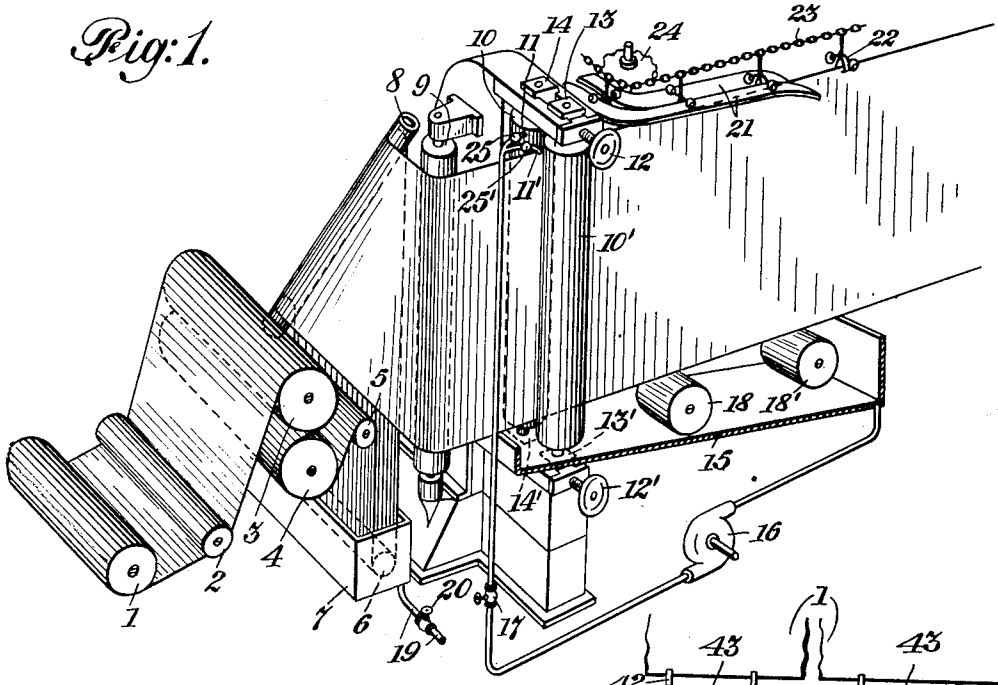
Sept. 28, 1937. C. C. WILLIS 2,094,112

VERTICAL COATER

Original Filed May 17, 1934

Fig:1.



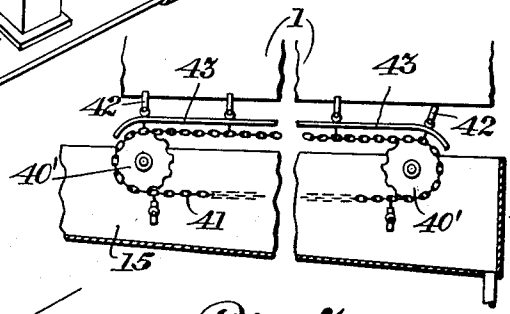


Fig:2.

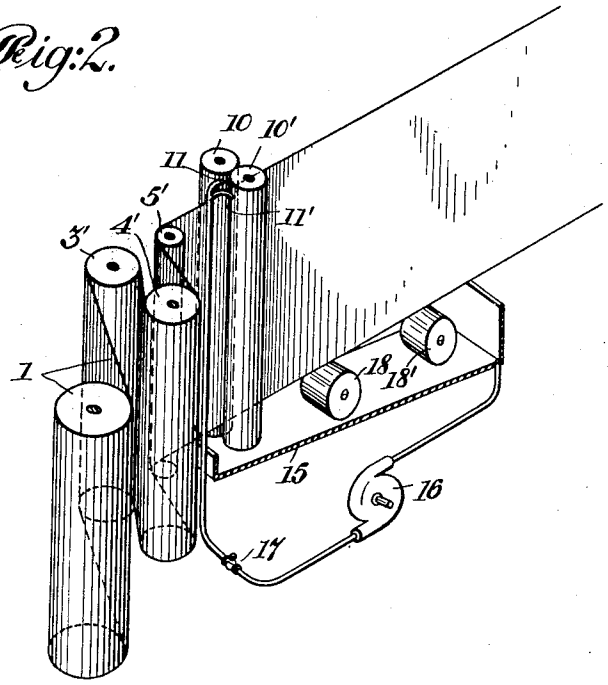


Fig:3.

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VERTICAL COATER

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7 Claims. (Cl. 91—49)

This invention relates to a coater for paper and the like.

