

July 22, 1952

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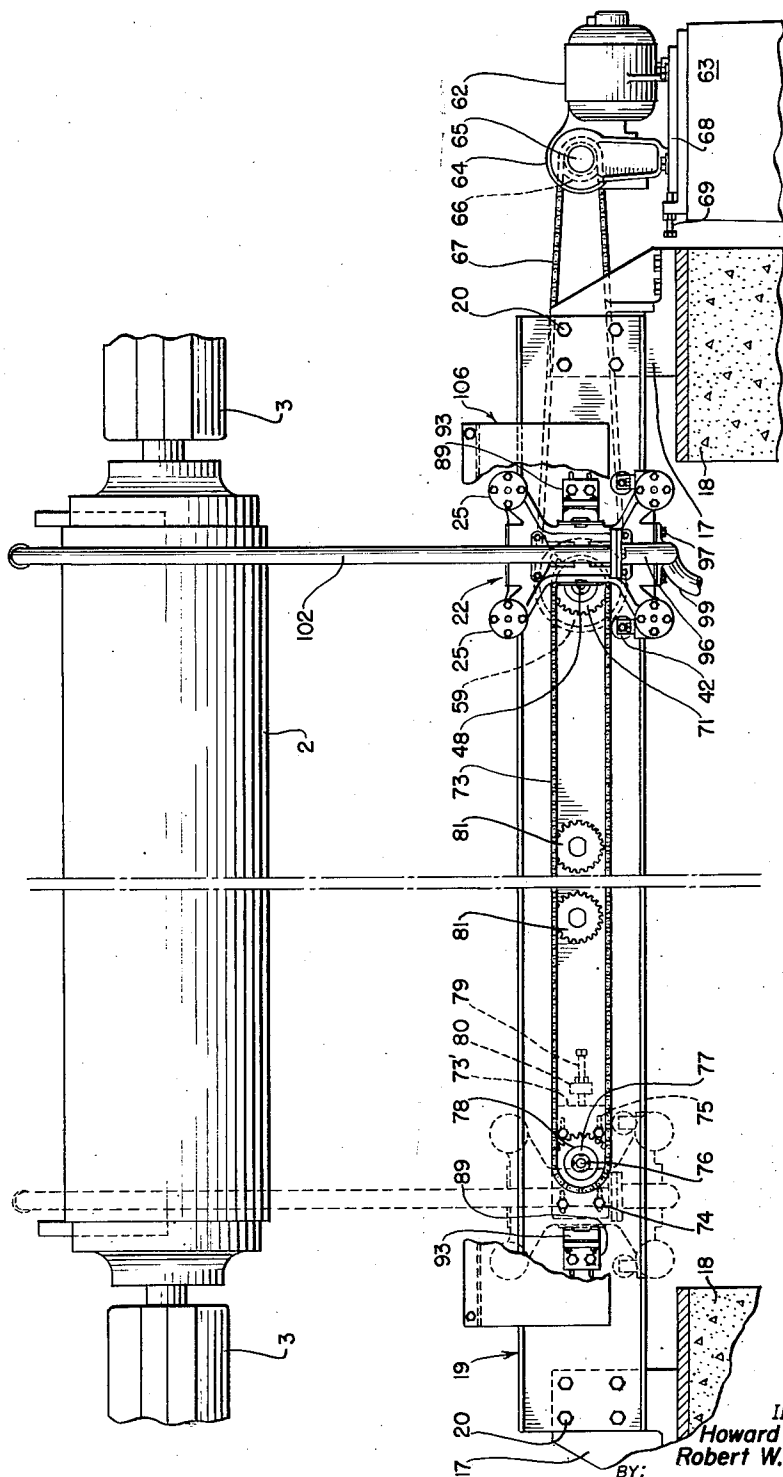
2,604,067

COATING FEED MECHANISM FOR GATE ROLLS

Filed Aug. 12, 1950

5 Sheets-Sheet 1

FIG. 1.



