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METHOD OF AND APPARATUS FOR COATING

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Fig. 1

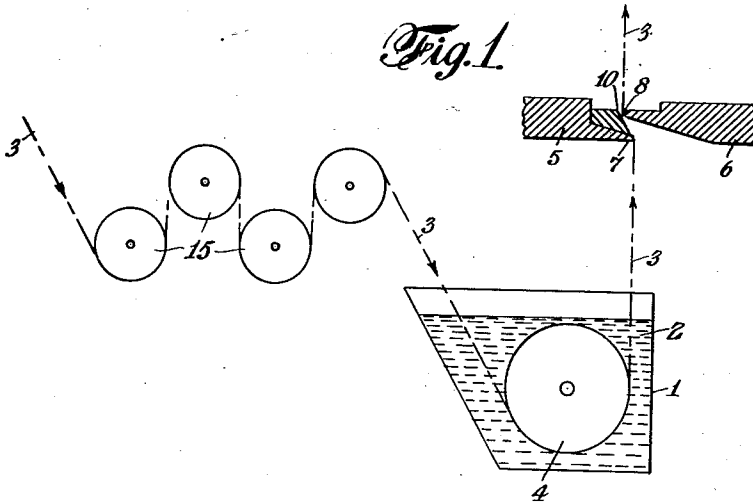


Fig. 2

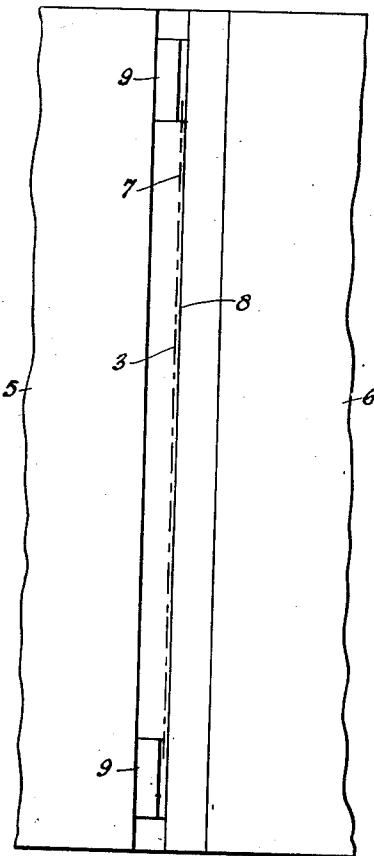


Fig. 3

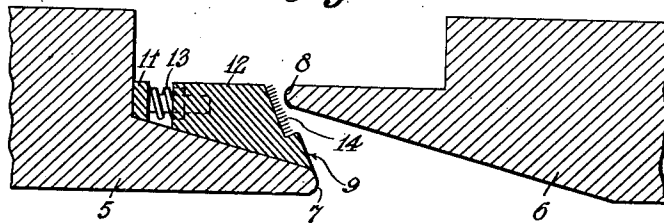
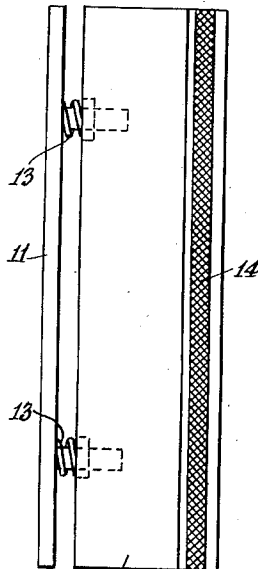


Fig. 4



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METHOD OF AND APPARATUS FOR COATING

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12 Claims. (Cl. 91—32)

This invention relates to a method and apparatus for coating and more particularly it relates to a method and apparatus for uniformly coating sheets or films of regenerated cellulose.

