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COATER WITH MARGIN CONTROL MEANS

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Fig. 1

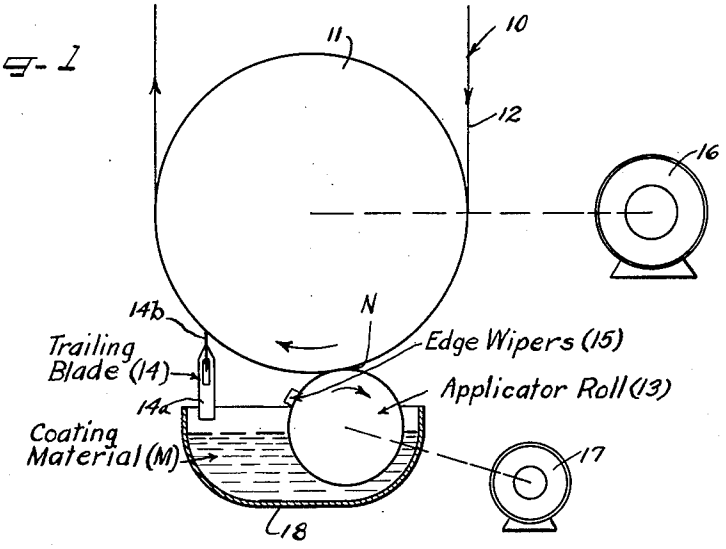
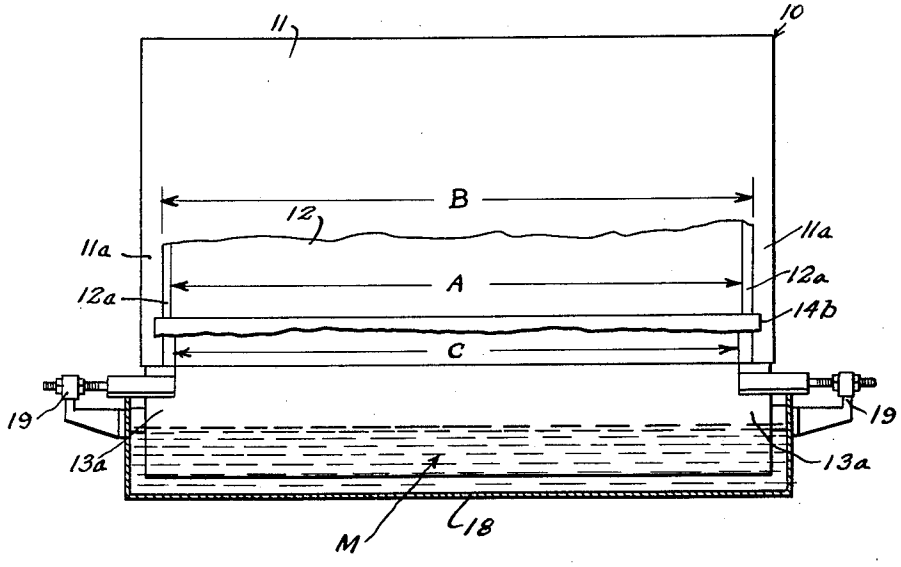


Fig. 2



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COATER WITH MARGIN CONTROL MEANS

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The instant invention relates to a device for coating a traveling sheet, and more particularly, to margin control means for a device for coating a paper web.

Although the instant invention may have application in a number of fields, including the coating of a number of different types of traveling sheets in the form of fabrics or cloth as well as paper, the instant invention is particularly useful in the coating of paper and will be described primarily in connection therewith. In the ordinary paper coater, the web travels over a back-up drum and a layer of coating is ordinarily applied by a first means, followed by a second means for smoothing or more uniformly applying the coating to the web. Such second means may be in the form of a doctor roll or blade. A difficulty encountered, however, is that the doctor means will actually spread the coating beyond the marginal edge of the web and onto the surface of the back-up drum. This leads to undesirable operating conditions. Also, the applicator means may apply coating to the drum surface beyond the marginal edges of the web. In either case, the coating on the drum surface must be removed before it completes one revolution, or it may lead to sticking of the underside of the web to the drum or similar difficulties.

The instant invention affords a deceptively simple and unique arrangement for avoiding these difficulties. In the instant arrangement an applicator roll is employed to apply coating to the web on the drum, but this applicator roll applies coating only to the main body of the web and not to relatively thin marginal edge portions of the web. The applicator roll is provided with wiper means which extend inwardly from the opposite edges or ends of the roll a controlled distance. In this way, the film of coating material picked up by the applicator roll is removed at the ends of the applicator roll so that no coating is applied to the marginal edges of the traveling sheet. It is then possible to use a simple trailing blade or doctor blade at the off-running side of the nip between the drum and the applicator roll for smoothing the coating material on the web. No side dams need be mounted with the blade to prevent flow of coating material laterally onto the drum. Instead, the adjustable wipers are mounted in association with the applicator roll so as to compensate for any spreading of the coating material laterally at the trailing blade. Also, the applicator roll speed is controlled so that an amount of coating material is applied to the web that will not spread appreciably at the trailing blade. It will be appreciated that the slight spread, if any, in the coating material at the blade will depend upon the characteristics of the coating material, the characteristics of the blade and the speed of operation, although the amount of spread will remain substantially constant for a given set of operating conditions. Under these circumstances the wipers are adjustably mounted in precisely the position desired to compensate for the other operating factors.

