This invention relates to a process of coating paper and to apparatus designed to perform said process.

The term "coated paper" is here used in the sense in which it is commonly employed in the paper industry, that is, to say, paper which has been coated with a fluid suspension of mineral pigment, such as clay, satin white and the like, in an aqueous solution of an adhesive such as casein, starch and the like, and the terms "coating", "aqueous coating", "coating mixture", etc., as used herein, are to be interpreted in accordance with this definition.

The present invention contemplates a coater in which the difficulties inherent in the use of reversely turning metallic, e. g. steel surfaced rolls, and distributing rolls, are overcome.

The invention will be described by reference to the accompanying drawing.

Fig. 2 is a diagrammatic view of one of the coating rolls.

While the drawing illustrates and the following description refers only to cylindrical rolls, it will be understood that other devices such as a traveling belt might be substituted therefor.

Referring to the drawing, 2 is the web of paper to be coated, supplied from the roll thereof of 1, 3 and 4 are guide rolls, and 5 is a supporting roll around which the paper travels. 6 is a pan of coating mixture into which the roll 7 dips. 8 is a large rotating brush which picks up coating from the roll 7 and deposits it on the paper as it passes around the roll 5. The weight of coating so applied to the paper may be controlled in the well-known manner, as by regulation of the relative speeds of rotation of rolls 7 and 8 and the travel of the paper web. 9 is an apron traveling on rolls 11 and 12, which serves to draw the paper through the machine. 10, 10, 10, are smoothing rolls driven in the reverse direction to the movement of the paper, preferably at a surface speed greater than and desirably two or more times that of the paper. 13, 14, 15 and 16 are supporting rolls. After contact with these smoothing rolls the paper is carried by the belt 9 to a drying system, for example a festoon line, not shown. Each of the smoothing rolls 10 consists of a wood or metal core 17 carried on a shaft 19 and provided with a surface or covering of soft, fibrous material which, in contradistinction to the steel or steel surfaced rolls above referred to, are yielding and pervious or absorptive to the aqueous coatings used. I prefer to use a covering of plush which provides a relatively dense, uniform, soft and pervious surface. In place of plush a variety of materials of a fibrous nature, such as various grades of felt, may be used. These rolls may be mounted in adjustable brackets to allow their being moved nearer to or further from the coating applying means as may be desirable in applying different grades or consistencies of aqueous coating mixture.

Like the reversely turning steel rolls described in the above-mentioned patent, my smoothing rolls exert a smoothing action on the coating on the sheet by picking up a portion of the coating and redepositing it on the sheet. But apparently due to the character of the surface of my rolls there is little or no tendency for the coating to draw up into ridges such as occurs when an impervious or steel roll is used. This tendency to draw up into ridges on a rotating smooth impervious roll is a very general phenomenon with liquids, but in the case of such materials as varnish, liquid wax and the like, the ridges also tend to flow out rapidly so that a fairly uniform deposit of coating of such liquids may result. However, with the coatings used in making coated paper, which consist of a relatively high percentage of insoluble mineral pigments suspended in an aqueous colloidal solution of casein, starch, glue or the like, and which to a degree are gelatinous in character, the ridges form on but do not flow out on an impervious roll, and consequently these ridges are transferred to the paper. In the case of rolls having a fibrous surface these ridges are much less pronounced.

The invention will, therefore, be seen to reside in (1) a method of coating paper comprising applying an aqueous coating to a traveling web of paper in controlled weight and spreading said coating.
coating by picking up the coating and redepositing it upon the traveling web of paper by one or more cylindrical bodies presenting a fibrous surface and rotating oppositely to the direction of travel of the paper and preferably at a peripheral speed greater than that of the paper, and (2) apparatus for making coated paper comprising means for applying aqueous coating mixture to a web of paper, means for regulating the weight of coating applied, means for advancing the web of paper, and means for smoothing the coating on the web, said smoothing means comprising one or more rolls covered with or presenting a surface of fibrous material and means for rotating said rolls so that the surface thereof in contact with the coating travels in a direction opposite to that of the paper and at a peripheral speed greater than that of the paper.

I claim:

1. Process of coating paper which comprises picking up aqueous coating material from a traveling web of paper and redepositing it thereon by means of one or more yielding absorptive surfaces moving oppositely to the direction of travel of the paper.

2. Process of coating paper comprising applying an aqueous coating to a traveling web of paper in controlled weight and spreading said coating by picking up coating material from and redepositing it upon the traveling web of paper by means of one or more yielding, absorptive surfaces moving oppositely to the direction of travel of the paper at a speed greater than that of the paper.

3. Apparatus for making coated paper comprising means for applying aqueous coating mixture to a web of paper, means for regulating the weight of coating applied, means for advancing the web of paper, means for smoothing the coating on the web, said last means comprising one or more rolls presenting a flush surface, and means for rotating said rolls oppositely to the direction of travel of the paper.

4. Apparatus for coating paper comprising means for applying aqueous coating mixture to a web of paper, means for regulating the weight of the coating applied, means for advancing the web of paper, means including a roll having a yielding, absorptive surface for smoothing the coating on the web and means for rotating said roll oppositely to the direction of travel of said web at a peripheral speed greater than the speed of the web.

5. Apparatus for making coated paper comprising means for applying aqueous coating mixture to a web of paper, means for advancing the web of paper, means for smoothing the coating on the web, said last means including a roll having a fibrous, yielding surface constituting means for carrying a layer of coating material without substantial transverse movement of said layer on said roll into longitudinal ridges and means for rotating said roll oppositely to the direction of travel of the web and at a peripheral speed greater than the speed of the paper.

THEODORE E. KNAPP, JR.

CERTIFICATE OF CORRECTION.

Patent No. 1,924,994.

August 29, 1933.

THEODORE K. KNAPP, JR.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, line 82, claim 3, for "flush" read "plush"; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 24th day of October, A. D. 1933.

(Seal)

F. M. Hopkins
Acting Commissioner of Patents.