Thin sheets or films of regenerated cellulose obtained from cellulosic solutions, such as viscose, can be considerably improved in their resistance toward moisture and water vapor by being coated with suitable compositions, for example, lacquers, lacquer compositions containing waxes, or the like. It is, however, extremely difficult to coat these films, since in order to produce a satisfactory product the coating on both sides must be very thin, approximately 0.001 to 0.002 mm. At the same time, the coating must be substantially uniform and devoid of scratches and irregularities which would mar the appearance of the product, particularly if the latter is transparent.

In the manufacture of sheets or films of regenerated cellulose, it is practically impossible to produce a sheet or film of uniform thickness. Usually, the edges of sheets or films of regenerated cellulose have heads which are of different thicknesses and are generally thicker than other parts of the film, for instance, the center. Moreover, the edges are or become deformed and uneven. Consequently, when coated, such as being immersed in a coating composition, the edges and the areas or zones adjacent thereto would carry along an excess of coating material which would not dry completely. As a result, the film was not uniformly coated. Furthermore, it became smeared and very often, because of the odor of the solvents transmitted to it, the material was rendered unfit for use.

It has now been found that the above disadvantages may be overcome and the films substantially uniformly coated by conducting a film, subsequent to the application of the coating composition, through a wiping mechanism which comprises a plurality of oppositely disposed doctor knives so arranged as to wipe excess composition from both sides of the coated film, and preferably in an overlapping relation with respect to each other, there being provided on one of the doctor blades, and preferably the lower one, a mechanism which additionally wipes excess composition from the zones adjacent the longitudinal edges of the film.

It is therefore an object of this invention to provide a method of substantially uniformly coating materials, such as sheets or films of regenerated cellulose with any suitable coating composition, such as lacquer, which comprises applying a coating composition to both sides of the film,

wiping excess composition from both sides of said film, and additionally wiping excess composition from the areas adjacent the longitudinal edges on one side of the film after the said side has been entirely wiped.

Another object is to provide an apparatus for carrying out the method constituting one part of this invention.

A further object of this invention is to provide a coating apparatus comprising means to apply a coating to both sides of a film of material, such as regenerated cellulose, and means to wipe excess composition from both sides of said film, said wiping mechanism comprising a pair of doctor knives, preferably oppositely disposed and overlapping, one of said doctor knives, and preferably the lower one, being provided with means for additionally wiping excess composition from the zones adjacent the longitudinal edges of the film.

Additional objects will appear from the following description, appended claims and accompanying drawing forming a part of this specification and in which:

Figure 1 illustrates a diagrammatic arrangement of an apparatus embodying the principles of this invention.

Figure 2 is a top plan view of one form of wiping mechanism.

Figure 3 is a cross-section of a modified form.

Figure 4 is an enlarged detail illustrating one form of a mechanism for wiping the zones adjacent the edges.

According to this invention, a coating composition, such as lacquer, is applied to a material, for example a sheet or film of regenerated cellulose. Subsequently, the excess coating material is removed as hereinafter explained, and finally the coated material is dried and finished, as well known in the art.

Referring now to the drawing wherein like reference numerals designate like parts, the reference numeral 1 designates a tank containing a coating composition 2, such as lacquer, with which the film of regenerated cellulose 3 is to be coated. It is to be understood that the coating composition may be applied in any manner, and in the modification illustrated, it is applied by submerging the film 3 in the coating composition 2. In order to more effectively secure the application of the coating composition, there is provided a guide roller 4 within the tank 1 beneath which the film 3 is passed.

At any suitable point, preferably in as close proximity as practical, there is disposed a wiping mechanism which is adapted to wipe excess com-

position from both sides of the coated material as it issues or is drawn from the coating bath. The wiping mechanism, as is apparent upon an inspection of the drawing, comprises a pair of oppositely disposed and overlapping doctor knives 5 and 6 of a width sufficient to wipe excess composition from substantially the entire width of both sides of the film under treatment. The particular form of doctor knives are not essential for the successful practice of the invention, but it is preferred to have the wiping edges 7 and 8 thereof rounded.

