Oct. 15, 1940. G. F. NADEAU ET AL 2,218,249

PRODUCTION OF PIGMENTED FILM

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FIG. 1.

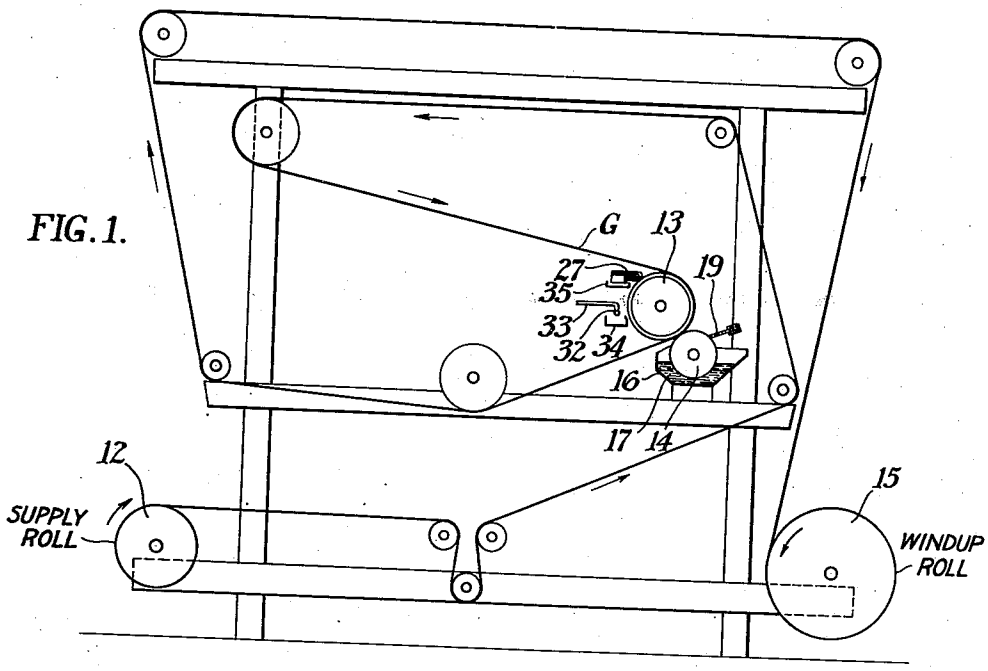


FIG. 2.

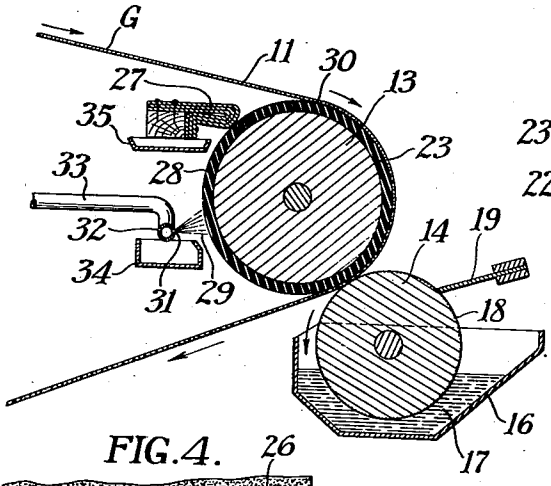


FIG. 3.

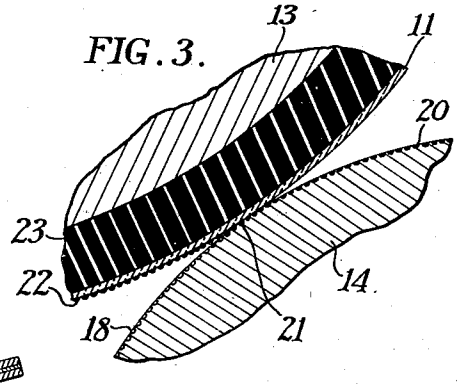
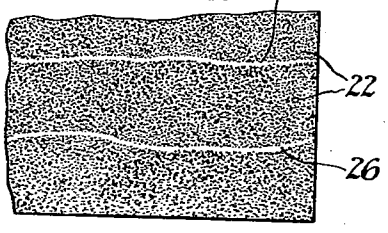


FIG. 4.



