Nov. 23, 1937. M. J. CONKLIN 2,100,068

COATING APPARATUS

Original Filed April 11, 1932 2 Sheets-Sheet 1

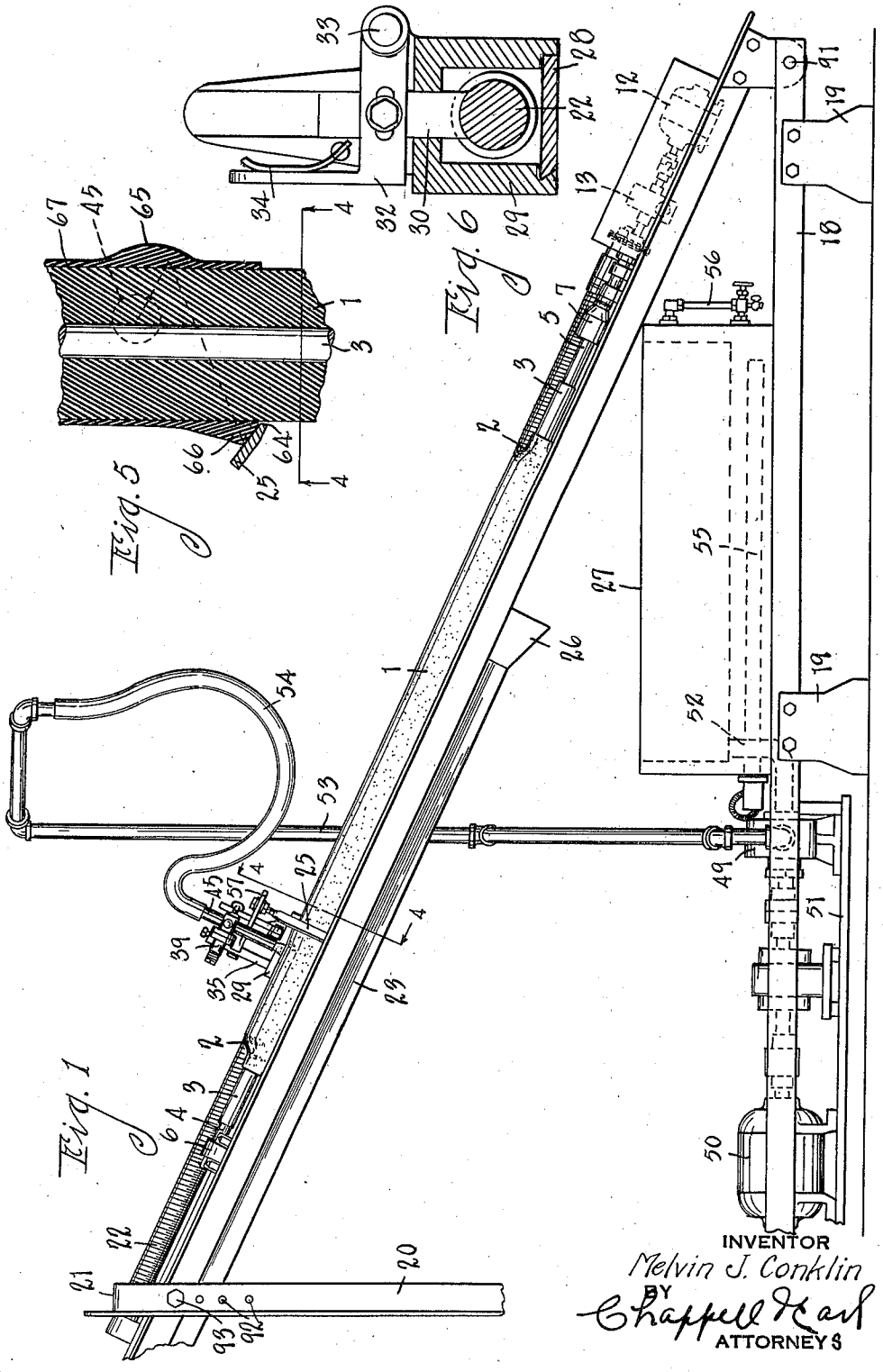

Fig. 1

Fig. 5

Fig. 6

INVENTOR
Melvin J. Conklin
BY
Chappell & Earl
ATTORNEYS

Nov. 23, 1937. M. J. CONKLIN 2,100,068

COATING APPARATUS

Original Filed April 11, 1932 2 Sheets-Sheet 2

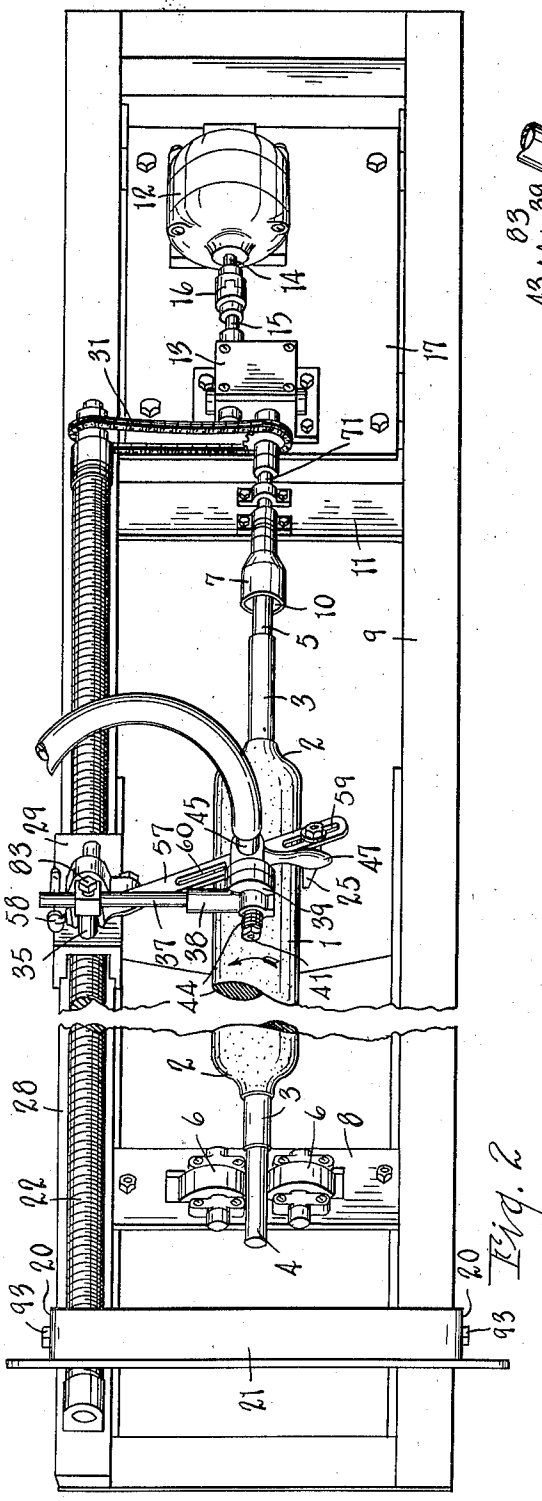

Fig. 2

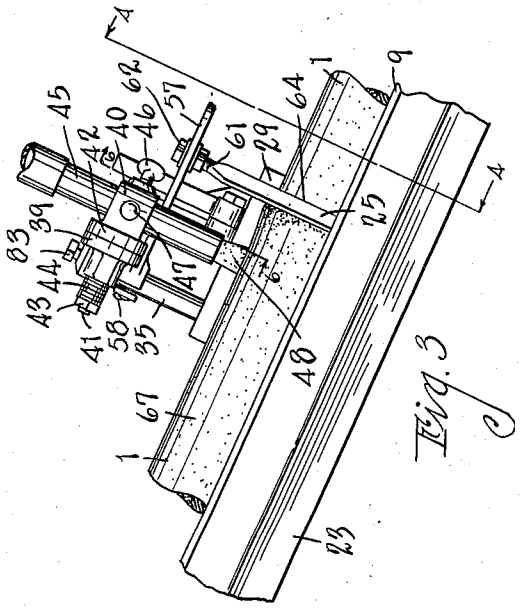

Fig. 3

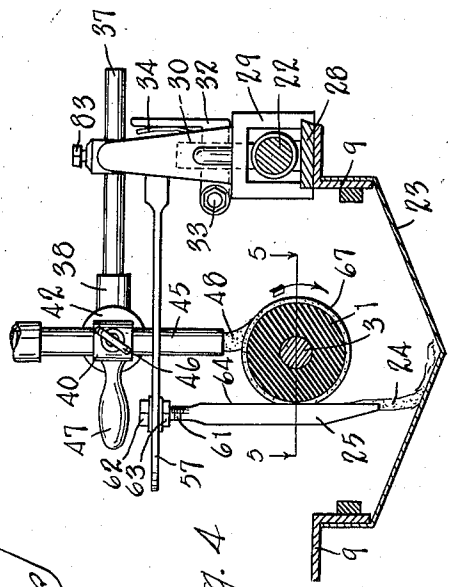

Fig. 4

INVENTOR
Melvin J. Conklin
BY
Chappell & Earl
ATTORNEYS

Patented Nov. 23, 1937 2,100,068

UNITED STATES PATENT OFFICE

2,100,068

COATING APPARATUS

Melvin J. Conklin, Kalamazoo, Mich., assignor to Sam'l. Bingham's Son Mfg. Co., Chicago, Ill., a corporation of Illinois

Substitute for application Serial No. 604,412, April 11, 1932. This application March 23, 1933, Serial No. 662,226

27 Claims. (Cl. 91—43)

This application is a substitute for my pending application Serial No. 604,412, filed April 11, 1932, for Apparatus for and method of coating inking cylinders and the like.

The main objects of this invention are:

First, to provide an improved apparatus for coating inking cylinders or rolls and the like.

Second, to provide an apparatus by means of which cylinders such as inking cylinders may be very quickly and economically coated while maintaining uniform diameter throughout.