Disposed in any appropriate manner on the doctor knife is a pair of wiping elements 9 which are adapted to additionally wipe excess composition from the zones adjacent the edges. As is apparent from the drawings, the marginal zones are wiped subsequent to the wiping of the entire face of the film.

The wiping elements 9 may be so positioned that they bear lightly against the upper doctor knife 6 as well as upon the material traveling between the doctor knives. They may be securely and firmly connected to the knife on which they are disposed. It is, however, more advantageous if they are removable and adjustably mounted, since during operation they may be guided by their rear edges and adjusted to proper position with relation to the film.

The wiping elements 9 may be of any shape. In the preferred form, they are made wedge-shaped, the wiping faces 10 thereof being at an angle to the vertical axis. They may be made of one piece (as shown in Figure 1) of any suitable material which is soft, yielding and resilient, such as fabric or a wax layer. They may also be made of any hard, rigid material, such as metal, in which case they are so constructed and mounted as to possess the desirable resiliency.

Due to the arrangement of the wipers 9 with respect to the knife 6, the excess composition adjacent the marginal edges on the surface opposite to that directly and positively wiped by the wipers 9 will also be removed.

Referring to Figures 3 and 4 wherein one exemplification of a wiper made of metal is illustrated, it will be noted that it is formed of two parts 11 and 12 maintained in spaced yielding relation by means of springs 13. The wiping face thereof is provided either wholly or in part, as shown in Figures 3 and 4, with a yielding and resilient covering 14, such as fabric.

Though not shown in the drawing, the doctor knives 5 and 6 are mounted so that they may be adjusted with relation to the film as well as be moved apart in order to facilitate the threading of the machine at the beginning of the operation.

It is also to be understood that by proper location of the elements 9 and/or adjustment of the parts thereof, they too may be adjusted in various positions with relation to the film. The entire effective wiping face of the wiper may press against the film, or it may contact with the film at various points thereof, such as at the higher and lower points, depending on the pressure applied to the wiper.

Films of regenerated cellulose are wound into rolls as they are produced, and on being unwound they may be, and in many cases are, distorted and pulled out of shape, whereby uniform coating thereof is rendered very difficult. In accordance with another object of this invention, these difficulties are overcome by providing a system of ironing or smoothing rolls arranged in front of

the coating-applying means, as hereafter described.

The ironing or smoothing rolls 15 are arranged comparatively close to each other and may be disposed in a single row or they may be disposed in a plurality of rows staggered as illustrated in Figure 1. They may be of any suitable size and diameter and they should be spaced apart from each other sufficiently to permit the threading of the machines at the beginning of the operation.

From the foregoing it is apparent that the apparatus produces a uniform coating and prevents the material from being distorted or deformed as it is unwound and conducted to the coating mechanism. The wiping mechanism not only removes the excess coating from both sides of the film, but by reason of the construction thereof the edges of the band are prevented from carrying along and retaining an excess of the coating material. With the construction of the apparatus hereinbefore described, there is no danger that the sensitive edges of the films will be injured or torn or that the films of regenerated cellulose which are easily distorted will be pushed toward the middle and fold over the edges of the scrap- ing device.

Since it is obvious that various modifications and changes may be made without departing from the nature or spirit of this invention, the above application is not limited thereto except as defined in the appended claims.

We claim:

1. An apparatus for coating sheets, films, webs or the like comprising means to apply a coating to both sides of the material, a plurality of oppositely disposed doctor knives to remove excess composition from the entire width on both sides of said material, and means to additionally and positively wipe the zones adjacent the edges on one side of the material after said side has been wiped by one of said doctor knives, said last-named means cooperating with one of said oppositely disposed doctor knives to also remove the excess composition from the zones adjacent the edges on the other side of said material.

