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(12) # EUROPEAN PATENT SPECIFICATION

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Description

Background of the Invention

1. Field of the Invention:

The present invention relates to a method and apparatus for coating and improving the uniformity of a coating material after it has been applied to a charge-retaining material, in general, and to such apparatus for improving the uniformity of a coating material that has been applied to a moving web of such material, in particular.

2. Description of the Prior Art

In the manufacture of various coated products, it is often essential that coating materials applied to such products be of uniform thickness and/or have a smooth or planar surface. In, for example, the continuous manufacture of coated photographic sheet material, a nonuniform thickness coating applied to a moving web of such material would require considerably more drying time for drying the thicker portions of said nonuniform coating than would be required for drying the thinner portions of said nonuniform coating. In addition, a temperature gradient that is optimum for drying said thicker coating portions is often excessive for optimum drying of said thinner coating portions. Drying time is usually the major factor limiting maximum production rates of many coated products. Also, many properties of photographic film such as sensitivity to light, color saturation, etc., for example, can be adversely affected when constructed with nonuniformly coated sheet materials.

One of the most effective coating thickness control techniques in present day used in the coating industry involves the employment of an electrostatic field to assist in the uniform deposition of coating materials on products to be coated. In the production of photographic film, for example, a web or sheet of material to be coated is passed between an electrically conductive support or backing roller and a coating applicator from which coating materials can flow onto a particular surface of said web. An electrostatic field is established across the gap between the coating applicator and said backing roller by a high voltage power supply whose output terminals are connected between said applicator and said roller. The electrostatic field in said coating causes a coating of uniform thickness to be deposited on a particular web surface. The magnitude of the voltage established between said applicator and said roller is normally less than that required to generate corona, but often exceeds 3 KV DC.

Electrostatic depositing apparatus like this are described in US—A—2 052 131 or US—A—3 335 026.

Electrostatic fields utilized in a manner such as those described above can greatly improve the thickness and/or surface uniformity of a layer of coating material. However, the use of an electrostatic field for coating improvement purposes will often cause changes in coating properties such as surface tension and/or the residual electrostatic charge on the material to be coated, and that can limit the extent to which coating uniformity can be improved with an electrostatic field. Electrostatic charges present on a coated material, or coating fluid on a coating material having an electrostatic field related change in such properties as surface tension, etc., for whatever reason or reasons, can also limit the extent to which the uniformity of a coating material can be improved.

It has been recognized that electrostatic charges remaining on coated material affect uniformity of the coating. These residual-type charges can be produced in several ways. Electrostatic fields employed to improve coating uniformity with a satisfactory degree of success in general cause electrostatic charges remaining on the coated material and limit the extent of the improvement.

However, electrostatic charges having detrimental effects on coating uniformity can be produced also in other way than by deposition of a coating in an electrostatic field.

The technical problem underlying the invention is to remove remaining electrostatic charges on a moving web to improve the uniformity of the coating.

Claims 1 and 7 respectively comprise features for solving the technical problem in connection with a coating apparatus using an electrostatic field for deposition and in connection with an apparatus respectively operating without assistance of an electrostatic field.

Claim 8 discloses a method for solving said technical problem.

Brief Description of the Drawings

Fig. 1 is a schematic diagram of web coating apparatus employing a conventional high voltage electrostatic coating-gap assist technique in accordance with the teachings of the prior art (US—A—2,052,131 or US—A—3,335,026).

Fig. 2 is a schematic diagram of electrostatic coating-gap assist apparatus of the type that places an electrostatic charge on the material to be coated before it applies coating fluid to said material as it is disclosed, for example, in the copending European application (EP—A—0 055 983) EP82 100012.2 also filed on January 4th, 1982 under the priority date of January 5th, 1981 and designating the same Contracting States as the present patent.

Fig. 3 is a schematic diagram of apparatus employing web coating uniformity improvement apparatus in accordance with the present invention.

Fig. 4 is an enlarged detail of the electrostatic field producing conductive bristle brush of Fig. 3 and a portion of the coated material in said Fig. 3 having its coating uniformity improved by the electric field established between said brush and the coating material.

In Fig. 1, numeral 10 generally indicates coating

apparatus employing conventional electrostatic coating-gap assist apparatus constructed in accordance with the teaching of the prior art. Web support or backing roller 12 is cylindrically shaped, is electrically conductive and is mounted for rotation about backing roller axis 14. Coating applicator 16 is mounted in a fixed position with respect to backing roller 12 and is spaced from said roller 12 by a distance or gap 18. High voltage power supply 20, having a DC voltage across its output terminals that is often in the neighborhood of several thousand volts, has said output terminals connected between backing roller 12 and applicator 16 through paths 22 and 24, respectively. Because the coating fluid supplied by applicator 16 is electrically conductive, it often maintains said applicator 16 at or near ground potential through a coating-fluid-supplying conduit (not shown), the high voltage terminal of power supply 20 is necessarily connected to said roller 12 and the low voltage terminal of said supply 20 is connected to said grounded applicator 16.