Third, to provide an apparatus of this character wherein a flow-retarding member is arranged in spaced relation to the roll or cylinder to improve the operation thereof.

Fourth, to provide an apparatus of this character having improved means for collecting the excess coating material.

Fifth, to provide improved means for manually adjusting the transverse position of the flow nozzle relative to the roll or cylinder to be coated.

Sixth, to provide an apparatus having the above desirable features and characteristics which is simple and economical in its parts and effective and efficient in operation.

Seventh, to provide a method of coating inking cylinders and the like which avoids the necessity of heating or bringing the cylinders to a predetermined temperature, and at the same time produces highly satisfactory results with a minimum of care or attention on the part of the operator.

Objects relating to details and economies of my invention will appear from the description to follow. The invention is defined and pointed out in the claims.

A structure which is a preferred embodiment of my invention is illustrated in the accompanying drawings, in which:

Fig. 1 is a fragmentary view in side elevation of a coating apparatus embodying the features of my invention.

Fig. 2 is an enlarged fragmentary top plan view.

Fig. 3 is an enlarged fragmentary view in side elevation.

Fig. 4 is an enlarged detail section on a line corresponding to line 4—4 of Figs. 1, 3, and 5, the thickness of the coating being exaggerated for purposes of illustration.

Fig. 5 is an enlarged fragmentary detail section on a line corresponding to line 5—5 of Fig. 4, showing the flow-retarding member in operation, the thickness of the coating material on the roll being exaggerated for purposes of illustration.

Fig. 6 is a detail section on line 6—6 of Fig. 3.

In the structure illustrated by the drawings, numeral 1 indicates the inking roll or cylinder of a printing press or the like having beveled ends 2 and a central shaft 3, the ends 4 and 5 of which project beyond the ends of the roll proper. The roll or cylinder is supported in an inclined position by the upper pair of bearing rollers 6, 6 and the lower chuck 7. The bearing rollers are carried by the transverse member 8 of the inclined support 9 which is in the form of a rectangular frame, the frame being inclined to the horizontal as illustrated by Figs. 1 and 3. The member 8 is adjustable longitudinally of the support to accommodate rolls of different length. The chuck 7 has a conical socket 10 for receiving the lower end 5 of the shaft 3 of the cylinder or roll 1 to be coated.

