Jan. 22, 1935. D. B. BRADNER 1,989,036

PAPER COATING

Filed July 18, 1932

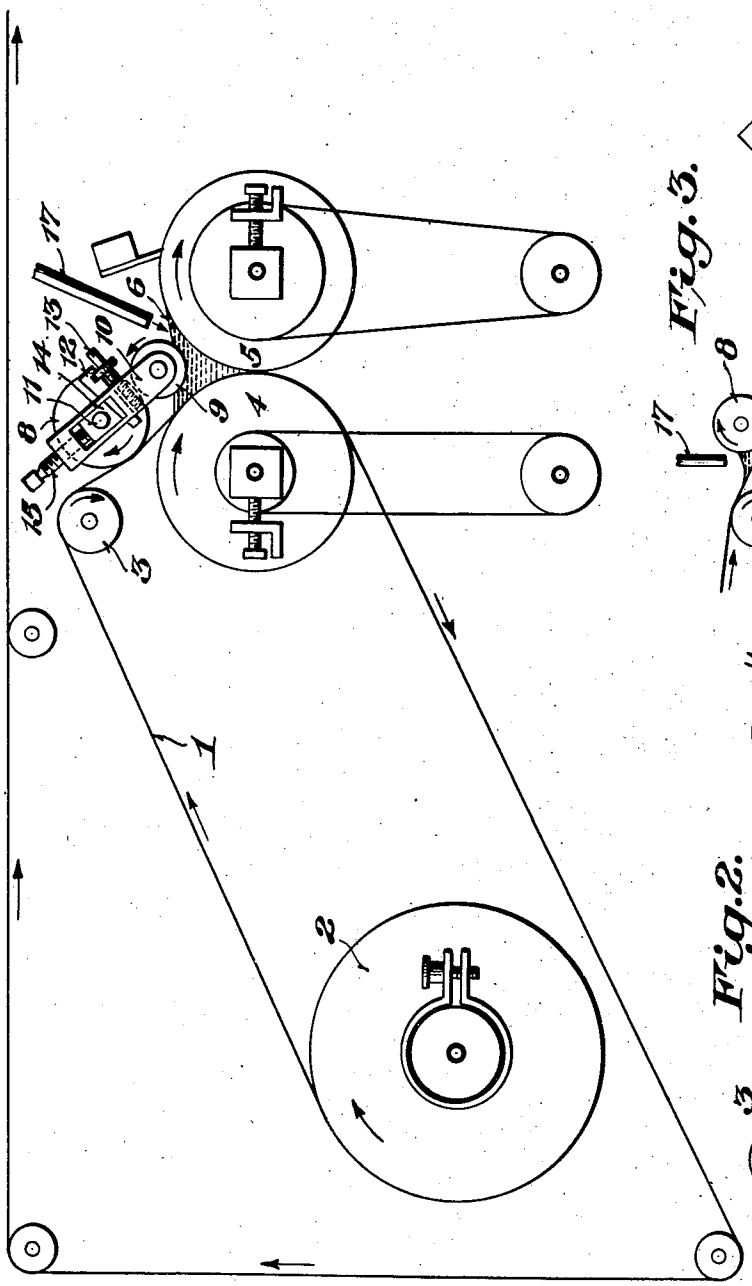


Fig. 1.

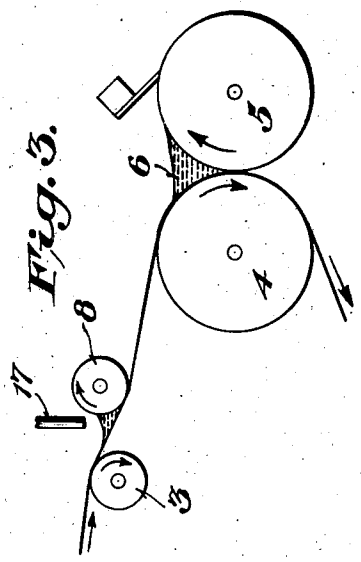


Fig. 3.