When power supply 20 is energized through path 25, electrostatic field 26 is produced in coating gap 18 between high potential backing roller 12 and grounded applicator 16. As charge-retaining web 28 is moved in direction 30 through gap 18 by drive means (not shown), said web 28 is electrostatically charged by orienting its dipoles (such as by orienting dipoles 31) by said electrostatic field 26. Electrostatic charges produced on web 28 by electrostatic field 26 cause fluid 32 flowing from applicator 16 into coating gap 18 to be attracted toward and uniformly deposited on moving web 28.

An extremely important factor in the web coating process is the maintenance of an appropriate amount of coating material 32 in gap 18 for proper web-coating purposes. This portion of the coating material 32 is sometimes referred to as a coating fluid bead and is designated numeral 34 in prior art Fig. 1. The surface of web 28 normally moves faster than the rate at which coating fluid 32 flows onto said web 28 surface. This being so, as web 28 and fluid 32 in the form of bead 34 are brought into contact with each other, the faster moving web 28 pulls and thereby stretches said fluid 32 causing the thickness of coating fluid 32 to be reduced to a desired intermediate level. It is believed that electrostatic field 26 changes properties of coating fluid 32 such as surface tension, thereby allowing said fluid 32 to be stretched to a greater degree and over a larger gap between web 28 and applicator 16 without losing (breaking) bead 34 than would be possible if electrostatic gap-assisting field 26 were not present. In addition to the primary contribution of providing the desired layer thickness on web 28, gap 18 in Fig. 1 must be large enough to accommodate such things as web splices and foreign matter so that such splices or matter do not come into contact with applicator 16 and thereby adversely affect web coating quality.

Another type of electrostatically assisted coating apparatus is schematically illustrated in Fig. 2. In Fig. 2, numeral 36 generally indicated web coating apparatus employing a precharged web coating technique. In Fig. 2, web support or backing roller 38 is cylindrically shaped, is electrically conductive, is mounted for rotation about backing roller axis 40 and for safety purposes is electrically grounded through path 41 to prevent said roller from operating like a high potential producing Van de Graaff generator. Coating applicator 42 is mounted in a fixed position with respect to backing roller 38 and is spaced from said roller 38 by distance or gap 44. Grounded web support or backing roller 46 is cylindrically shaped, is electrically conductive and grounded, and is mounted for rotation about backing roller axis 48. Conductive bristle brush 50 is mounted in a fixed position with respect to and has the free ends of its bristles pointed toward and spaced from said grounded backing roller 46. DC power supply 52 has its high voltage output terminal connected to one end of each of the bristles of said conductive bristle brush 50 through path 54 and has its low voltage output terminal connected to grounded backing roller 46 through path 56 and common ground points 58.

When power supply 52 is energized through path 60, a relatively intense electrostatic field is established between the free ends of the bristles of said conductive bristle brush 50 and roller 46 with a relatively low voltage. A similar disclosure of a conductive bristle brush electrostatic charge controlling technique is contained at page 70 in the February 1980 issue of Research Disclosure.

As charge-retaining web 62 is moved in direction 64 through the relatively intense electrostatic field established between energized conductive bristle brush 50 and grounded backing roller 46 by drive means (not shown), an electrostatic charge of a predetermined magnitude is established on said web 62. This electrostatic charge results from the orientation of dipoles in web 62 (such as oriented dipoles 66) that were so oriented when web 62 was moved through the electrostatic field between the free ends of conductive bristle brush 50 and roller 46. Conductive bristle brush 50 and backing roller 46 may be spaced a considerable distance from applicator 42 and its associated backing roller 38 as schematically emphasized by the artificial break in web 62 and by partition 68 passing through said artificial break because of the relative stability of the charge placed on web 62 by brush 50.

Undesirable residual electrostatic charges will normally remain on a material that has been coated by means of electrostatically assisted coating apparatus such as those described above and schematically illustrated in Figs. 1 and 2. Even if such electrostatic charge producing coating apparatus are not employed, coating uniformity can be adversely affected by electrostatic charges present on coated material produced by other means such as by handling or by a coating machine, as said material is routed through same for coating purposes. In Fig. 3 a coated web is

illustrated that is assumed to have this undesirable electrostatic charge thereon. The primary significance of this charge is the detrimental effect that it has on such things as coating thickness and/or surface uniformity and not the actual mechanism that produced such a charge.

Turning to Fig. 3, numeral 70 generally indicated web coating apparatus employing coating uniformity improvement means constructed in accordance with the present invention. In Fig. 3, web support or backing roller 72 is cylindrically shaped, is electrically conductive and is mounted for rotation about backing roller axis 74. Backing roller 72 may or may not be grounded depending upon whether or not an electrostatically assisted coating technique is employed and if employed, the particular type of electrostatic assist technique selected. Coating applicator 76 is electrically grounded through either the coating fluid conduit (not shown) or through path 77, is mounted in a fixed position with respect to backing roller 72 and is spaced from said roller 72 by distance or gap 78. An intermediate portion of elongated sheet or web of charge retaining material 80 is supported by backing roller 72 in said gap 78 in a spaced relation from said applicator 76. Conductive bristle brush 82 is mounted in a fixed position with respect to, and has the free ends of its bristles spaced from surface 84 of said web 80.