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5 Sheets-Sheet 2

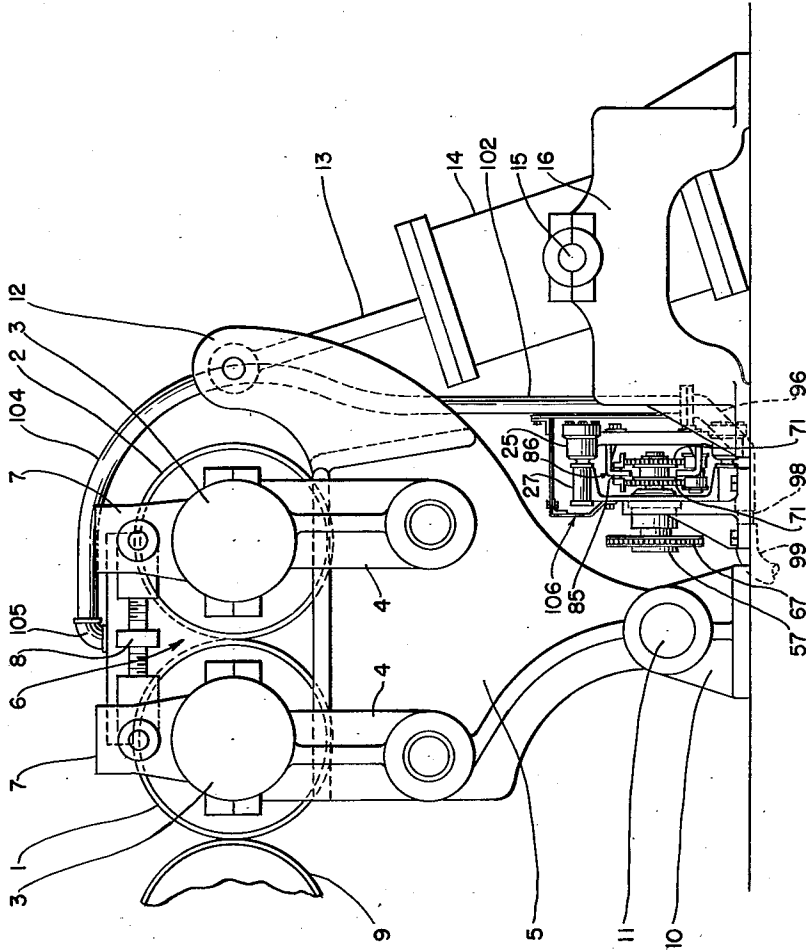


FIG. 2.

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FIG. 3.

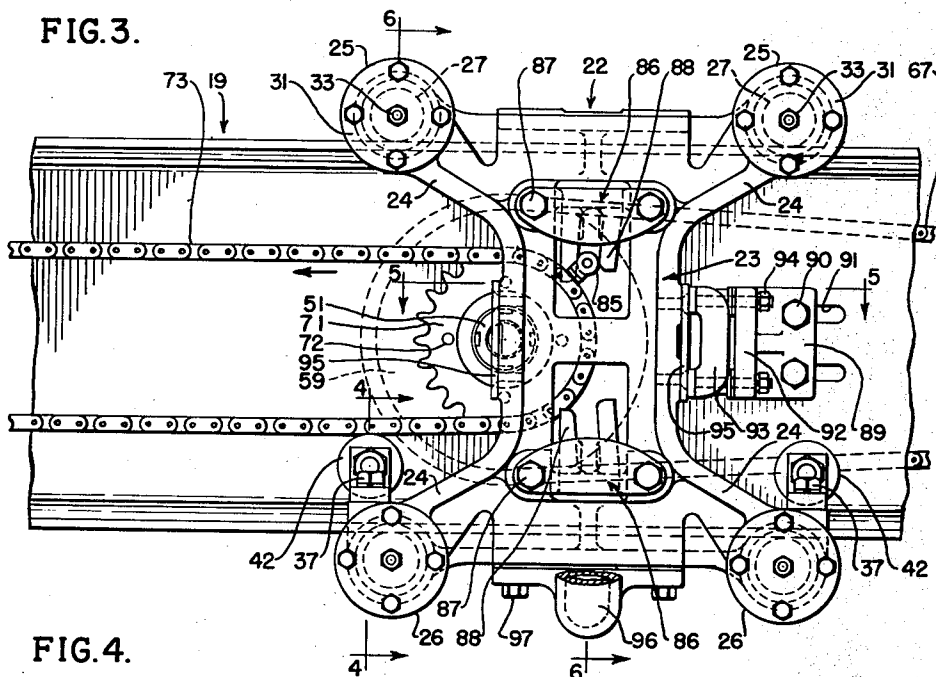


FIG. 4.