2. An apparatus for coating sheets, films, webs or the like comprising means to apply a coating to both sides of the material, a plurality of overlapping doctor knives to remove excess composition from the entire width on both sides of said material, and means on the lower doctor knife to additionally wipe the zones adjacent the edges on one side of the material after said side has been wiped by the lower doctor knife.

3. An apparatus for coating sheets, films, webs or the like comprising means to apply a coating to both sides of the material, a plurality of overlapping doctor knives to remove excess composition from the entire width on both sides of said material, and adjustable means on the lower doctor knife to additionally wipe the zones adjacent the edges on one side of the material after said side has been wiped by the lower doctor knife.

4. An apparatus for coating sheets, films, webs or the like comprising means to apply a coating to both sides of the material, a plurality of overlapping doctor knives to remove excess composition from the entire width on both sides of said material, and resiliently mounted means on the lower doctor knife to additionally wipe the zones adjacent the edges on one side of the material after said side has been wiped by the lower doctor knife.

5. An apparatus for coating sheets, films, webs or the like comprising means to apply a coating

to both sides of the material, a plurality of overlapping doctor knives to remove excess composition from the entire width on both sides of said material, and adjustable and resiliently mounted means on the lower doctor knife to additionally wipe the zones adjacent the edges on one side of the material after said side has been wiped by the lower doctor knife.

6. An apparatus for coating sheets, films, webs or the like comprising means to apply a coating to both sides of the material, a plurality of overlapping doctor knives to remove excess composition from the entire width on both sides of said material, and means having a soft and yielding surface on the lower doctor knife to additionally wipe the zones adjacent the edges on one side of the material after said side has been wiped by the lower doctor knife.

7. An apparatus for coating sheets, films, webs or the like comprising means to apply a coating to both sides of the material, a plurality of overlapping doctor knives to remove excess composition from the entire width on both sides of said material, and adjustable means having a soft and yielding surface on the lower doctor knife to additionally wipe the zones adjacent the edges on one side of the material after said side has been wiped by the lower doctor knife.

8. An apparatus for coating sheets, films, webs or the like comprising means to apply a coating to both sides of the material, a plurality of overlapping doctor knives to remove excess composition from the entire width on both sides of said material, and resiliently mounted means having a soft and yielding surface on the lower doctor knife to additionally wipe the zones adjacent the edges on one side of the material after said side has been wiped by the lower doctor knife.

9. An apparatus for coating sheets, films, webs or the like comprising means to apply a coating to both sides of the material, a plurality of overlapping doctor knives to remove excess composition from the entire width on both sides of said

material, and adjustable and resiliently mounted means having a soft and yielding surface on the lower doctor knife to additionally wipe the zones adjacent the edges on one side of the material after said side has been wiped by the lower doctor knife. 80

10. An apparatus for coating sheets, films, webs or the like comprising means to apply a coating to both sides of the material, a plurality of overlapping doctor knives to remove excess composition from the entire width on both sides of said material, and adjustable and resiliently mounted means having a wax coating on the lower doctor knife to additionally wipe the zones adjacent the edges on one side of the material after said side has been wiped by the lower doctor knife. 85 90

11. In combination, means for applying a coating composition, means for wiping excess composition from the entire width of both sides thereof, means to additionally wipe the zones adjacent the edges on one side of said material and after said side has been entirely wiped, said last-named means cooperating with one of the elements of the first-mentioned means to also remove the excess composition from the zones adjacent the edges on the other side of said material and a plurality of ironing or smoothing rollers disposed in front of the coating-applying means. 95 100

12. In combination, means for applying a coating composition, means for wiping excess composition from the entire width of both sides thereof, means to additionally wipe the zones adjacent the edges on one side thereof and after said side has been entirely wiped, said last-named means cooperating with one of the elements of the first-mentioned means to also remove the excess composition from the zones adjacent the edges on the other side of said material and a plurality of ironing or smoothing rollers disposed in staggered relationship in front of the coating-applying means. 105 110 115

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