DC power supply 86 has its high voltage output terminal connected to one end of each of the bristles of said conductive brush 82 through path 88 and has its low voltage output terminal electrically grounded through path 90.

As charge-retaining material or web 80 is moved in direction 92 through coating gap 78, coating fluid 94 is deposited on said web 80 by coating fluid applicator 76. The coating process may or may not be assisted by an electrostatic field. However, under normal conditions a substantially larger residual electrostatic charge and substantially greater change in coating fluid properties will be present in a coated material and its coating, respectively, when an electrostatic field is employed in a web coating process than when a such a field is not so employed.

When power supply 86 is energized through path 96, a relatively intense electrostatic field is established between the three ends of the bristles of said conductive bristle brush 82 and electrically conductive coating fluid 94 grounded through applicator 76 and its associated fluid-transporting conduit (not shown), or through path 77, when a portion of coating material 94 is eventually moved into the vicinity of brush 82 by moving web 80 to which it has been applied. The method of application and the effects of the electrostatic field established between brush 82 and coating fluid 94 on said fluid 94 are schematically illustrated in Fig. 4.

Turning now to Fig. 4, which is an enlarged detail of energized conductive bristle brush 82 and a portion of coated web 80 immediately adjacent said brush 82, said coated web 80 is moved in direction 92 through the electrostatic field established between said brush 82 and coating fluid 94 on said web 80. As shown in said Fig. 4, surface 96 of coating fluid 94 is relatively uneven or nonuniform after it has been applied to web 80 but before coating fluid 94 with its said nonuniform surface 96 is subjected to the electrostatic field of brush 82. The magnitude and polarity of this electrostatic field is normally established empirically and is primarily determined by the type of material to be coated and the type coating material to be applied.

When web 80 together with coating 94 moves in direction 92 through the electrostatic field between brush 82 and coating fluid 94 while said coating fluid 94 is still in its fluid state, relatively nonuniform surface 96 of said coating fluid 94 is transformed into relatively uniform surface 98 by the electrostatic field of said brush 82. The electrostatic field of brush 82 changes the electrostatic charge level on charge-retaining web 80 and it is believed, changes the surface tension of coating fluid 94 while said coating fluid is still in its fluid state thereby increasing coating fluid fluidity and decreasing surface roughness or nonuniformity by reason of the increased coating fluid flow resulting from the said brush 82 electrostatic field-produced change in coating fluid 94 fluidity.

Discussion

The electrostatic field associated with brush 82 in the coating uniformity improvement apparatus of the present invention must be positioned such that it interacts with the charge retaining material having the residual electrostatic charges that adversely affect coating fluid surface uniformity. With respect to sheet of charge-retaining material 80 schematically illustrated in Fig. 3, the free ends of conductive bristle brush 82 are optimally located adjacent surface 84 of said sheet 80 which is the side that is directly opposite the side on which coating material 94 is located. In this position the electrostatic field established between brush 82 and coating fluid 94 can most effectively change the electrostatic charge level on web 80 and it is believed, change such properties as the surface tension of coating fluid 94.

The web coating uniformity improvement apparatus of the present invention employs the electrically conductive coating material itself as a ground or electrically conductive reference member in conjunction with a conductive bristle brush to establish the desired charge-controlling electrostatic field. This use of coating fluid 94 is necessary because the coating fluid is necessarily in its fluid state when it is subjected to the electrostatic field of brush 82 for coating improvement purposes and if an alternate reference or ground member were employed it would adversely effect coating fluid thickness and surface quality if it were placed in contact with the coating fluid while said fluid was still in its said fluid state.

When a potential difference is established be-

tween brush 82 and coating fluid 94 in, for example, Fig. 3, said brush 82 is sometimes referred to herein as an electrode. Also the term "electrostatic field" employed herein means one species of electric field.

Claims

1. Coating apparatus comprising: an applicator (76) for depositing a wet coating (94) on one surface of a web (80) of charge-retaining material as it is advanced through an electrostatic field in gap (78) between a backing roller (72) and said applicator (76), said web (80) having a residual charge following said coating deposition, characterized in that an electrode (82) is mounted at a point downstream of said gap (78), along the path of the web (80) and in adjoining relation to the opposite surface of the web (80), said coating (94) being still wet at said downstream point said electrode (82) creating another electrostatic field which alters the residual charge of the web (80) and enhances redistribution of the still wet coating (94) and thereby improves it uniformity.

2. The apparatus of claim 1, characterized in that said electrode for altering said residual charge includes a brush (82) mounted at said downstream point in adjoining relation to the opposite surface (84) of said web (80) and that means are provided for applying said another electrostatic field between said brush (82) and said coating (94).

3. The apparatus of claim 1, characterized in that said depositing applicator (76) includes dipole charging of said web prior to or during deposit of said coating (94) which results in a residual dipole charge remaining after deposit of said coating (94).

4. The apparatus of claims 1 and 2, characterized in that said coating is a conductive coating (94), that said applicator (76) has at least a conductive portion (77) thereof which defines the polarity and charge of said coating as it is deposited on said web (80) and that said means for applying said another electrostatic field comprises a DV voltage power supply (86), the output terminals of which are connected to said electrode (82) and to ground, whereas the electrostatic applicator (76) is grounded through said conductive portion (77).