In the coating of paper with varnishes, oils and similar substances that dry slowly while at the same time become tacky when drying, the usual methods of coating have not proven entirely satisfactory. Where both sides of the paper or like material are coated in the customary horizontal roll coating machine the substances such as varnishes and the like can only be coated on one side as they will adhere to the supports in the dryer. Even when coated on one side at a time and then re-run the stick mark settings will be discernible in the coating.

One of the objects of this invention is to provide a form of coating for both sides of the web wherein the coating on both sides will be uniform and of the desired thickness and of a smooth even appearance and wherein substances such as varnishes and the like may be utilized as a coating material.

Another object of the invention is to provide a coating machine that will be simple and one wherein the depth of coating can be controlled.

A further object of the invention is to provide a coater that will coat both sides of the web simultaneously and which is adaptable to apply a wide range of coating materials.

A further object of the invention is to provide a roll coating device wherein both sides of the web are coated while at the same time leaving an uncoated edge of predetermined width.

Referring to the drawing:

Figure 1 is a diagrammatic view of a device embodying the principles of this invention.

Figure 2 is a view of a modified form of device embodying the principles of this invention.

Figure 3 is a detail view of auxiliary web stabilizing device for the bottom edge of the web.

In carrying out this invention the web 1 of the paper starts from the unroll position (see Figure 1) and passes under roll 2, thence around pull rolls 3 and 4, and over roll 5 and around dip roll 6. Certain webs with some forms of coating require preliminary impregnation prior to coating. Where such preliminary wetting is not required the use of a bath in container 7 may be dispensed with. From roll 6 the web passes around angle bar 8, thence around vertical roll 9 and between feed rolls 10, 10'. The coating is applied by means of two pipes 11, 11', from which the coating emerges to flow-down the surfaces of rolls 10, 10', adjacent the nip, or it may be permitted to flow down each side of the web of paper 1. An excess of coating is applied. The adjustment of the distances between the feed rolls 10, 10', by means of adjustment screws 12, 12', which move bearing blocks 13, 13', towards blocks 14, 14', thereby bringing the feed rolls to or from each other to permit greater or lesser amounts of coating on the web to pass through.

The excess coating then runs down and is collected by trough 15 which prevents the coating from running into the bearings and also acts as a reservoir from which the coating is recirculated to the pipes 11, 11', by circulating pump 16. A valve 17 may control the supply of coating material that is allowed to flow from pipes 11, 11', or the pump 16 may be controlled to vary this supply as required. In some cases it is necessary to stabilize or equalize the pull on the web as it comes from the coater. In such cases, I propose to substitute sprockets 40' for rolls 18, 18'. The sprockets as shown in Figure 3 and numbered 40' carry chain 41 supporting clamps 42 between parallel tracks 43 which cause the clamps 42 to engage and disengage the bottom edge of the web to stabilize the pull adjacent the rolls. The chain 41 is motivated in trough 15. The stabilizing mechanism is only required with certain types of coating where a relatively strong pull must be exerted to prevent sagging and to assist same through the coating rolls 10, 10'. The selvage is an important element and is obtained by the regulation of the height of the pipes 11, 11', with respect to the height of the rolls 10, 10', and web 1. In other words, if a two inch uncoated edge is desired the pipes 11, 11', are adjusted through universals 25, 25', so that the coating will flow and strike either the rolls 10, 10', sufficiently low down to leave a margin on the rolls so as not to coat the web 1 passing between the rolls 10, 10', two inches from the top. Pipe 19 with valve 20 supplies the dip tank 7. It should be noted with the form of coater shown in Figure 1 that the web 1 is unwound in the usual horizontal position. In Figure 2, however, a modified form is shown wherein the web 1 is unwound while being supported on its side or end in the vertical position. For instance, paper web 1 passes around feed rolls 3' and 4', thence around roll 5' and between feed rolls 10, 10'. The pipes 11, 11' flood rolls 10, 10' in a similar manner as previously described and the balance of the apparatus is the same as shown in Figure 1.

If desired, tanks (not shown in the drawings) may also be utilized to feed pipes 11, 11', by gravity with recirculation by pump 16 to the supply tanks.

