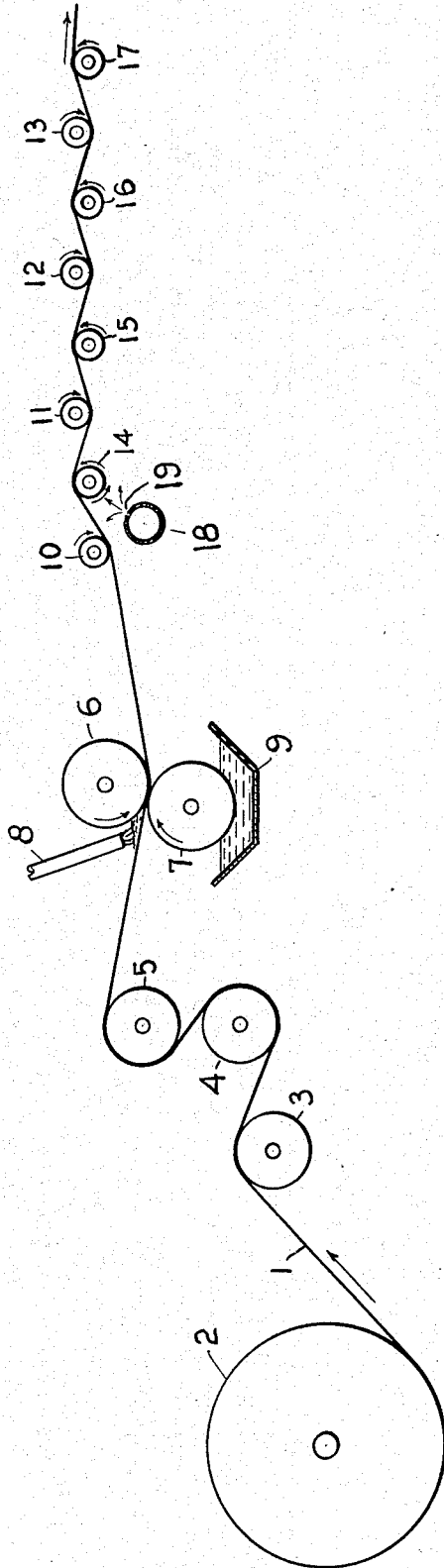


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METHOD OF COATING PAPER

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METHOD OF COATING PAPER

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This invention relates to a method of coating paper and it has particular reference to an improvement in those processes where reversely turning rolls are used to assist in spreading and smoothing the coating.

In the manufacture of coated paper such as is used for high grade printing it is common practice to apply to a travelling web of paper stock a desired quantity of aqueous coating composition containing mineral pigment such as clay, calcium carbonate, satin white or the like, and adhesive such as casein, starch, or the like. In case a coated-one-side paper is desired, the coating is ordinarily applied by means of a rotating brush; if a coated-two-sides paper is desired, the coating is usually applied by a pair of so-called "squeeze" rolls. In either case it is necessary to spread and smooth the coating immediately after it is applied to the web, since the rotating brush or the squeeze rolls leave the coating very unevenly distributed on the paper. This spreading and smoothing operation may be accomplished by a series of reciprocating brushes. The use of brushes for this purpose, however, has never been completely satisfactory. It requires a high degree of skill to adjust the pressure of the brushes so as to get the desired smoothing effect without creating highly undesirable brush marks. Also, the coating composition tends to dry out on the brushes, and then lumps of dried coating drop off onto the web and form color lumps, which are so dreaded by the printers because of the damage to printing plates. Bristles sometimes come loose from the brushes, fall onto the paper and become imbedded in the calender rolls in the subsequent finishing operation where even a single bristle may mar hundreds of feet of paper. The use of brushes has thus always been the cause of considerable losses to both paper maker and printer.

To avoid these brush difficulties, it has been proposed to substitute a series of small rolls operating on the freshly coated paper by rotating in the opposite direction to the paper at the point where they contact it. These so-called reversely turning rolls when rotated at controlled speeds help smooth out the gross irregularities of the initially applied coating. Such rolls have never served to satisfactorily smooth the coating, which is usually pulled by them into a series of more or less closely spaced longitudinal ridges. It has therefore been found necessary in commercial operations to supplement their action by the use of brushes. Although the use of these rolls has reduced the number of brushes formerly required, it has not completely eliminated them, and so

long as any brushes are used, there remain the dangers and losses above enumerated.