5. The apparatus of claim 1, characterized in that said potential of said electrode (82) is more positive than the potential of said applied coating (94).

6. The apparatus of claim 1, characterized in that the potential of said electrode (82) is more negative than the potential of said applied coating (94).

7. Apparatus for improving the uniformity of a wet coating (94) deposited by an applicator (76) on one surface of the web (80) of charge-retaining material which retains residual charges following deposition, as it moves through a gap 78) between said applicator (76) and a backing roller (72), characterized in that an electrode (82) is mounted in adjoining relation to the opposite surface (84) of said web (80) at a point downstream of said gap (78) wherein said coating still remains wet and that means (86) are provided for applying a potential to said electrode (82) to reduce the residual charge of said web (80) and thereby enhance redistribution of the still wet coating so as to improve its uniformity.

8. A method for coating one surface of a web (80) as it is advanced through an electrostatic field in a gap (78) between a backing roller (72) and an applicator (76) of a wet coating (94), characterized in that an electrode (82) is mounted at a point downstream of said gap (78), along the path of the web (80) and in adjoining relation to the opposite surface of the web (80), the coating being still wet at said downstream point, said electrode (82) creating another electrostatic field which alters the residual charge of the web (80) and enhances redistribution of the still wet coating (94) and thereby improves it uniformity.

9. The method of claim 8, characterized in that said coating (94) is conductive and is deposited by means of the applicator (76) said applicator (76) having a conductive portion (77) which defines the polarity and charge of said coating (94) as it is deposited, and that a potential is applied between said electrode (82) adjoining the opposite surface of said web downstream of said gap (78) and said conductive portion of said applicator so that said electrode (82) creates said another electrostatic field across said web (80) in the area of said electrode (82).

Revendications

1. Appareil pour revêtement comprenant: un applicateur (76) pour déposer un revêtement humide (94) sur une surface d'une bande (80) de matière retenant les charges à mesure qu'on la fait avancer à tavers un champ électrostatique dans un espace (78) entre un rouleau d'appui (72) et ledit applicateur (76), ladite bande (80) ayant une charge résiduelle à la suite du dépôt dudit revêtement, caractérisé en ce qu'une électrode (82) est montée en un point situé en aval dudit espace (78), le long du parcours de la bande (80) et de manière contigue à la surface opposée de la bande (80), le revêtement (94) étant encore humide au niveau dudit point situé en aval, l'électrode (82) créant un autre champ électrostatique qui modifie la charge résiduelle de la bande (80) et favorise une nouvelle répartition du revêtement (94) encore humide et améliore grâce à cela son uniformité.

2. Appareil selon la revendication 1, caractérisé en ce que ladite électrode servant à modifier la charge résiduelle comporte un balai (82) monté au niveau dudit point situé en aval de manière contiguë à la surface opposée (84) de la bande (80) et en que que des moyens sont prévus pour appliquer ledit autre champ électrostatique entre le balai (82) et le revêtement (94).

3. Appareil selon la revendication 1, caractérisé en ce que l'applicateur (76) pour le dépôt com-

porte un chargement bipolaire de ladite bande avant ou pendant le dépôt du revêtement (94), ce qui a pour effet qu'une charge bipolaire résiduelle demeure après de dépôt du revêtement (94).

4. Appareil selon les revendications 1 et 2, caractérisé en ce que le revêtement est un revêtement conducteur (94), en ce que l'applicateur (76) possède au moins une partie conductrice (77) de celui-ci qui définit la polarité et la charge du revêtement lorsqu'il est déposé sur la bande (80) et en ce que ledit moyen pour appliquer ledit autre champ électrostatique comporte une source (86) d'alimentation en courant électrique à tension continue, dont les bornes de sortie sont reliées à l'électrode (82) et à la terre alors que l'applicateur électrostatique (76) est relié à la terre par l'intermédiaire de la partie conductrice (77).

5. Appareil selon la revendication 1, caractérisé en ce que le potentiel de l'électrode (82) est plus positif que le potentiel du revêtement appliqué (94).

6. Appareil selon la revendication 1, caractérisé en ce que le potentiel de l'électrode (82) est plus négatif que le potentiel du revêtement appliqué (94).

7. Appareil pour améliorer l'uniformité d'un revêtement humide (94) déposé par un applicateur (76) sur une surface de la bande (80) en matière retenant des charges qui retient des charges résiduelles après le dépôt lorsqu'elle passe par un espace (78) entre l'applicateur (76) et un rouleau d'appui (72), caractérisé en ce qu'une électrode (82) est montée de manière contiguë à la surface opposée (84) de la bande (80) en un point situé en aval dudit espace (78) où le revêtement demeure encore humide et en ce que des moyens (86) sont prévus pour appliquer un potentiel à l'électrode (82) pour réduire la charge résiduelle de la bande (80) et favoriser grâce à cela une nouvelle répartition du revêtement encore humide afin d'améliorer son uniformité.