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PRODUCTION OF PIGMENTED FILM

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6 Claims. (Cl. 91—51)

The present invention relates to the production of pigmented film, and more particularly to the application of a colored pigment to a strip of acetate sheeting to render the transparent sheeting opaque for use as lampshades and similar articles.

In the making of such film, only a single color is used at one time. The pigment is applied, in the present invention, by means of an engraved intaglio roll which is rotatably mounted in a pan containing the solution which is to be applied to the strip or sheeting. The surface of the roll is embossed so that there are a plurality of very minute cups which carry the solution, the excess solution being scraped off by means of a doctor blade. The solution in these various cups is then transferred or applied uniformly to the strip by pressing the strip firmly against the cups by means of a rubber pressure roll over which the strip is fed.

In the production of pigmented film using the intaglio method of coating, serious difficulties were encountered due to the appearance of parallel lines or streaks in the coated film strip. These lines were clear lines caused by the lack of coverage or flow of the pigmenting ink, and appeared regardless of the adjustments made in the various coating conditions and seemed to be uncontrollable. It was at first thought that these lines were caused by tool marks or hardened streaks in the rubber-coated pressure roll. Accordingly, a cloth moistened with acetone was applied to the pressure roll in the hope that the rubber would be swollen and somewhat softened. It was found that with this treatment, the lines in the coated film disappeared in the area treated with the moistened cloth. It became apparent that this was not the correct explanation of the difficulty because it was later found that the cloth, after losing its solvent by evaporation, was equally effective in eliminating these lines. In other words, a dry cloth was equally as good as one laden with solvent. As a result of this discovery, the difficulty was overcome by placing a strip of cloth, or similar material, in contact with the rubber-covered pressure roll. It was then found that the pigment coating could now be satisfactorily applied without the appearance of the troublesome clear lines.

The theory underlying the use of this strip is not definitely understood, although from other experiments it seems fairly certain that some frictional static effect is being realized. The question of surface abrasions is not significant since the strip contacts the pressure roll on the side opposite the surface being coated. That the phenomenon is static or electrical in nature is further shown by the fact that if one rubs the surface of the strip prior to the application of the pigment, such as at point G, Figs. 1 and 2, with a brush of tinsel, a large number of lines are produced wherever the tinsel contacts the strip. Furthermore, the parallel line effects are different on acetate and nitrate supports which, as is well known, have greatly different electrification properties.

In addition to the above methods of eliminating the parallel lines or coating streaks, it has been found that a jet of low pressure steam directed against the rubber-coated pressure roll previous to the point of contact of the film strip therewith gives better results than either the dry or moistened strip. This fact tends to bear out the contention that these clear parallel lines are caused by an electrical phenomenon. The steam jet moistening the surface of the pressure roll improves the conductivity of its surface.

The invention has, therefore, as its primary object the provision of an arrangement which insures the production of a uniformly pigmented film strip.

A further object of the invention is the provision of an arrangement which prevents the repelling of the uniformly applied pigment solution and thus effectively eliminates the presence of clear streaks or lines in the finished strip.

A still further object of the invention is the provision of an arrangement of the class described which is simple in construction, inexpensive to manufacture, easy to apply to existing machines, and extremely effective and positive in use.

To these and other ends, the invention resides in certain improvements and combinations of parts all as will be hereinafter more fully described, the novel features being pointed out in the claims at the end of the specification.

In the drawing:

Fig. 1 is a side view of an apparatus for producing pigmented film.

Fig. 2 is an enlarged fragmentary view of a portion of the apparatus illustrated in Fig. 1, and on a larger scale than the latter, showing the relation thereto of a device constructed in accordance with the present invention for eliminating clear coating streaks in the finished pigmented film;

Fig. 3 is a partial view, on a larger scale than in Figs. 1 and 2, of the pigment applying roll and the pressure roll for holding the film strip in posi-

tion to receive the pigment from the applying roll; and

Fig. 4 is a view of a portion of a pigmented or coated sheet or film, showing the presence and relation of the clear streaks in the sheet prior to the application of the device of the present invention.