The chuck is carried by the shaft 71 which is journaled to the lower transverse member 11 of the frame 9 and is connected to the electric motor 12 by means of speed reducing gears in the gear box 13, the shaft 14 of the motor being connected to the shaft 15 of the speed reducing gears by means of the clutch 16. The motor and gear box are mounted on the panel 17 which is in turn mounted on the frame 9. The frictional engagement of the lower end 5 of the shaft of the cylinder or roll with the conical socket 10 of the chuck is sufficient to cause the shaft to be rotated with the chuck. With the parts thus arranged, it will be apparent that the inking rolls or cylinders may be readily placed in and removed from the apparatus and that variations in the size of the rolls or cylinders, and the length and diameter of the shaft are provided for. The bearing rollers 6 provide a centering support for the upper end 4 of the roll or cylinder shaft.

The frame 9 is pivotally mounted at 91 on a substantially horizontal platform 18 which is held in elevated position by means of the legs 19. The upper end of the inclined frame 9 is supported on the platform 18 by means of the uprights 20, the upper ends of the latter being connected by the cross member 21 which is disposed above the slide actuating screw 22. To permit adjustment of the inclination of the frame, the uprights 20 have aligned pin holes 92 for receiving the cross pin 93 which carries the frame.

The trough 23 is carried by the frame 9 in substantially parallel relation to the axis of the roll or cylinder and under the latter for receiving excess coating material 24 from the blade-like dam or retarding member 25 which is preferably tapered at its lower end. The lower end of the drain trough is provided with a flared down spout

26 for delivering the excess coating material to the water-jacketed pan or tank 27 which is arranged on the platform 18. The excess of composition dropping off the roll after the nozzle has passed below the lower end of the trough 23 passes directly to the tank 27.

At one side of the supporting frame, I mount a slideway 28 in substantially parallel relation to the axis of the roll or cylinder to be coated. The carriage or slide 29 travels on this way and is provided with a segmental nut 30, the lower end of which is adapted for coaction with the driving screw 22. The lower end of the driving screw is connected to the shaft 71 carrying the chuck 7 by means of sprockets and the chain or belt 31 so that as the roll or cylinder is rotated, the carriage or slide is moved downwardly.

The segmental nut 30 is mounted on the slide 29 for vertical adjustment by means of the bell crank lever 32 which is pivoted to the carriage at 33 and is held in inoperative position by the leaf spring 34. With the parts thus arranged, when the carriage reaches the end of its stroke at the lower end of the cylinder or roll, it may be quickly retracted by manually moving the bell crank lever 32 against the force of the leaf spring 34 to lift the segmental nut 30 out of engagement with the driving screw 22 and sliding the carriage back to the upper end of the screw or in any desired position.

The carriage or slide has an upright or post 35 thereon having a bore receiving the transverse arm 37. The arm is longitudinally and rotatably adjustable on the post and is held in adjusted position by means of the set screw 83. At its outer end the arm is provided with a bracket 38 which is provided with a socket receiving the end of the arm.

The bracket has a stationary abutment 39 arranged with its face in substantially parallel relation to the axis of the arm. The nozzle support 40 is provided with a shank 41 which is journaled to the bracket 38 and has a movable abutment 42 facing the stationary abutment 39. A nut or cap 43 is threaded to the end of the shank 41 and constitutes an outer thrust member for the compression spring 44 which is arranged between it and the bracket 38. The compression spring 44 acts to urge the movable abutment into frictional engagement with the stationary abutment whereby to hold the nozzle support in any adjusted position relative to the bracket.

The nozzle support 40 has an opening through which the nozzle 45 is arranged for vertical adjustment, the nozzle being secured in adjusted position by means of the set screw 46. The nozzle support is provided with a handle 47 extending at substantially right angles to the axis of the movable abutment whereby the nozzle can be manually adjusted relative to the roll or cylinder disposed thereunder. When it is desired to retract the slide or carriage, the handle 47 is manipulated to throw the nozzle 45 in such position that the stream 48 of coating material flowing therefrom clears the previously coated roll or cylinder. The handle 47 is also used to adjust the nozzle to vary the transverse position of the stream 48 of coating material relative to the cylinder or roll.