8. Procédé pour enduire une surface d'une bande (80) à mesure qu'on la fait avancer à travers un champ électrostatique dans un espace (78) entre un rouleau d'appui (72) et un applicateur (76) de revêtement humide (94), caractérisé en ce qu'une électrode (82) est montée au niveau d'un point situé en aval de l'espace (78), sur le parcours de la bande (80) et de manière contiguë à la surface opposée de la bande (80), le revêtement étant encore humide au niveau dudit point situé en aval, l'électrode (82) créant un autre champ électrostatique qui modifie la charge résiduelle de la bande (80) et favorise une nouvelle répartition du revêtement (94) encore humide et améliore grâce à cela son uniformité.

9. Procédé selon la revendication 8, caractérisé en ce que le revêtement (94) est conducteur et est déposé au moyen de l'applicateur (76), ledit applicateur (76) ayant une partie conductrice (77) qui définit la polarité et la charge du revêtement (94) à mesure qu'il est déposé, et en ce qu'un potentiel est appliqué entre l'électrode (82) contiguë à la surface opposée de la bande en aval de l'espace (78) et la partie conductrice de l'applicateur de façon que l'électrode (82) crée ledit autre champ électrostatique à travers la bande (80) dans la région de l'électrode (82).

Patentansprüche

1. Vorrichtung zum Beschichten, die eine Auftragseinrichtung (76) umfaßt, durch die auf ein Band (80) aus einem Ladungen enthaltenden Material beim Vorschub durch ein elektrostatisches Feld in einem Spalt (78) zwischen einer Widerlagerwalze (72) und der Auftragseinrichtung (76) ein feuchter Überzug (94) auf einer Oberfläche aufgebracht wird, wobei das Band (70) nach Ablagerung des Überzuges eine Restladung aufweist, dadurch gekennzeichnet, daß eine Elektrode (82) an einer Stelle stromab des Spaltes (78) längs des Bewegungspfades des Bandes (80) benachbart zur gegenüberliegenden Oberfläche des Bandes (80) montiert ist, wobei der Überzug (94) noch feucht an der stromabwärtigen Stelle ist und die Elektrode (82) ein weiteres elektrostatisches Feld erzeugt, welches die Restladung des Bandes (80) ändert und die Verteilung des noch feuchten Überzuges (94) verbessert und dadurch die Gleichförmigkeit des Überzuges verbessert.

2. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß die Elektrode zur Änderung der Restladung eine Bürste (82) aufweist, die an dem stromabwärtigen Punkt benachbart zur gegenüberliegenden Oberfläche (84) des Bandes angeordnet ist und daß Mittel vorgesehen sind, um das weitere elektrostatische Feld zwischen der Bürste (82) und dem Überzug (94) anzulegen.

3. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß die Auftragseinrichtung (76) eine Dipol-Ladung des Bandes bewirkt, bevor der Überzug (94) abgelagert wird oder während dieser abgelagert wird und hierdurch eine Restdipol-Ladung erzeugt wird, die nach Ablagerung des Überzuges (94) verbleibt.

4. Vorrichtung nach den Ansprüchen 1 und 2, dadurch gekennzeichnet, daß der Überzug ein leitfähiger Überzug (94) ist, daß die Auftragseinrichtung (96) wenigstens einen leitfähigen Abschnitt (77) besitzt, der die Polarität und Ladung des Überzuges definiert, wenn dieser Überzug auf dem Band (80) abgelagert wird und daß die Mittel zum Anlegen eines weiteren elektrostatischen Feldes eine Gleichspannungsquelle (86) aufweisen, deren Ausgangsklemmen mit der Elektrode (82) und Masse verbunden sind, während die elektrostatische Auftragsvorrichtung (76) über den leitfähigen Abschnitt (77) an Masse gelegt ist.

5. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß das Potential der Elektrode (82) positiver ist als das Potential des aufgebrachten Überzuges (94).

6. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß das Potential der Elektrode (82) negativer ist als das Potential des aufgebrachten Überzuges (94).

7. Vorrichtung zu Verbesserung der Gleichförmigkeit eines feuchten Überzuges (94), der von

einer Auftragseinrichtung (76) auf einer Oberfläche des Bandes (80) mit ladungsenthaltendem Material aufgebracht wird, das nach der Aufbringung bei Bewegung durch einen Spalt (78) zwischen der Auftragseinrichtung (76) und einer Widerlagerwalze (72) Restladungen enthält, dadurch gekennzeichnet, daß eine Elektrode (82) benachbart zu der gegenüberliegenden Oberfläche (84) des Bandes (80) an einer Stelle stromab des Spaltes (78) gelagert ist, wobei der Überzug noch feucht verbleibt und daß Mittel (86) vorgesehen sind, um an die Elektrode (82) ein Potential anzulegen, um die Restladung des Bandes (80) zu vermindern und dadurch die Verteilung des noch feuchten Überzuges und seine Gleichförmigkeit zu verbessern.

