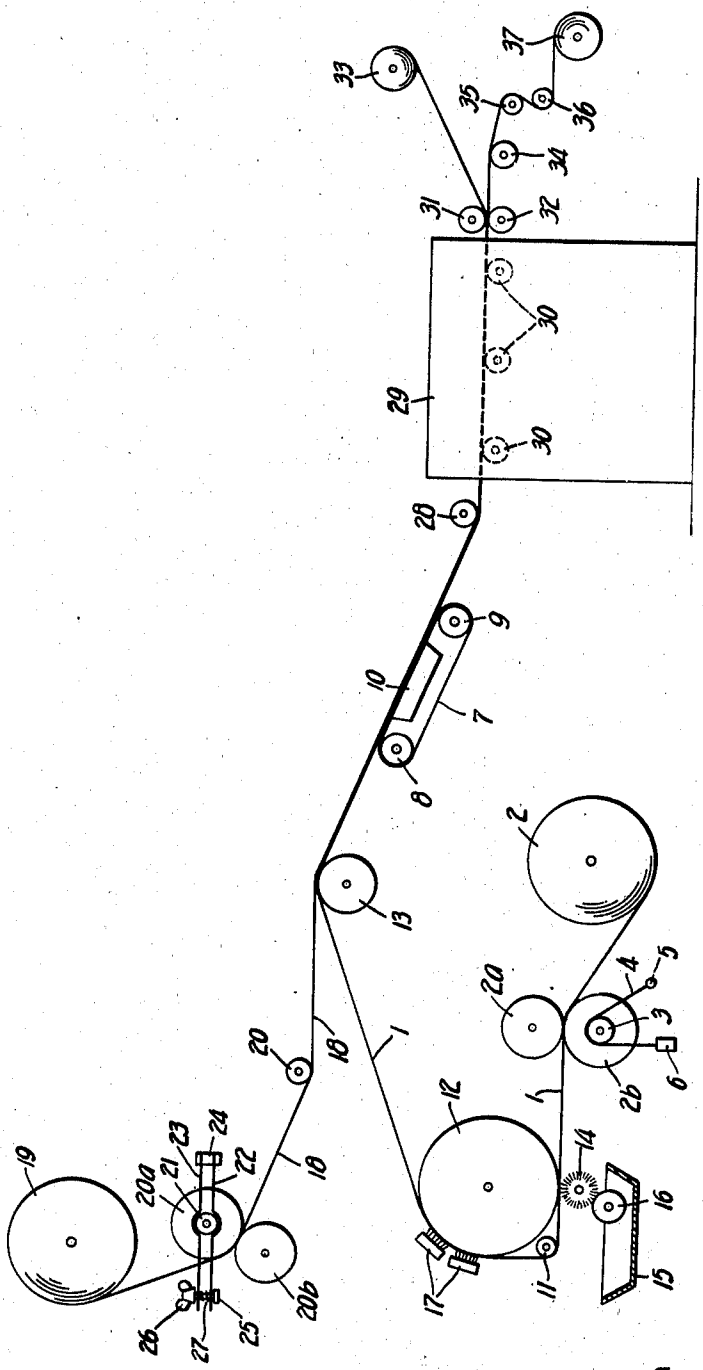
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METHOD AND MEANS FOR COATING PAPER

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METHOD AND MEANS FOR COATING PAPER

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This invention relates to the coating of paper or paper board and is in the nature of an improvement upon the invention disclosed and claimed in the pending application of Fred Kabela and George F. Whiting, Serial No. 190,696, filed February 16, 1938.

In common with said pending application, the present invention has for an object the production of an improved finish of the paper coating. The invention is applicable to coatings applied for purposes of coloring or for any other purpose for which coatings are customarily applied. The invention will be referred to as for coating paper, although it is to be understood that that term as herein used is intended to comprehend paper board or any other equivalent sheet materials.

In accordance with the disclosure of the pending application referred to, the coating is applied to the paper in any well known manner, but before being dried, a smooth, freely flexible, nonporous pressing sheet or web is pressed against the coating while the coating is in a wet and plastic condition, by means of pressure rollers. The laminated structure thus produced is then passed through a drier to dry the coating and the pressing sheet is thereafter separated from the coated face of the web. This kind of treatment is found to produce a smooth and improved surface finish as compared with prior practice.

The application of pressure rollers for applying the pressure sheet to the plastic coating has certain drawbacks, however. The pressure is positive in character and is difficult to regulate. The coating material is apt to be squeezed out from between the sheets and spread upon the surfaces of the rollers. The spreading of the coating upon the surface of the upper roller is particularly objectionable because there is no satisfactory way of continuously cleaning the upper roller.