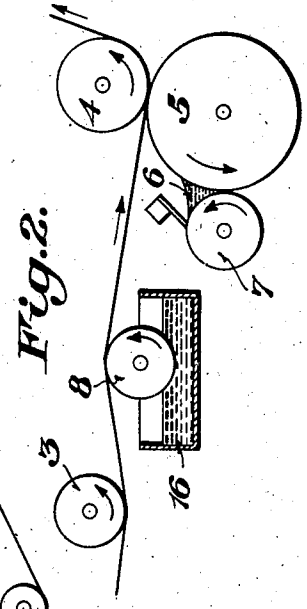


Fig. 2.

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PAPER COATING

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Application July 18, 1932, Serial No. 623,224

2 Claims. (Cl. 91—31)

This invention relates to paper coating; and it comprises certain improvements in paper coating machines which apply and level an aqueous coating on a traveling web of paper in a single operation and which have a pair of adjacent cooperating coater rolls adapted to rotate in the same angular direction, said improvements comprising a roll engaging the web and driven in the opposite direction to the travel of the paper, which is adapted to receive water or coating composition and to exert pressure on and moisten the web of paper prior to passage of said web around one of said coater rolls; all as more fully hereinafter set forth and as claimed.

This invention has particular utility in connection with roll coaters of the types described in patents to Bradner 1,838,358 and to Münch 1,847,065. Using these machines with certain types of stock and with certain coating compositions, it is desirable to condition or prewet the web prior to its engagement with the coater rolls proper, in order to promote exit of air and remove adhering air bubbles from the sheet. In the absence of such prewetting, small "skips" in the coating often result, that is, small areas of uncoated paper occur. This is particularly serious when coating at high speed. The desirability of prewetting when using either type of coater is recognized in the Bradner patent above referred to. In prewetting either water or coating composition may be employed but it is better to use the latter to avoid dilution of the composition subsequently employed.

In the present invention a special prewetting mechanism is used, this mechanism including a roll engaging the paper and rotating in a direction opposed to the travel of the paper. By using this prewetter roll pressure is exerted on the web at the point of engagement and in the pressure of moisture. This pressure facilitates extrication of air from the web and prepares the web for coating.

In the accompanying illustration I have shown, more or less diagrammatically, certain embodiments of the present invention. In this showing

Figure 1 is a diagrammatic end view of one form of my prewetter as applied to a paper coating apparatus of the Bradner type.

Figure 2 is a diagrammatic view of the present invention applied to a roll coater of the Münch type, and

Figure 3 is a similar view of another form of roll prewetter applied to a coater of the Bradner type.

In the drawing element 1 is a traveling web of paper being unwound from stock roll 2. The web passes over carrier roll 3. In the Bradner type coater shown in Figures 1 and 3, a carrying roll 4 and a doctor roll 5 form the main coater rolls. The web of paper passes into a pool of coating 6 maintained between the two coater rolls 4 and 5, which are traveling in the same angular direction, the paper being carried on roll 4 and being brought close to, but not in contact with, the doctor roll 5. In the Münch coater as shown in Figure 2 the arrangement is different, the pool of coating being maintained not between rolls 4 and 5, but between roll 5 and a doctor roll 7, traveling in the same angular direction as the other rolls. A layer of controlled thickness is deposited directly upon the face of roll 5 and is thereafter transferred to the paper by a wiping action.

The prewetter roll 8 is a roll as shown in the drawing, rotated in a direction opposite to the travel of the paper and preparing the paper for coating.

In Figure 1 is shown a prewetter roll 8 which cooperates with a prewetter doctor roll 9, these rolls rotating in opposite angular directions as indicated by the arrows on the figure. These two rolls are held in an adjustable frame 10. In this showing, roll 3 serves to maintain the web of paper in contact with the prewetter roll 8. In Figure 2 is shown a different type of prewetter roll. The roll dips into a prewetting liquid in pan 16. This liquid may be water but is usually the same material as the coating composition applied later. In Figure 3 coating composition is supplied in front of the prewetter roll 8 from the pipe 17.