Coating material is supplied to the nozzle 45 from the tank 27 by means of the pump 49 which is driven by the electric motor 50, the pump and motor being mounted on the panel 51 which is in turn carried by the platform 18. The pump is connected to the interior of the tank 27 by the conduit 52 and to the nozzle 45 by means of the upright pipe 53 and the flexible pipe 54, the arrangement being such that the carriage or slide 29 is free to move to the ends of its stroke without interference. The bottom of the tank or pan 27 is provided with an electrical heating element 55 for maintaining the temperature of the coating material contained therein. The glass tube 56 is provided at the end of the tank for indicating the level of the water jacket surrounding the tank.

The upright 35 of the slide carries an arm 57 which is pivotally and vertically adjustable thereon and secured in its adjusted position by means of the set screw 58. This arm 57 is provided with spaced longitudinal slots 59 and 60 for receiving the shank 61 of the blade-like dam or retarding member 25. The shank 61 is threaded to receive the nuts 62 and 63 disposed above and below the arm 57 for clamping engagement therewith. The blade is disposed tangentially of the roll or cylinder to be coated with its edge 64 adjacent to but preferably in slightly spaced relation to the side of the roll as illustrated by Figs. 4 and 5. By means of the spaced longitudinal slots 59 and 60 in the arm 57, the flow-retarding member 25 may be disposed on either side of the roll or cylinder. By means of the clamping nuts 62 and 63, the transverse axis of the blade may be adjusted in any desired angular position relative to the axis of the roll or cylinder. By way of example, the blade 25 is shown with its transverse axis arranged at an angle of about forty-five degrees with the axis of the roll or cylinder 1.

The retarding member 25 is disposed in advance of the nozzle 45 so as to retard the natural flow of the coating liquid 65 which is discharged upon the roll or cylinder by the nozzle. The retarding member and nozzle both being mounted on the carriage, they travel together in whatever relation they may have been adjusted.

The coating composition or material is discharged upon the roll or cylinder in a free and unrestricted stream 48, preferably at one side of the vertical plane passing through its axis (see Fig. 4) and so that the surface of the roll or cylinder upon which the material is discharged is traveling downwardly as illustrated by the arrow. The retarding member is disposed on the side of the roll opposite the nozzle 45 and so that the surface of the roll or cylinder adjacent the retarding member is traveling upwardly. The result is that the retarding member serves to dam up or hold back the coating material as indicated at 66 so that the final coating indicated at 67 is very uniform in thickness and the coated roll is of uniform diameter from end to end.

As the stream of coating material is poured upon the downwardly moving side of the roll or cylinder, it tends to form a thickened body as indicated at 65 which tends to flow vertically downward under the roll or cylinder, but this action is anticipated by the direction of travel of the roll in the same direction so that the thickened body of coating material is delivered to the retarding member 25 shortly after the coating composition starts its upward travel. The retarding member thereupon acts temporarily to restrain the excess material 24 upon the roll, leaving the evenly distributed coating 67 on the roll or cylinder. It is believed that this damming or temporary retention of the excess of coating fluid by the blade 25 results in a more even deposit, the

excess which is not deposited draining from the roll.

A further advantage is that by this apparatus the rolls may be coated while cold, it heretofore having been deemed necessary to heat the rolls to a predetermined temperature in order to provide a coating even approximating uniformity. Such coatings required great care and skill. With my apparatus, however, a uniform coating may be had with a minimum of attention.

Suitable coating compositions are well known in this art and therefore I do not specify the particular compositions as my apparatus is well adapted for applying the coating compositions now in use as stated. Such coatings may be applied and substantially perfect rolls, that is, rolls of uniform diameter, are secured.

In the operation of my apparatus, the roll 1 to be coated is placed with the lower end 5 of its shaft 3 in the conical socket 10 of the chuck 7 and the upper end 4 of the shaft is placed between the roller bearings 6. The nozzle 45 and retarding member 25 are then adjusted in position relative to the roll 1. The electric motors 12 and 50 are set in operation and the carriage is moved by the driving screw 22 from the upper to the lower end of the roll. At the same time, the pump 49 delivers the coating material from the tank 27 to the nozzle 45, the latter discharging the free and unrestricted stream 48 of coating material directly upon the downwardly moving side of the roll as the carriage advances. On the opposite or upwardly moving side of the roll and in advance of the nozzle with respect to the direction of travel of the carriage, the retarding member 25 acts to uniformly distribute the coating material on the roll, the lower end of the retarding member, preferably tapered, directing the excess coating material 24 to the trough 23 which returns such material to the tank 27.