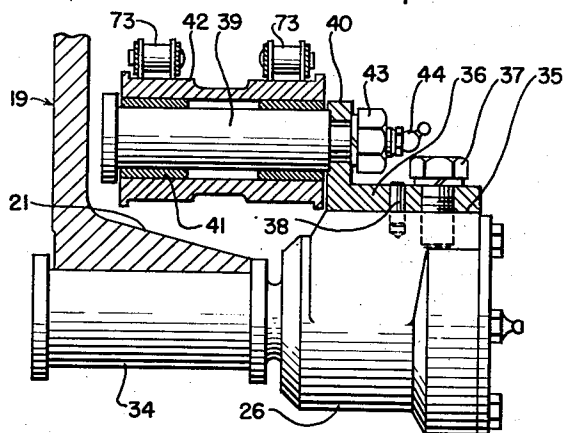
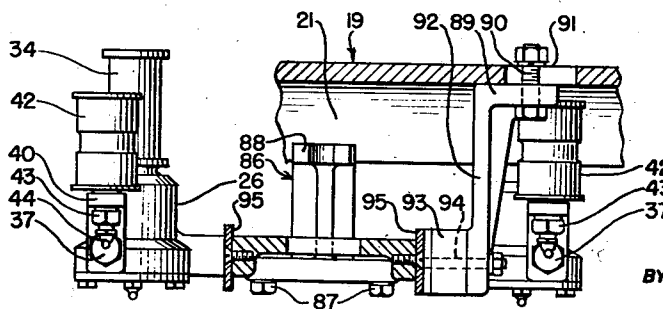


FIG. 5.



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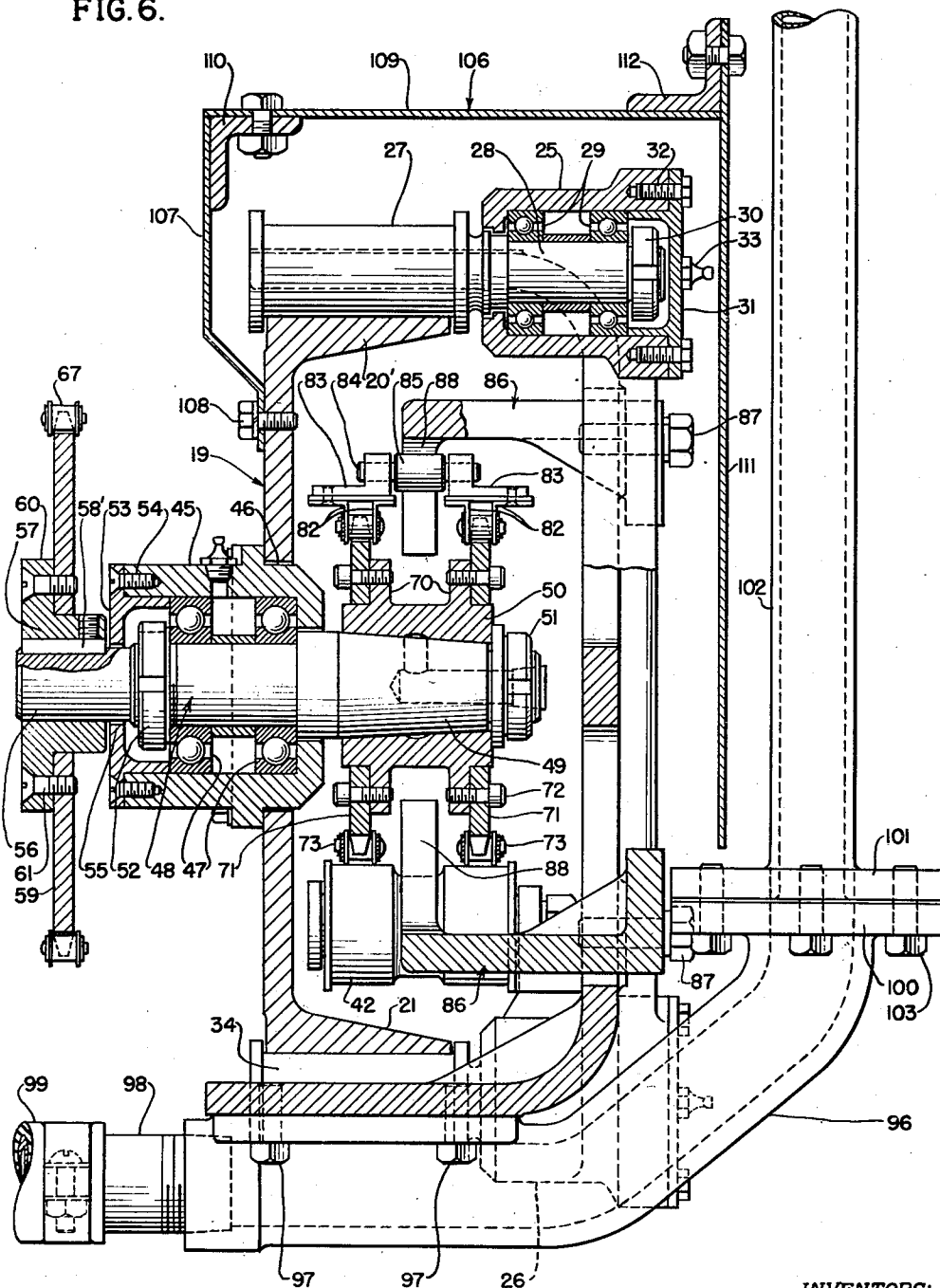
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COATING FEED MECHANISM FOR GATE ROLLS