In the structure of Figure 1, the prewetting mechanism as a whole, including the prewetter roll and the prewetter doctor roll, is shown mounted pivotally on transverse rod 11, thereby making it possible to raise the mechanism up and out of contact with the pool of coating to facilitate threading a new web. To compensate for variation in the nature of the coating composition used, the opening between the prewetter roll and the prewetter doctor roll may be varied. Means for this are shown as a wedge 12 adjustable by screw 13, and sliding bearing blocks 14, and clamping screw 15.

In the operation of this structure the prewetter doctor roll 9 dipping into the pool of coating composition picks up a thick layer of coating and carries it to the nip between the prewetter doctor roll and the prewetter roll. Roll 9 has, in addition to the dipping function, a doctoring roll. Depending upon the adjustment between these rolls, a thicker or thinner layer of coating is deposited upon the prewetter roll. Roll 9 may

thus be said to be a combined dipping and doctoring roll. If the rolls are too close together, an insufficient quantity of coating will be put on the transfer roll and inadequate prewetting of the web will result. On the other hand, if the opening between the rolls is too great, there will likewise be an insufficient amount applied to the prewetter roll, since most of the coating will remain on the prewetter doctor roll. With the ordinary type of liquid coating compositions used in making mineral coated paper, I have found that with the prewetter roll having a peripheral speed 1.5 times the paper speed and with the prewetter doctor roll rotating at about two-thirds the peripheral speed of the prewetter roll, a nip opening between the rolls of 0.003 to 0.015 inch gives satisfactory results.

Although this particular type of prewetter has been described in connection with the Bradner type of coater, it will be apparent that it can also be used with the Münch type.

While the particular arrangement shown and described I regard as the most advantageous, it may be simplified or changed in various ways. Thus, instead of the prewetter doctor roll 9 dipping into the pool of coating and transferring coating to the prewetter roll 8, the coating composition may be supplied directly to the nip between the rolls by means of a pipe. Also, in place of a doctor roll to regulate the quantity of coating carried on roll 8, a doctor blade may be used. Or the doctor member (roll or blade) may be dispensed with, and an unregulated amount of coating applied directly to the paper by the prewetter roll turning reversely to the paper, the prewetter roll then dipping into or being submerged in the pool.

The reversely turning prewetter as described in all embodiments presses against the web to a certain extent, thereby facilitating exit of air and completely overcomes skips in the coated paper at any speed of paper travel and with practically any coatings or stocks used in the manufacture of coated paper for printing. Furthermore, the paper is not in any way marred by the prewetter action and the present reversely turning roll is superior to prewetting rolls which are either stationary or turn in the direction of the paper. Using the latter type of rolls the coating is frequently stippled and streaked.

What I claim is :

1. In a paper web coating apparatus a pair of cooperating rolls rotatable in the same angular direction, means for moving the web into contact with one of said rolls, a prewetter roll for applying liquid to and to press on the web just prior to its contact with said roll and means for rotating said prewetter roll in the direction opposite to the travel of said web.

2. In a paper web coating apparatus comprising a pair of cooperating rolls rotatable in the same angular direction, and adapted to retain between their adjacent upper quadrants a pool of liquid coating composition and to receive a traveling web of paper passing between the rolls, a prewetter device comprising a prewetter roll arranged to engage and press on the traveling web prior to its passage between the rolls and adapted for rotation in direction opposite to the travel of the web and a doctor roll spaced a small adjustable distance from the prewetter roll, and adapted to supply said prewetter roll with coating composition from said pool.

DONALD B. BRADNER.

CERTIFICATE OF CORRECTION.

Patent No. 1,989,036. January 22, 1935.

DONALD B. BRADNER.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 1, second column, line 53, for "roll" read function; 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 12th day of March, A. D. 1935.

Leslie Frazer

(Seal)

Acting Commissioner of Patents.