8. Verfahren zur Beschichtung einer Oberfläche eines Bandes (80) beim Vorschub des Bandes durch ein elektrostatisches Feld in einem Spalt (78) zwischen einer Widerlagerwalze (72) und einer Auftragseinrichtung (76) eines feuchten Überzuges (94), dadurch gekennzeichnet, daß eine Elektrode (82) an einer Stelle stromab des Spaltes (98) längs des Pfades des Bandes (80) und benachbart zu der gegenüberliegenden Oberfläche des Bandes (80) angeordnet ist, wobei der Überzug an der stromabwärtigen Stelle noch naß ist, und wobei die Elektrode (82) ein weiteres elektrostatisches Feld erzeugt, das die Restladung des Bandes (80) ändert und die Verteilung des noch feuchten Überzugs (94) und dadurch die Gleichförmigkeit verbesert.

9. Verfahren nach Anspruch 8, dadurch gekennzeichnet, daß der Überzug (84) leitfähig ist und durch die Auftragseinrichtung (76) abgelagert wird, wobei die Auftragseinrichtung (76) einen leitfähigen Abschnitt (77) aufweist, der die Polarität und Ladung des Überzuges (94) definiert, während dieser Überzug abgelagert wird, und daß ein Potential zwischen der Elektrode (82), die benachbart zu der gegenüberliegenden Oberfläche des Bandes stromab des Spaltes (78) und dem leitfähigen Abschnitt der Auftragseinrichtung angelegt wird, so daß die Elektrode (82) das weitere elektrostatische Feld über dem Band (80) im Bereich der Elektrode (82) erzeugt.