When the operation of coating the roll or cylinder is completed, the handle 27 is manipulated so that the nozzle 45 throws the stream 48 of coating composition clear of the roll or cylinder and the arm 57 is swung so as to throw the retarding member 25 clear of the roll or cylinder. The segmental nut 30 is then elevated by means of the bell crank 32 to disengage its lower end from the driving screw 22 and the carriage is retracted to its initial position. The inking cylinder or roll is readily removed from the apparatus by merely lifting it out of the conical socket 10 of the chuck.

While my improvement is simple and economical in its parts, nevertheless it greatly increases the scope and usefulness of coating apparatus, insuring as it does a uniform coating on the roll or cylinder.

While I have found the arrangement and process specifically described in the specification to be the most satisfactory, nevertheless, I am not to be considered as limited to such specific arrangement and process, at least in the broader aspect of the invention.

I have illustrated and described my improvements in an embodiment which I have found very practical. I have not attempted to illustrate or describe other embodiments or adaptations, as it is believed this disclosure will enable those skilled in the art to embody or adapt my improvements as may be desired.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. Apparatus for coating a roll or cylinder, the combination of means for supporting and rotating the roll or cylinder to be coated in an inclined position, a coating fluid discharge nozzle traveling in a line parallel to the axis of the roll or cylinder and adapted to discharge the coating material directly upon the surface of the roll or cylinder so that the surface receiving the coating material travels downwardly, the coating material at the point of contact with the roll or cylinder being unconfined, and a flow-retarding member traveling at substantially the same speed as said nozzle and positioned in advance thereof and in spaced coacting relation to the roll or cylinder and remote from the point of contact of the coating material from the nozzle with the cylinder or roll and in such relation that the surface of the roll over which the flow retardation is effected travels upwardly.

2. Apparatus for coating a roll or cylinder, the combination of means for supporting and rotating the roll or cylinder to be coated in an inclined position, a discharge nozzle traveling in a line parallel to the axis of the roll or cylinder and adapted to discharge coating material directly upon the surface of the roll or cylinder so that the surface receiving the coating material travels downwardly, the coating material at the point of contact with the roll or cylinder being unconfined, and a flow-retarding member traveling at substantially the same speed as said nozzle and positioned in advance thereof and in coacting relation to the roll or cylinder and remote from the nozzle and in such relation that the surface of the roll over which the flow retardation is effected travels upwardly.

3. Apparatus for coating a roll or cylinder, the combination of a discharge nozzle traveling in a line parallel to the axis of the roll or cylinder and adapted to discharge coating material directly upon the surface of the roll or cylinder so that the surface receiving the coating material travels downwardly, the coating material at the point of contact with the roll or cylinder being unconfined, and a flow-retarding member traveling in advance of said nozzle and in coacting relation to the roll or cylinder and remote from the point of contact of the coating material with the cylinder or roll and in such relation that the surface of the roll over which the flow retardation is effected travels upwardly.

4. Apparatus for coating a roll or cylinder, the combination of means for supporting and rotating the cylinder or roll to be coated in an inclined position, means for discharging coating material upon the roll or cylinder in an unrestricted stream, said last named means comprising a nozzle adapted to travel parallel to the axis of the roll or cylinder and disposed to discharge the coating material upon the roll or cylinder so that the surface receiving the coating material travels downwardly, and a retarding member disposed in spaced relation to the roll so that the surface over which the retardation of the coating material is effected travels upwardly.

5. In a coating apparatus of the class described, the combination of means for discharging coating material upon an inclined roll or cylinder in an unrestricted stream, said means comprising a nozzle adapted to travel parallel to the axis of the roll or cylinder and disposed to discharge the coating material upon the roll or cylinder so that the surface receiving the coating material travels downwardly, and a retarding member disposed in relation to the roll so that the surface over which the retardation of the coating material is effected travels upwardly.

6. In a coating apparatus of the class described, the combination of means for discharging coating material upon an inclined roll or cylinder in an unrestricted stream, said means comprising a nozzle adapted to travel parallel to the axis of the roll or cylinder and disposed to discharge the coating material upon the roll or cylinder so that the surface receiving the coating material travels downwardly, and a retarding member having an edge disposed in coacting relation to the roll so that the surface over which the retardation of the coating material is effected travels upwardly.

