also be obtained by having spurs project from the edge of electrode 111 and engage perforations along the edges of sheet 86 in the manner known to the moving picture art. A grounded shoe 115 contacts electrode 111 and maintains it at ground potential.

Underneath sheet 86 a belt 116 may be positioned by utilizing supporting pulley 117 and supporting and propelling pulley 118. Belt 116 may be perforated as a stencil and function as a field stencil in the manner of member 63 in Fig. 1. The stenciling belt must move at the same speed as sheet 86 and such movement is obtained through drive 119. Other field altering means, such as screens, can be used in place of stenciling means 116, and such means travelling at the speed of sheet 86 will give the pile on sheet 86 a woven appearance. Although pattern control electrode 111 and stenciling or other field altering means 116 can be used at the same time, ordinarily this is not done. A flat stationary electrode may be used in place of special electrode 111 when a field stencil is being used in front of sheet 86. Fibers are supplied to the field between electrodes 110 and 111 by supply means 120 in which air jets are utilized to project the fibers up through electrode 110.

Electrodes 124 and 125 in Fig. 4 are energized and used to deposit fibers if portions of the surface of sheet 86 remain unpiled after the sheet passes through the processing steps described in the above. No special effect is sought in this

last step. Both electrodes have, in general, flat surfaces and the uniform field that results from impressing a high voltage across electrodes 124 and 125 tends to deposit an erect uniform pile. The deposition of fibers in this step is usually for the purpose of completing the pile started with spray electrodes 101 and/or the pile deposited through field stencil 116 and this filling is often made with fibers of a different color from that used in the preceding steps.

Apparatus for satisfactorily supplying fibers to the field between electrodes 124 and 125 is shown diagrammatically under electrode 124. It comprises an endless foraminous conveying belt 126 upon which fibers are spread by a distributor 130, preferably agitated, and a blowing means 127 that distributes air under pressure under belt 126 and causes it to pass up through the belt and raise the fibers therefrom and blow them through screen electrode 124. Undeposited fibers are collected in hopper 128 and conveyed by an air stream set in motion by fan 129 to filter bag collector 131 and thence to distributor 130.

Fig. 4 illustrates apparatus with a wide range of usefulness in the forming of simulated piles on adhesive covered surfaces. It is illustrative of the wide variation in methods and means for obtaining useful patterns in the electrical deposition of pile forming materials by the local alteration of the characteristics of the electrical field effecting the deposition, so as to produce a definite typical non-uniformity therein. It is obviously subject to a very large degree of variation and may be provided with electrode rapping or agitating means and other devices and modifications.

This application is a division of our application Serial No. 5,288, filed February 6, 1935, now Patent 2,152,077.

We claim:

1. Apparatus for electrically depositing attenuated fibers upon an adhesive coated surface to form a pile thereon in pattern form, comprising complementary electrodes, means for maintaining a high potential difference between said electrodes to establish an electric field therebetween whereby attenuated fibers introduced into said field are caused to be projected towards one of said electrodes, means positioned between the electrodes for causing local concentrations of the electric field between said electrodes, means for positioning an adhesive-surfaced base material in the non-uniform portion of said field, and means for supplying attenuated fibers to said field between said field concentrating means and the other electrode.

2. Apparatus for electrically depositing attenuated fibers upon an adhesive coated surface to form a pile thereon in pattern form, comprising complementary electrodes, means for maintaining a high potential difference between said electrodes to establish an electric field therebetween whereby attenuated fibers introduced into said field are caused to be projected towards one of said electrodes, a member positioned in the field between said electrodes having perforations extending therethrough in the direction of the lines of force of said field, means for passing an adhesive-surfaced base material through the electric field between said member and said electrode, and means for supplying attenuated fibers to said field between said member and the other electrode.

3. Apparatus for electrically depositing at-

5 attenuated fibers upon an adhesive coated surface
 to form a pile thereon in pattern form, compris-
 ing complementary electrodes, means for main-
 10 taining a high potential difference between said
 electrodes to establish an electric field therebe-
 15 tween whereby attenuated fibers introduced into
 said field are caused to be projected towards one
 of said electrodes, a member positioned in the
 field between said electrodes having perforations
 extending therethrough in the direction of the
 lines of force of said field, means for passing an
 adhesive-surfaced base material through the
 electric field between said member and said elec-
 trode, means for moving said member substan-
 20 tially synchronously with said base material, and
 means for supplying attenuated fibers to said field
 between said member and the other electrode.

4. Apparatus for electrically depositing fibers
 upon an adhesive coated surface to form a pile
 20 thereon in pattern form, comprising opposed
 complementary electrodes, means for impressing
 a high potential difference between said electrodes
 to establish an electric field therebetween where-
 by attenuated fibers introduced into said field
 25 are caused to be projected towards one of said
 electrodes, means for positioning an adhesive-
 surfaced base material in the electric field ad-
 jacent the electrode toward which the fibers are
 projected by the field, a member positioned in
 30 the field between said base material and the

other of said electrodes having perforations ex-
 tending therethrough in the direction of the lines
 of force of said field, and means for supplying at-
 tenuated fibers to said field between said mem-
 ber and said other electrode.

5 5. Apparatus for electrically depositing fibers
 upon an adhesive coated surface to form a pile
 thereon in pattern form, comprising opposed
 complementary electrodes at least one of which
 10 presents an extended substantially plane surface
 to the opposing electrode, means for impressing
 a high potential difference between said elec-
 trodes to establish an electric field therebetween
 whereby attenuated fibers introduced into said
 field are caused to be projected towards an ex-
 15 tended surface electrode, means for positioning
 an adhesive-surfaced base material in the elec-
 tric field adjacent the electrode toward which the
 fibers are projected by the field, a member ex-
 20 tending through said field in substantially par-
 allel relation to said extended surface electrode
 between said base material and the other of said
 electrodes having perforations extending there-
 through in the direction of the lines of force of
 25 said field, and means for supplying attenuated
 fibers to said field between said member and
 said other electrode.

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