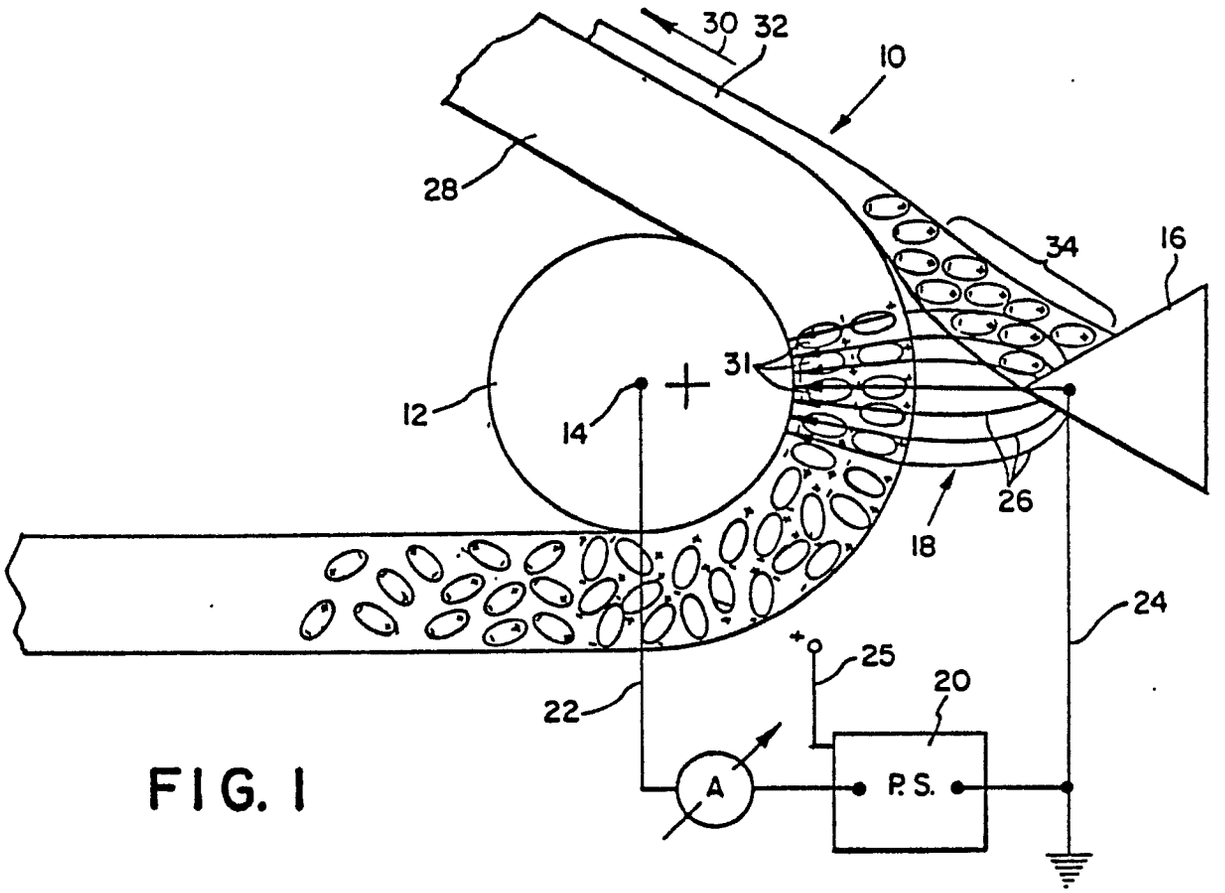


FIG. 1

FIG. 2

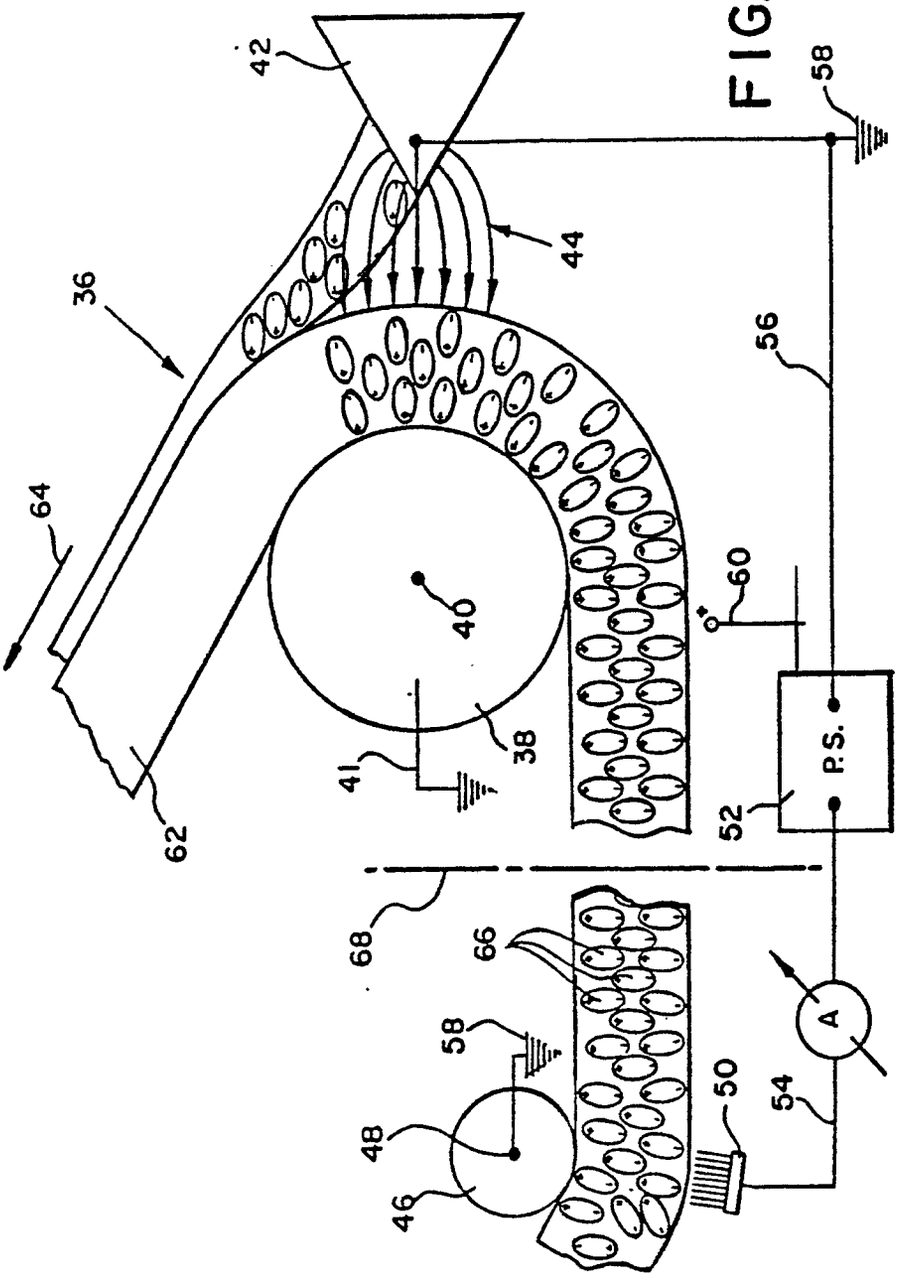
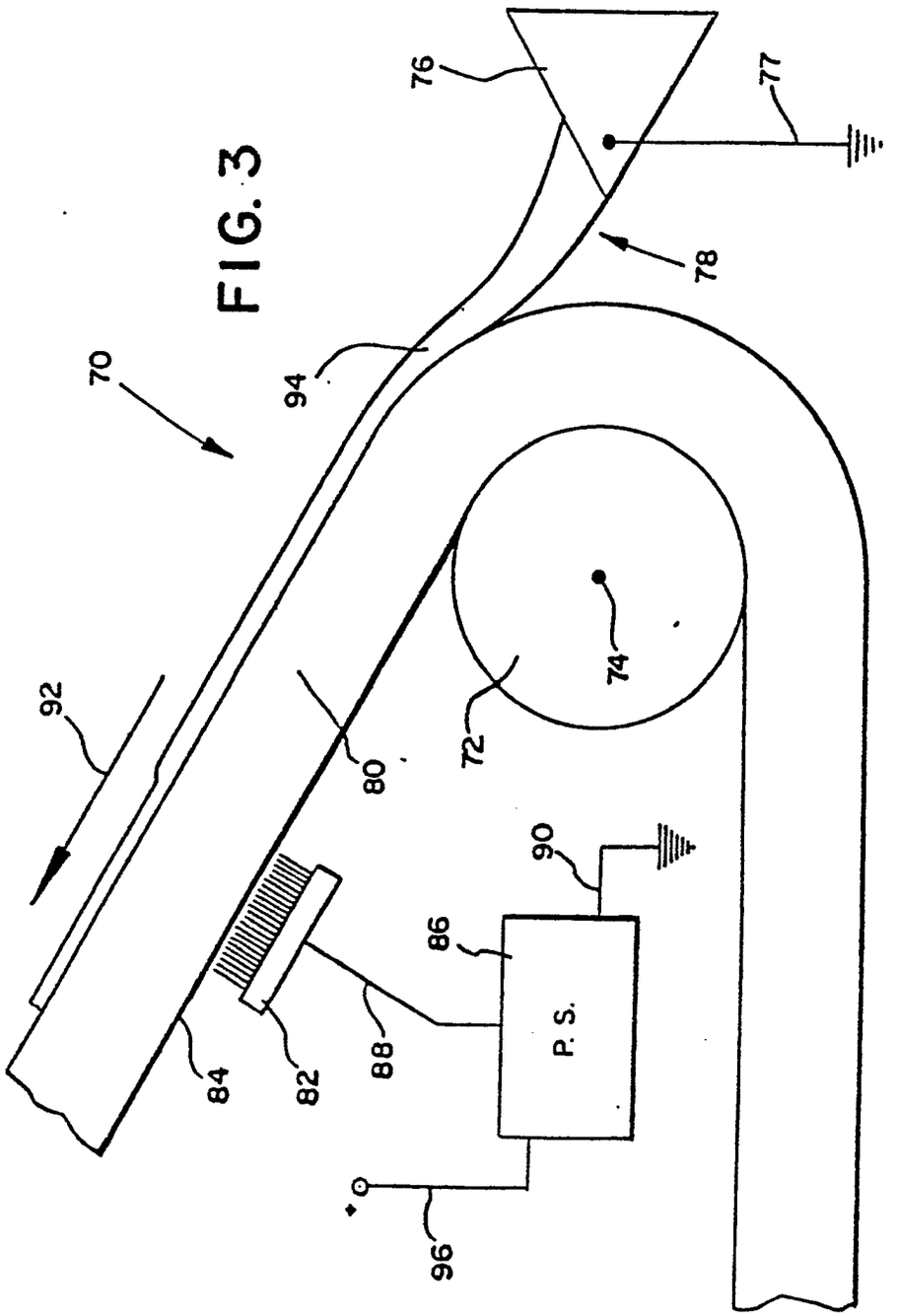