One object of the present invention is to provide a method of coating paper which will make possible the complete elimination of the use of brushes in smoothing the coating. Another object is to provide a method of coating paper utilizing reversely turning smoothing rolls but giving a more perfect quality product than that previously produced by that method.

We have discovered that if the reversely turning smoothing rolls are maintained in an atmosphere rich in steam, their spreading efficiency is so greatly enhanced that the use of brushes for the final smoothing out of the coating may be dispensed with entirely. Just why this should be is not clear. It is perhaps associated with condensation of the steam on the rolls. The increased temperature may play a part, possibly in decreasing the viscosity of the coating. But whatever the mechanism, the effect is noteworthy. Aside from the elimination of all brushes, the quality of the product is generally improved.

The invention will be further described by reference to the accompanying drawing, the single figure of which represents a diagrammatic side view of apparatus suitable for carrying out the invention. A web of paper stock 1 is unwound from the roll 2 and passes around the guide rolls 3, 4, and 5 as indicated. The coating applying rolls 6 and 7 apply coating to the top and bottom sides of the paper respectively. The coating composition is supplied through the pipe 8 and forms a pool on the paper just in front of the upper coating roll 6. Excess coating flows over each end of the web of paper into the pan 9 in which the lower coater roll 7 dips and applies coating to the under side of the web. By adjustment of the spacing between rolls 6 and 7, the desired quantity of coating may be applied to the paper.

Four upper smoothing rolls, 10, 11, 12, and 13, are shown and also four smoothing rolls to treat the bottom side of the paper are shown, at 14, 15, 16, and 17. These rolls are advantageously metal rolls, which may be about two inches in diameter and are driven at surface speeds in excess of the paper speed, in the direction indicated by the arrows; that is to say, at the place where they contact the paper they are travelling opposite the direction of the travel of the paper.

After leaving the smoothing rolls the paper passes directly to a float line of conventional design, to be dried without the interposition of any brushes or other smoothing mechanism.

A steam pipe 18 is provided under the web of

paper as shown. This pipe is drilled with a large number of openings 19 through which the steam may escape and form an atmosphere rich in steam under the web and enveloping the lower coater rolls. Advantageously the steam is directed in a gentle stream in the general direction of the paper travel.

Only a comparatively gentle stream of steam is required for carrying out this invention. Furthermore, we have observed that for reasons which are not understood, the application of steam merely to the bottom of the sheet results in an improved distribution and smoothness of the coating not only on the bottom of the sheet but on the top as well, thus eliminating the necessity of brushes either above or below the paper.

A further advantage arising from the use of the steam is that there is not formed a hard bead of coating on the smoothing rolls at and beyond the edges of the paper. This bead or crust of hard coating resulted from the drying out of the coating on the rolls beyond the paper and would sometimes mar the edges of the paper so that it was necessary for the operator to periodically remove this hard crust. The steam keeps this coating from drying out and thus eliminates another troublesome feature.

Paper coated in accordance with this invention does not require the aid of any brushes. The coating dries to a smooth, even surface without ridges, herringbone or brush marks and entirely free from color lumps. It may subsequently be supercalendered in the usual manner to give an improved coated paper for printing and other purposes.

We claim:

1. In the process of coating paper by the application of aqueous coating composition to a travelling web of paper and the smoothing of the freshly applied fluent coating by means of rolls 40

rotating opposite to the direction of the paper, the step of introducing steam into the zone where said rolls operate on the freshly coated paper.

2. Process of making coated paper which comprises applying aqueous suspension of mineral pigment and adhesive to a web of paper, spreading and smoothing the coating by contacting the coating while in a substantially fluent state with reversely turning rolls, and steaming the paper in the zone where the rolls contact the paper.

3. Process of making coated-two-sides paper which comprises applying aqueous coating composition comprising mineral pigment and adhesive to both sides of a web of paper, spreading and smoothing the coating by contacting the coating while in a substantially fluent state with reversely turning rolls, and maintaining an atmosphere containing steam under the paper where the rolls contact the coated paper.

4. Process of making coated paper which comprises applying aqueous suspension of mineral pigment and adhesive to a web of paper, spreading and smoothing the coating by contacting the coating while in a substantially fluent state with reversely turning rolls and condensing steam on the said rolls and on the paper immediately adjacent thereto.

5. Process of making coated paper which comprises applying aqueous coating composition to a web of paper, then while the coating is still fluent, smoothing the coating by means of reversely turning cylindrical surfaces and maintaining an atmosphere of steam in the zone where at least some of the said cylindrical surfaces operate, whereby the use of brush smoothing means is rendered unnecessary.

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