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FIG. 6.



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FIG. 7.

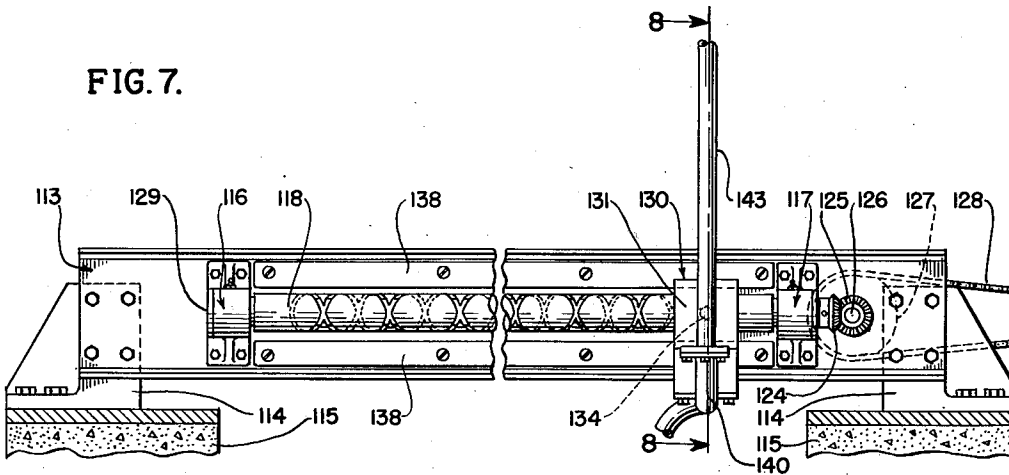


FIG. 8.

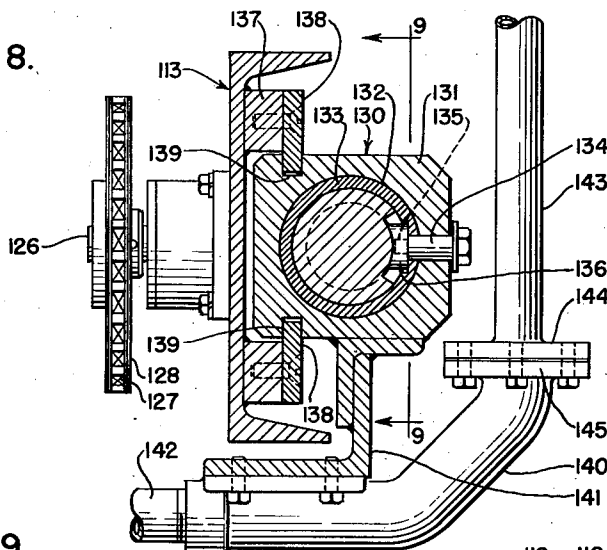
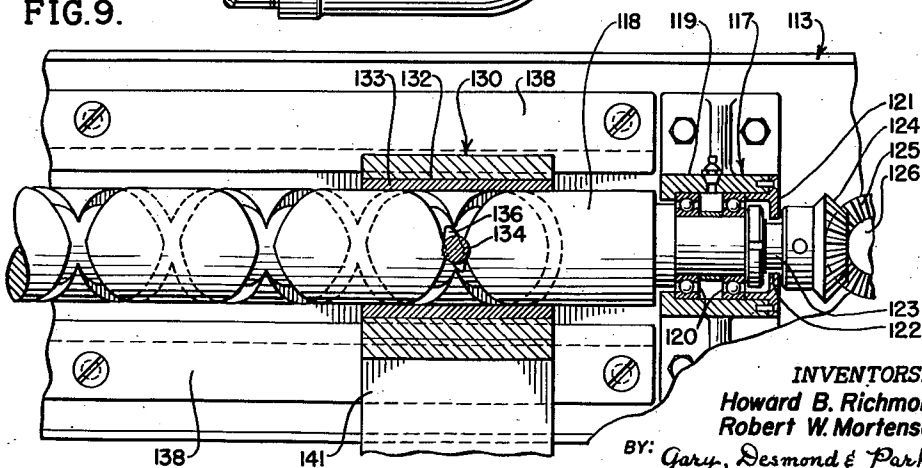


FIG. 9.