FIG. 3



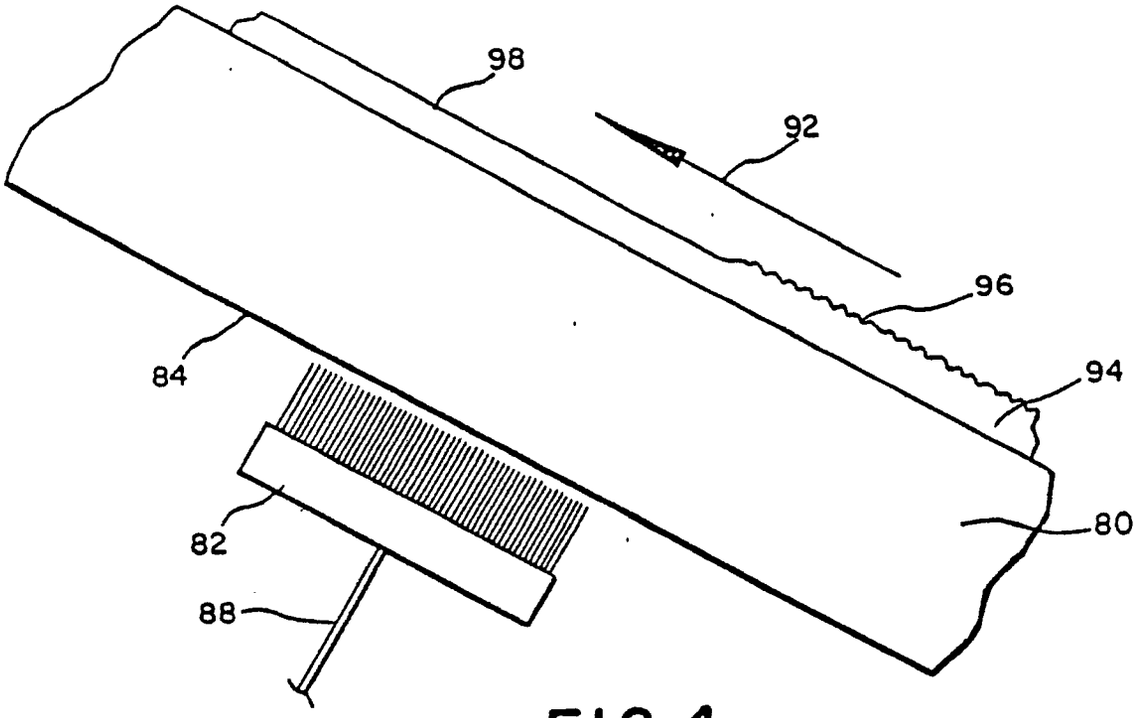


FIG. 4