It is, therefore, an important object of the instant invention to provide an improved coating device.

Another object of the instant invention is to provide an improved device for coating a traveling sheet which comprises a back-up roll wrapped by the traveling sheet, an applicator roll picking up coating material and applying it to the sheet on said back-up roll, blade means smoothing the applied coating material on the sheet, and wiper means extending inwardly from opposite ends of the applicator roll to wipe the ends free from coating material and thereby prevent the application of coating material to marginal edges of the traveling sheet.

Other and further objects, features and advantages of the present invention will become apparent to those skilled in the art from the following detailed disclosure thereof and the drawings attached hereto and made a part hereof.

On the drawings:

FIGURE 1 is an essentially diagrammatic side elevational view of a coating device of the instant invention; and

FIGURE 2 is an elevational view taken from the left hand side of FIGURE 1, with parts broken away.

As shown on the drawings:

The coating device of the instant invention, indicated generally by the reference numeral 10, comprises a back-up roll or drum 11 which is wrapped by a traveling sheet or web 12, an applicator roll 13 picking up coating material M and applying it to the sheet 12 on the back-up roll 11, blade means 14 smoothing the applied coating material M on the sheet 12, and wiper means 15, 15 extending inwardly (FIGURE 2) from opposite ends of the applicator roll 13 to wipe the ends free from coating material M and thereby prevent the application of coating material to marginal edges of the traveling sheet 12.

The rotary drum or back-up roll 11 is driven by suitable drive means such as a motor indicated diagrammatically at 16, so as to attain a predetermined surface speed on the drum 11. The drum 11 receives the web 12 on the surface thereof for travel at the surface speed of the drum 11. As indicated in FIGURE 2, the drum 11 is of greater length (or transverse dimension with respect to the web 12) than the web 12, so as to assure that the web 12 is backed by the drum 11 throughout its entire width. This leaves exposed edges 11*a*, 11*a* of the drum surface and the instant invention provides means for avoiding the application of coating material M to these exposed drum edges 11*a*, 11*a*. In fact, the instant invention provides means for leaving a slight marginal edge 12*a*, 12*a* of the web 12 uncoated.

The applicator roll 13 is also driven by a suitable drive means such as a motor indicated diagrammatically at 17 and the applicator roll 13 has substantially the same length as the drum 11. The applicator roll is rotated, however, at a direction opposite to the direction of web travel and the direction of rotation of the drum 11 at a nip N formed between the drum 11 and the applicator roll 13. The nip N is not a press nip and it merely permits contact between the web 12 and the applicator roll 13 to the extent necessary to apply the coating material M at the nip N. The extent of contact between the applicator roll 13 and the web 12 and the relative speeds are correlated so that the web 12 removes coating material from the surface of the applicator roll 13 slightly more rapidly than the coating material is brought to the nip N with the result that the coating material M is spread much more thinly on the web 12 than on the surface of the applicator roll 13. As will be seen, the applicator roll 13 is partially immersed in a bath 18 of coating material M and the amount of coating material M that is filmed onto the uprunning side of the applicator roll 13 is relatively difficult to control. Variations in the level of coating material M in the bath 18 will make appreciable differences in the amount of coating material M applied by the applicator roll 13. These conditions can be controlled, however, so that the desired amount of coating material M is applied to the web 12; and as has been pointed out, this amount is much less per unit of area on

the web than the amount of coating material per unit of area on the applicator roll surface.

The function of the trailing blade 14 is thus essentially that of smoothing the coating material, rather than actual removal of excess. If removal of excess coating material M occurs deliberately or accidentally, you will note that the trailing blade 14 is also mounted over the bath 18 so that the coating material M can return to the bath 18. The trailing blade 14 is formed of a mounting bar 14*a* which holds a thin blade 14*b* in close running relation to the drum 11 (and the coated web 12 thereon) at the off-running side of the nip N. The blade 14*b* extends the full length of the roll 11, or substantially so, so as to smooth coating across the full width of the web 12.

It will be appreciated that, even though smoothing is the primary function of the blade 14*b*, there may be a slight spreading or lateral outward movement of the coating material M on the web 12. This slight spreading will be substantially uniform for any given set of operating conditions, but the trailing blade is not provided with end dams or the like to restrain a pool of coating material. A slight spreading takes place and then the coating material may drop down from the blade into the bath 18. If the web 12 is coated across its entire width, it will be appreciated that however slight the spreading may be it will result in the application of coating material to the surface of the drum 11.