7. A coating apparatus for inking rolls and the like, comprising means for supporting and rotating the roll to be coated in an inclined position, means for discharging coating material upon said roll comprising a nozzle traveling in a plane parallel to the axis of the roll and disposed to discharge coating material upon the roll at one side of the longitudinal center thereof so that the surface of the roll at the point of discharge is traveling downwardly, and a blade-like retarding member pointed at its lower end disposed vertically and tangentially of the roll and opposite to and in advance of the point of discharge of the coating material upon the roll, said retarding member being disposed so that the surface of the roll adjacent the retarding member travels upwardly.

8. The combination with traveling means for flowing a liquid coating material upon an inclined rotating roll, of means carried by said traveling means for retarding the natural flow of the composition on the roll including an arm moving with said traveling means, and a vertical blade adjustably secured to said arm for coaction with the roll as the latter rotates and the blade is moved parallel to the axis thereof.

9. The combination with means for flowing a liquid composition upon an inclined rotating roll, of means for retarding the natural flow of the composition on the roll including an arm moving with said liquid applying means, and a flow retarding member adjustably secured to said arm for coaction with the side of the roll as the latter rotates and the blade is moved parallel to the axis thereof.

10. Apparatus for coating a roll or cylinder, the combination of means for supporting and rotating the roll or cylinder to be coated in an inclined position, a coating fluid discharge nozzle traveling in a line parallel to the axis of the roll or cylinder and adapted to discharge the coating material directly upon the surface of the roll or cylinder, the coating material at the point of contact with the roll or cylinder being unconfined, and a flow retarding member traveling at substantially the same speed as said nozzle and positioned in advance thereof and in spaced coacting relation to the roll or cylinder and remote from the point of contact of the coating material from the nozzle with the cylinder or roll.

11. Apparatus for coating a roll or cylinder, the combination of means for supporting and rotating the roll or cylinder to be coated in an inclined position, a discharge nozzle traveling in a line parallel to the axis of the roll or cylinder and adapted to discharge coating material directly upon the surface of the roll or cylinder, the coating material at the point of contact with the roll or cylinder being unconfined, and a flow retarding member traveling at substantially the same speed as said nozzle and positioned in advance thereof and in coacting relation to the roll or cylinder and remote from the nozzle.

12. Apparatus for coating a roll or cylinder. the combination of a discharge nozzle traveling in a line parallel to the axis of the roll or cylinder and adapted to discharge coating material directly upon the surface of the roll or cylinder so that the surface receiving the coating material travels in one vertical direction, the coating material at the point of contact with the roll or cylinder being unconfined, and a flow-retarding member traveling in advance of said nozzle and in coacting relation to the roll or cylinder and remote from the point of contact of the coating material with the cylinder or roll and in such relation that the surface of the roll over which the flow retardation is effected travels in the opposite vertical direction.

13. In a coating apparatus of the class described, the combination of means for discharging coating material upon an inclined roll or cylinder in an unrestricted stream, said means comprising a nozzle adapted to travel parallel to the axis of the roll or cylinder and disposed to discharge the coating material upon the roll or cylinder so that the surface receiving the coating material travels in one vertical direction, and a retarding member having an edge disposed in coacting relation to the roll so that the surface over which the retardation of the coating material is effected travels in the opposite vertical direction.

14. Apparatus for coating inking rolls and the like, comprising means for supporting and rotating the roll to be coated in an inclined position, means for pouring an unrestricted stream of coating material upon said roll comprising a nozzle traveling in a plane parallel to the axis of the roll and disposed to discharge coating material directly upon the roll, and a blade-like retarding member disposed at an angle to the axis of the roll and having a portion adjacent the outer periphery of the roll and in advance of the point of discharge of the coating material upon the roll.

15. In a roll coating apparatus, the combination with means for supporting and rotating a roll to be coated in an inclined position, of a carriage traveling in a plane parallel to the axis of the roll, a coating fluid discharge means adapted to pour coating material upon the roll in a uniform unrestricted stream, and a flow retarding member carried by said carriage and positioned in advance of said coating material discharge means at the side opposite said stream and acting to control the flow of the coating material longitudinally of the roll.