Valves in the lines leading to pipes 11, 11', can

be used to cut off or control the supply. Rolls 10, 10', are run as ordinary squeeze rolls being set slightly wider than the paper whereby the coating is carried in the nip, coating both sides of the paper uniformly. The excess coating supplied at the top of the rolls or adjacent the top of the web 1 runs down the rolls into trough 15 which prevents the coating from getting in the bearings driving mechanism. Rolls 10, 10', run slightly faster than pull rolls 3, 4, and 3', 4', in order to supply the proper tension on the side between rolls 3, 4, and 3' and 4', and rolls 10, 10'. The coated web after passing rolls 10, 10', passes under a track 21 which latter serves to spread clamps 22 carried by chain 23, supported by sprockets 24. The clamps 22 have their jaws spread sufficiently to pass onto track 21 and over the edge of the paper and as they leave the track 21 the jaws drop and grip the uncoated selvage to transport it into the dryer or for further processing. In this manner web 1 can be handled without damage and a high speed coating may be applied simultaneously to both sides.

The use of vertical coating rolls have certain advantages over the usual horizontal type. The coating is continuously flowing down the rolls from the pipe feed at the top and the amount of coating can be regulated so that only a comparatively small excess of coating over that required by the web is exposed to the air.

On many coatings where there are highly volatile materials such as naptha or some of the alcohols, it is desirable that as little coating be exposed to the air as possible. This method therefore reduces the amount of coating exposed to evaporation and by returning the excess coating from the bottom of the rolls to the main tank where it is agitated a continuous supply of fresh uniform coating material is always applied to the travelling web.

This method also tends to carry away dirt or other foreign particles or loose particles of the fabric which normally cause trouble in roll coaters, this material being strained out of the coating in returning it to the tank. On the ordinary horizontal coating the web leaves the rolls with a series of fine ribs. With the web in the horizontal position there is apparently little tendency for these ribs to flow out. When the web, however, is run in the vertical position there is more tendency for these ribs to flow together and even up the coating. It is therefore possible to obtain with many materials a smoother coating than on a horizontal coater.

With the rolls in the vertical position and an equal amount of coating applied to each side of the web a more uniform application of the coating to each side of the web is obtained than on horizontal coaters where there is frequently a tendency to apply an excess coating on one side of the web over the other. This heavy tendency, frequently showing up on the bottom side of the web.

It will thus be seen that a simple form of coating apparatus may be utilized for simultaneously coating both sides or one side of a web of paper wherein the coating may be controlled, wherein a selvage may be left uncoated to permit of the handling of the web, and wherein coating substances may be utilized that have heretofore been with difficulty applied or wherein only one side could be coated at a time because of the tacky condition while drying or the time required for oxidation.

What I claim is:

1. A roll coating device for coating a solid web of material, comprising two rolls at an angle to the horizontal with said solid web of material passing between said rolls, means for emitting a coating material on said rolls, means for adjusting the distance between said rolls to control the depth of coating applied to said material.

2. A coating machine for coating paper, fabric and leather, two parallel vertical coating rolls, means for passing said material between said roll, means for flowing the coating upon said material and rolls adjacent to the points of passage of said material between said rolls, means for adjusting the distance between said rolls and the quantity of coating material to control the depth of coating applied to the material being coated.

3. In a coating machine, two vertical coating rolls, means for passing a web of material between said rolls, means for flowing the coating material upon said web and rolls adjacent to the points of passage of said web between said rolls, and means for adjusting the point of flow with respect to the distance from the top of said vertical rolls to provide an uncoated margin of predetermined width.

4. In a coating machine, two parallel vertical coating rolls adjustable in parallel relationship to provide a predetermined nip, means for passing a web of material between said rolls, means for flowing a predetermined quantity of coating material at a predetermined height upon each roll adjacent to the points of passage of said web between said rolls to provide an uncoated margin of relatively small width as a means of handling the roll of web material.

5. In a coating machine, two vertical cooperating coating rolls with a web of material passing therebetween, said rolls in parallel spaced relationship, means for adjusting the spaced relationship between said rolls and means for controlling the quantity of coating allowed to flow upon the rolls to control the depth of coating upon the material in its passage between the coating rolls.

6. In a coating machine, two vertical coating rolls with a roll of material unwinding to pass therebetween, means for flowing coating upon the rolls at the nip in an excess amount, means for draining off the excess from the rolls, means for adjusting the rolls towards and from each other to regulate the depth of coating, means for controlling the speed of said rolls, and means for regulating the rate of flow of coating material.

7. In a machine, vertical coating rolls, means for flowing coating material upon both sides of a web adjacent the nip of the said rolls to leave a margin of uncoated web and to permit the coating to flow down the web for said rolls to coat the balance of the web on both sides, and means for supporting the web by the uncoated portion after coating for further processing.

CHARLES C. WILLIS.