The present invention has for its primary object to eliminate these drawbacks. As illustrated herein, this is accomplished by bringing the two webs, namely, the coated web and the pressing web into meeting relation under tension upon the convex surface of a curved pressing member, say an idler roller, so that they pass together over a considerable arc of the surface. The tension is produced by pulling the webs away from the pressing member in one direction and retarding the pressing web as it approaches the pressing member in another direction.

This arrangement enables the upper pressing roller to be omitted altogether, and at the same time provides for a nicely regulated and uniform pressure of the pressing web against the coated web. The total pressure may be regulated by adjusting the resistance of the pressing web to movement toward the uniting roller. The ratio of the total pressure to the tension varies with the angular change of direction of the pressing web in passing around the pressing member. The pressure per unit area may be increased by diminishing the radius of the pressing member, since this reduces the area of the pressing surface for a given change of direction.

In the illustrative embodiment of the invention, the regulation of pressure is secured by the application of an adjustable friction brake to a hub or drum of a roller which runs in frictional engagement with the pressing web as the web approaches the point of union. The frictional drag upon the web may, however, be applied in any suitable and approved manner which will maintain a suitable and desirably uniform tension upon the web.

Other objects and advantages will hereinafter appear.

The single view of the drawing illustrates diagrammatically in side elevation a practical and advantageous embodiment of the invention.

The paper web 1 to be coated is drawn from a reel 2, and between upper and lower rollers 2a and 2b. The roller 2b is provided with a brake drum 3 around which a friction belt 4 is passed. The belt 4 is anchored at one end to a fixed member 5 and hangs at its other end with a weight or weights 6 suspended upon it. The web 1 is drawn forward by a perforated belt 7 which runs upon rollers 8 and 9 and which passes over a suction box 10 located beneath the web 1. The web 1 is sucked against the belt 7 by the suction box 10 so as to avoid the application of direct pressure to the coated web at this point. After passing from the rollers 2a and 2b, the web 1 travels around rollers 11 and 12 and thence around the uniting roller 13. The coating is applied to the web by a rotary brush 14 while in engagement with the roller 12. The coating material is delivered to the brush from a pot 15 by means of a transfer roller 16. The coating may be smoothed out by a series of brushes 17 which bear lightly through the web against the roller 12.

The pressing web 18 is delivered to the machine from a reel 19. The web 18 is led between upper and lower rollers 20a and 20b and under a guide roller 20, so that it approaches the uniting roller 13 at a constant acute angle to the web 1. The two webs travel in contact around the periphery of the uniting roller 13 through a substantial area. The web 18 is drawn forward by the web 1

through adhesion to the coating applied to the web 1. The coating will produce sufficient adhesion by the time the feed belt 7 is reached to cause the two webs to be drawn forward in unison and without liability of slipping.

The roller 20a is provided with a friction drum 21, which is engaged by shoe members 22 and 23. The shoe members 22 and 23 are relatively pivotally mounted in a block or link 24 and may be drawn toward one another with regulated pressure. A headed bolt 25 passes through the ends of the shoe members 22 and 23 remote from the block 24 and has a wing nut 26 threaded on its end remote from the bolt head. A coil spring 27 encircles the shank of the bolt 25 and bears against the opposed faces of the members 22 and 23. Adjustment of the wing nut 26 adjusts the pressure of the shoes against the drum and thereby adjusts the resistance to feeding of the web 18.

After the belt 7, the webs 1 and 2 with the interposed coating travel forward in unison around a guide roller 28 and then through a drier 29 of any approved type being supported upon rollers 30 in the drier. The webs are drawn through the drier under slip tension by a pair of lightly engaged rollers 31 and 32 which act upon the webs after they have left the drier. Upon leaving the rollers 31 and 32, the web 18 is separated from the coated web 1 and is rewound upon a reel 33. The coated web travels in engagement with guide rollers 34, 35 and 36 and is rewound upon a reel 37.

Various materials may be used for the pressing web such as "Cellophane," "Kodapak," or "Sylphrap." Very thin, freely flexible metallic sheet material or in some instances a highly finished waterproof paper may be advantageously employed.

Instead of winding the pressing web from a supply reel onto a take-up reel, an endless pressing web may be utilized as illustrated, for example, in Fig. 2 of the prior application already referred to herein. The same principle of causing the pressing web to change direction in passing around the pressing member or roller 13 and of applying a regulated drag to the pressing web in advance of the roller 13 as described in connection with Fig. 1 would, of course, be adhered to.