In the practice of the instant invention edge wipers 15, 15 are mounted in association with the applicator roll to wipe the uprunning edges thereof. As shown in FIGURE 2, the edge wipers 15, 15 are mounted for threaded engagement with frame elements 19, 19 to permit limited axial adjustment thereof. The bath 18 applies coating material M to the underside of the applicator roll 13 for travel on the uprunning side of the nip N. The edge wipers 15, 15 are interposed between the bath 18 and the nip N on the uprunning side of the applicator roll 13. The wipers 15, 15 may be formed of suitably durable resilient material such as rubber or the like synthetic elastomers and the wipers 15, 15 are urged against the end portions 13*a*, 13*a* of the applicator roll 13 so as to wipe the end portions 13*a*, 13*a* clean. The sheet 12 in FIGURE 2 is shown as having a predetermined substantially uniform transverse dimension B. The wipers 15, 15 are spaced apart a distance C which is less than the web transverse dimension B. The wipers 15, 15 permit the application of coating material to the web 12 only across a transverse dimension C, which is substantially the space between the wipers 15, 15. This leaves an uncoated marginal edge 12*a*, 12*a* on both sides of the web 12. As indicated in FIGURE 2, the blade 14*b* (shown fragmentarily) smooths the coating material on the web 12 and results in a very slight spreading of the coating on the web 12 to obtain a coating having a lateral dimension A, slightly greater than the initial lateral dimension C of the coating, but still less than the lateral or transverse dimension of the web B.

The wipers 15, 15, in association with the applicator roll 13, thus permit the use of a simplified trailing blade arrangement 14 which is particularly effective for smoothing the coating to the desired extent.

The device 10 also permits starting a new web without the difficulties of applying a pool of coating before stable speed is reached and also avoids most of the difficulties encountered when the web breaks. For example, if during a start-up of the machine, an applicator roll will tend to apply too much coating to the web (so that spreading is excessive at the blade 14*b*), the adjustable wipers 15, 15 may be moved inwardly an appreciable distance to compensate for this spreading. As machine speeds are reached, the adjustable wipers can be moved back to the desired position, without in any way interfering with the operation of the machine.

It will be understood that modifications and variations may be effected without departing from the spirit and scope of the novel concepts of the present invention.

We claim as our invention:

1. In a device for coating a traveling paper web having a predetermined substantially uniform transverse dimension, in combination, a rotary drum of greater length than said dimension receiving a paper web on the surface thereof and rotating at a predetermined surface speed, a rotary applicator roll of substantially the same length as the drum mounted in nip-defining relation to the drum for receiving the paper web therebetween, means rotating the roll at a direction opposite the rotation of the drum at the nip and at a surface speed slower than that of the drum, a source of paper coating material feeding coating onto the roll for application to the paper web at the nip, a trailing doctor blade extending at an angle in the direction of travel of the web as it leaves the blade at the off-running side of the nip extending substantially the full length of the drum in close running relation therewith to smooth paper coating material on the web traveling on the drum, and adjustably mounted end wipers spaced apart less than said paper web transverse dimension, said end wipers extending inwardly from opposite ends of the applicator roll to wipe the ends free from paper coating material and thereby prevent the application of coating material to marginal edges of the traveling sheet.

2. A device for applying a paper coating to a traveling paper web comprising a back-up roll wrapped by a traveling paper web, means for driving said roll in rotation at a first peripheral speed, a container for a pool of coating material positioned beneath the back-up roll, an applicator roll having its lower circumferential portion submerged in the pool picking up paper coating material and positioned to form a coating nip with the back-up roll for applying coating to the paper web on said back-up roll, means for driving said applicator roll at a second peripheral speed slower than said first speed, a thin doctor blade extending in the direction of paper travel to be in a trailing position and positioned after said nip and above the container to be in engagement with the paper web on the back-up roll smoothing the applied paper coating material on the paper web with excess coating material running downwardly into the container, wiper blades extending axially inwardly from opposite ends of the applicator roll from the edge thereof to project inwardly a short distance beyond the axial location of the edges of the paper web to wipe the ends of the applicator roll free from the paper coating material and thereby prevent the application of paper coating material to the marginal edges of the traveling paper web, the wiped material dropping downwardly into the container, said wiper blades extending axially beyond the edge of the roll and outwardly thereof for guiding liquid coating to drip down into the container, and an adjustable support mounted on the container and connected to each of said wiper blades for adjusting the axial position at each end of the applicator roll to accurately control the width of the paper coating material applied to the applicator roll relative to the width of the traveling paper edge and thereby control the width of uncoated paper at the edge of the web.

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