Similar reference numerals throughout the various views indicate the same parts.

Fig. 1 of the drawing shows an apparatus for continuously applying a suitable colored pigment or ink to one surface of a strip of transparent acetate sheeting to render the latter opaque for use as lampshades or other similar articles. The acetate sheeting 11 is supplied from a supply roll 12 and, after passing over suitably positioned idler rolls, is fed between a pressure roll and an engraved intaglio applying roll generally indicated by the numerals 13 and 14 respectively. The pigmented sheet or strip is then fed through an elongated path to cure or dry the sheet, and the finished opaque sheet is then wound up on the wind-up roll 15. Certain of the above rolls are positively driven to feed or draw the sheet through the apparatus.

The embossed or engraved roll 14 is driven solely by the moving strip 11 and is rotatably mounted in a pan 16 containing a supply of suitable pigmenting material 17. The surface of the roll 14 is formed with a plurality of minute cups or embosses 18 which, when the roll is rotated through the material 17, become filled with the latter, as is well known. The excess material on the roll 14 is scraped therefrom by means of a doctor blade 19 so that each cup 18 is filled just to the top or surface of the cup, as shown at 20, Fig. 3. As the filled cups now successively engage the strip 11 at 21, the pigment in the cups is transferred or applied uniformly over the surface of the strip in the form of a plurality of small minute deposits, as shown at 22, Fig. 3. In order to insure proper transfer of the pigment to the sheet 11, the latter is firmly held against the roll 14 by the pressure roll 13, the surface of which is coated with a layer of rubber or other suitable elastic or resilient material 23 to provide a flexible backing for the strip at the point of application of the pigment. The above described apparatus may be of any standard or well-known construction and does not constitute per se a part of the present invention.

The various deposits 22 are uniformly applied and distributed over the surface of the strip 11; and were it not for the static effect, above described, each of these deposits would flow or run out so as to merge with the other deposits to provide a uniform coating over the entire film surface. The presence of this static condition, however, causes, as far as can be ascertained, a repelling of the sheet 11 to the various deposits 22 so that the latter do not tend to spread evenly but rather separate or segregate to form a plurality of clear lines or tracks 26 which extend along the film strip in substantially parallel relation, as clearly shown in Fig. 4. Thus although the pigment is evenly and uniformly applied to the sheet 11, the finished sheet does not have a uniform coating or matte surface due to the presence of the lines or uncoated portions 26. Furthermore, these clear lines are not uniform and may or may not be continuous. The presence of such lines thereby prevents the securing of a uniform matte surface which is highly desirable for diffusing the light, and is considered a material defect by those in the trade and is therefore not acceptable thereto.

For these reasons, it is highly desirable that means be provided for neutralizing or overcoming this static effect so as to eliminate the formation of these troublesome lines and to secure a uniformly coated strip. It has been found that this desired result can be readily and easily accomplished by merely applying a pad 27, of cloth or other similar material, to the surface 28 of the pressure roll 13 in advance of the point of engagement of the strip 11 with the roll 13, as shown in Figs. 1 and 2. The pad may either be dry or moistened with a suitable volatile solvent such as acetone or alcohol. However, the method which best suits production methods is to spray low pressure steam in a series of small jets 29 against the rubber surface 23 of the pressure roller 13 previous to the contact point 30 of the strip 11. These jets issue through small orifices 31 formed in a spray pipe 32 which extends across the face of the roll 13, as shown in Fig. 2. The spray pipe 32 is connected by means of a supply pipe 33 to a suitable source of low pressure steam, not shown. A small pan 34 is positioned below the spray pipe 32 to catch any dripping therefrom.