16. A roll coating apparatus provided with traveling means for pouring a free stream of coating fluid upon an inclined rotating roll, the traveling means moving from the upper to the lower end of the roll during its delivery stroke, and a flow retarding member carried by said traveling means and movable longitudinally of and adjacent the roll in spaced relation to and in advance of the stream of the coating fluid.

17. A roll coating apparatus comprising means for rotating a roll to be coated on its axis in an inclined position, a dam traveling longitudinally of the roll and disposed tangentially thereof and so that the surface of the roll adjacent the dam travels upwardly, and means for pouring a free stream of fluid coating material upon said roll at a point at the rear of said dam.

18. A roll coating apparatus comprising means for rotating a roll to be coated on its axis in an inclined position, a dam traveling longitudinally of the roll, and means for pouring a free stream of fluid coating material upon said roll at a point

angularly removed from and at the rear of said dam.

19. A coating apparatus for inclined inking rolls and the like comprising a nozzle traveling in a plane parallel to the axis of the roll to be coated and adapted to deliver a free stream of coating fluid to one side of the roll, and a blade-like retarding member pointed at its lower end disposed vertically and tangentially at the other side of the roll to be coated and in advance of the said nozzle for controlling the natural flow of the coating fluid on the surface of the inclined roll.

20. A coating apparatus for inclined inking rolls and the like comprising a nozzle traveling in a plane parallel to the axis of the roll to be coated and adapted to pour a free stream of the coating fluid directly on the roll, and a blade-like retarding member disposed tangentially of the roll to be coated and in angular relation to and in advance of the said nozzle for controlling the natural flow of the coating fluid on the surface of the inclined roll.

21. A roll coating apparatus for inclined rolls, comprising a carriage, a coating fluid discharge means carried by said carriage and adapted to pour a free stream of the coating fluid directly on the roll, and a flow retarding member carried by said carriage and positioned in angular relation to and in advance of said coating material discharge means for controlling the natural flow of the coating fluid on the surface of the inclined roll.

22. The method of applying a coating of uniform thickness to an inking roll or the like, comprising rotating an unheated roll to be coated in an inclined position, pouring fluid coating material thereon in a free stream moving longitudinally of the roll and beginning at the upper end thereof, and retarding the natural flow of the coating material longitudinally of the cylinder.

23. The method of applying a coating of uniform thickness to an inking roll or the like, comprising rotating a roll to be coated in an inclined position, pouring fluid coating material thereon in a free stream moving longitudinally and at one side of the roll and beginning at the upper end thereof, and retarding the natural flow of the coating material longitudinally and at the other side of the cylinder.

24. The method of applying coating to an inking roll or the like which comprises rotating the roll to be coated in an inclined position, pouring a free stream of coating fluid thereon, moving the point of application of said coating to said roll downwardly along the latter and damming the natural flow of the composition longitudinally of the roll at a point in advance of and angularly spaced from said stream.

25. The method of applying coating to an inking roll or the like which comprises rotating an unheated roll to be coated in an inclined position, pouring a free stream of coating fluid thereon, moving the point of application of said coating to said roll downwardly along the latter and damming the natural flow of the composition longitudinally of the roll at a point in advance of and angularly spaced from said stream.

26. In a machine of the character described, the combination of means for supporting a roller in inclined position with respect to the horizontal, a nozzle for directing a stream of molten composition onto the surface of said roller in excess of the quantity required to form a coating thereon, means for rotating said roller and effecting relative movement between the roller and nozzle in a direction longitudinally of the roller beginning at the upper end of the latter, and a deflector member maintained in fixed longitudinal position with respect to said nozzle and adapted to contact the roller surface a short distance in advance of the nozzle, said member acting to divert off from the roller surface any composition tending to flow by gravity beyond the member.

27. In a machine of the character described, the combination of means supporting a roller to be coated in a position to permit draining of composition along the roller in an endwise direction, means for applying composition progressively throughout the length of the roller surface and in an amount in excess of that required to form a coating of the desired thickness, and means acting mechanically in advance of the point of application to remove composition from the roller surface.

MELVIN J. CONKLIN.