We have described what we believe to be the best embodiments of our invention. We do not wish, however, to be confined to the embodiments shown, but what we desire to cover by Letters Patent is set forth in the appended claims.

We claim:

1. The method of coating paper to produce a smooth surface finish which comprises applying a wet mineral coating to one face of the paper web, pulling the paper web forward around a smooth, round supporting surface, while maintaining the paper under tension, pulling a pressing web of freely flexible, smooth non-porous material, capable of following distortions of the paper web, into contact with the coated face of the paper web upon said smooth round supporting surface, and around said supporting surface in unison with the paper web, while maintaining the pressing web under tension to produce pressure of the pressing web against the coated face of the paper on the round pressing surface to cause adhesion between the supporting web and the paper web, and thereafter drying the coating and separating the flexible pressing web from the coated face of the paper.

2. The method of coating paper as set forth in claim 1 in which the paper web is drawn forward independently of the pressing web, and the pressing web is drawn forward by adhesion to the coated face of the paper.

3. The method of uniting a pressing web with a wet, mineral coated paper web under regulated pressure which comprises effecting the meeting relation and union of the webs upon a curved supporting surface, drawing the webs together away from the curved supporting surface in one direction, directing the pressing web to the point of union at an angle to that direction, and maintaining a measured drag upon the pressing web in advance of its meeting relation with the coated paper web to create a predetermined tension of the pressing web, and thereby produce a predetermined pressure of the pressing web against the coated face of the paper to cause adhesion between the webs, the pressing web being of freely flexible, smooth, non-porous material capable of following distortions of the paper web.

4. The method of uniting a pressing web with a coated paper web as set forth in claim 3 in which the pressure with which the webs are united is controlled and regulated by adjusting the force of the drag acting upon the pressing web.

5. An apparatus for coating paper comprising, in combination, means for supplying a paper web, means for supplying a pressing web, means for coating the paper web, a curved supporting member, means for pulling the two webs forward in unison in the same direction and away from the curved supporting member, means for directing the two webs in convergent paths onto the curved supporting member, and means for maintaining a predetermined drag upon the pressing web to assure a predetermined pressure of said web against the coated face of the paper web, means for drying the coating, and means for thereafter separating the webs, said pressing web being of freely flexible, smooth, non-porous material capable of following distortions of the paper web.

6. An apparatus for coating paper comprising, in combination, means for supplying a paper web, means for supplying a pressing web, means for coating the paper web, a curved pressing member, means for pulling the two webs forward in unison in the same direction and away from the curved pressing member, means for directing the two webs in convergent paths onto the curved pressing member, and means for maintaining a predetermined drag upon the pressing web to assure a predetermined pressure of said web against the coated face of the paper web, comprising a friction brake and means for regulating the pressure of the brake.

7. An apparatus as set forth in claim 5 in which the means for pulling the webs forward comprises a perforate friction conveyor and suction means acting through the conveyor for drawing the paper web against the conveyor, the pressing web being pulled forward by adhesion to the paper web.

8. An apparatus for coating paper comprising, in combination, means for supplying a paper web, means for supplying a pressing web, means for coating a face of the paper web, a curved supporting member, means for pulling the two webs away from the supporting member in unison and in the same direction whereby the paper web leaves the supporting member at a line of contact on said supporting member, means for directing the paper web against said supporting member along

a line of contact spaced apart from said first named line of contact, means for directing the pressing web against the coated face of the paper web at a region intermediate said lines of contact, means for maintaining a predetermined drag upon the pressing web to assure a desired pressure of said web against the coated face of the paper web to cause adhesion between the pressing web and the paper web, said paper web being of freely flexible, smooth, non-porous material capable of following distortions of the pressing web, means for drying the coating and means for thereafter separating the webs.

9. An apparatus as set forth in claim 8 in which the means for directing the paper and pressing webs are so disposed that said webs approach the curved pressing member in convergent relation and disposed at an acute angle with each other.

10. The method of coating a continuous paper web to produce a smooth surface finish, which comprises applying a wet mineral coating to a face of the web, pulling the paper web forward around a smooth, round supporting surface, feeding into juxtaposed relation with the coated face of the web upon said smooth, round supporting surface a thin, freely flexible, pressing sheet of smooth, non-porous material, while maintaining the pressing sheet under tension to produce pressure of the pressing sheet against the coated face of the paper on the round supporting surface, the pressing sheet being more flexible than the paper web and being caused to follow all distortions of the paper web and its surface and to adhere continuously to said web, drying the coating and separating the flexible sheet from the coated face of the web.

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