While either the pad or the spray pipe may be effectively used separately, they may also be used together, or in cooperating relation as shown in Figs. 1 and 2. In this arrangement, the pad 27 additionally serves as a wiper to remove any excess moisture off the surface of the roll 13. This moisture thus removed by the pad 27 collects in a drain pan 35 positioned below the pad, as shown in Figs. 1 and 2. These drain pans 34 and 35 may then be connected, by any suitable and well-known manner, to the point of disposal. The elimination of the clear lines in the finished strip by the use of the steam jets tends to bear out the assumption that the lines are caused by an electrical phenomenon. We are unable, however, after considerable investigation to definitely state whether the sprays impress a static charge on or take such a charge off the strip. It is believed, however, that a static charge is impressed on the sheet to neutralize an opposite charge on the sheet. In any event the application of the steam jets to the pressure roll 13 definitely and positively eliminates the highly undesirable and unwanted lines 26 to provide a uniformly coated sheet having a matte surface which is readily acceptable to the trade for use in lampshades and similar articles.

It is thus apparent from the above description that the present invention provides a simple yet highly effective arrangement for securing a uniform coated pigmented film strip. It is also apparent that the apparatus is not only simple in construction, inexpensive to manufacture, highly effective and positive in its results, but may be easily applied to existing machines.

While one embodiment of the invention has been disclosed, it is to be understood that the inventive idea may be carried out in a number of ways. This application is therefore not to be limited to the precise details disclosed but is intended to cover all variations and modifications thereof falling within the spirit of the invention or the scope of the appended claims.

We claim:

1. An apparatus for forming pigmented film by the intaglio method comprising, in combination, an embossed application roll for applying a

pigmenting solution uniformly over the surface of a film strip, a solution pan in which said roll is rotatably mounted, a pressure roll for feeding said strip over and for maintaining it in solution receiving contact with said application roll, and means applied directly to said pressure roll for retaining the uniform distribution of said solution on said strip.

2. An apparatus for forming pigmented film by the intagio method comprising, in combination, an embossed application roll for applying a pigmenting solution uniformly over the surface of a film strip, a solution pan in which said roll is rotatably mounted, a pressure roll for feeding said strip over and for maintaining it in solution receiving contact with said application roll, and means contacting said pressure roll for preventing the uniformly applied solution from separating to form clear lines extending longitudinally of said strip.

3. An apparatus for forming pigmented film by the intaglio method comprising, in combination, an embossed application roll for applying a pigmenting solution uniformly over the surface of a film strip, a solution pan in which said roll is rotatably mounted, a pressure roll for feeding said strip over and for maintaining it in solution receiving contact with said application roll, and a strip arranged in wiping contact with said roll for preventing the uniformly applied solution from repelling and forming clear non-pigmented lines extending longitudinally of the strip.

4. An apparatus for forming pigmented film by the intaglio method comprising, in combination, an embossed application roll for applying a pigmenting solution uniformly over the surface of a film strip, a solution pan in which said roll is rotatably mounted, a pressure roll for feeding said strip over and for maintaining it in solution receiving contact with said application roll, and a fluid spray applied directly to said pressure roll, said spray serving to retain the uniform distribution of the solution on said strip to prevent the formation of clear lines in the strip.

5. An apparatus for forming pigmented film by the intaglio method comprising, in combination, an embossed application roll for applying a pigmenting solution uniformly over the surface of a film strip, a solution pan in which said roll is rotatably mounted, a pressure roll for feeding said strip over and for maintaining it in solution receiving contact with said application roll, and a low pressure steam jet directed against said pressure roll previous to the point of engagement of said strip therewith to prevent the separation of said solution on said strip and the formation of clear uncoated lines thereon.

6. An apparatus for forming pigmented film by the intaglio method comprising, in combination, an embossed application roll for applying a pigmenting solution uniformly over the surface of a film strip, a solution pan in which said roll is rotatably mounted, a pressure roll for feeding said strip over and for maintaining it in solution receiving contact with said application roll, a low pressure steam jet directed against said pressure roll previous to the point of engagement of said strip therewith, and a wiping pad positioned intermediate said jet and said point of engagement and contacting said pressure roll to remove the excess moisture therefrom, said jet and pad serving to retain the uniform distribution of the solution on said strip and prevent the formation of clear uncoated lines in the finished coated strip.

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