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UNITED STATES PATENT OFFICE

2,604,067

COATING FEED MECHANISM FOR GATE ROLLS

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Application August 12, 1950, Serial No. 179,076

10 Claims. (Cl. 118-259)

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This invention relates to improvements in apparatus for the roll coating of paper, and refers particularly to means for uniformly feeding coating material to the nip of gate rolls employed in the coating apparatus.

In apparatus for applying mineral coating material to the surface of paper to improve the printing quality of the paper, such as that shown and described in Massey et al. Patents Nos. 2,105,488, January 18, 1938, and 2,105,981, January 18, 1938, gate rolls are employed to supply the mineral coating suspension to the coating-applying rolls. The gate rolls comprise essentially two juxtaposed rolls having a nip in which a bath of coating material is maintained. During operation, the rolls are rotated and their relative speed is varied to controllably feed coating material forwardly to the coating-applying rolls.

An important feature of the present invention resides in means for feeding mineral coating material to the nip of the gate rolls in such manner as to uniformly distribute the coating material through the length of the nip.

Briefly described the invention comprises means for continuously carrying a coating material feed pipe forwardly and backwardly along substantially the entire length of the nip whereby a stream of coating material is fed to the nip throughout its length.

In a specific form of the present invention a carrier is contemplated which moves in a reciprocating manner parallel to the nip, said carrier having a coating material feed pipe mounted thereon, together with means for moving the carrier characterized in that the driving means therefor is operated in only one direction while the carrier continuously reverses its direction of motion.

Other objects, advantages and important features of the invention will be apparent from the accompanying drawings and following detailed description.

In the drawings,

Fig. 1 is a side elevational view illustrating our invention employed in conjunction with conventional gate rolls.

Fig. 2 is an end elevational view of the device shown in Fig. 1.

Fig. 3 is a detailed enlarged view of the carrier for the coating material feed pipe.

Fig. 4 is a detailed sectional view taken on line 4-4 of Fig. 3.

Fig. 5 is a detailed plan sectional view taken on line 5-5 of Fig. 3.

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Fig. 6 is an enlarged sectional view of the carrier taken on line 6-6 of Fig. 3.

Fig. 7 is a side elevational view of a modification of the present invention.

Fig. 8 is a transverse sectional view taken on line 8-8 of Fig. 7.

Fig. 9 is a fragmentary sectional view taken on line 9-9 of Fig. 8.

Referring in detail to the drawings, 1 and 2 indicate a pair of gate rolls which are journaled in bearings 3 at opposite ends thereof. The bearings 3 are carried by arms 4, only one pair of which are shown, said arms, there being four of them, being journaled on opposite frame members 5, only one of which is shown. The arrangement is such that rolls 1 and 2 may be brought together in a controlled manner to provide a nip 6 which is adapted to carry a quantity of coating material. The arms 4 have extensions 7 above the bearings 3 and an adjusting screw 8 is pivotally secured at each of its ends to the extension 7 whereby the rolls 1 and 2 may be maintained in a desired relationship with respect to each other.

The gate rolls 1 and 2 comprise a portion of a paper coating machine, such as that more fully described in the patents hereinbefore identified. The roll 1 is maintained in contact with roll 9 which comprises one of the distributing rolls of the coating machine. The frames 5 are pivotally mounted upon supports 10 whereby the frames carrying the rolls 1 and 2 may be rocked about the pivot shaft 11. In this fashion roll 1 may be brought to the desired contiguous relationship with the distributing roll 9. Frame 5 is provided with an extension 12 which is pivotally connected to a piston rod 13 operating in a fluid pressure cylinder 14. The pressure cylinder 14 is journaled, as at 15 in Fig. 2, upon a support 16. The arrangement is such that by the manipulation of the piston rod 13 the frames 5 may be rocked to bring gate roll 1 into contact with the distributing roll 9. In this fashion coating material which may be carried in the nip 6 may be transferred from said nip by means of gate roll 1 to the distributing roll 9 whereby said material is eventually transferred to the coating applying roll (not shown) of the coating machine. In practice, the rolls 1 and 2 are rotated at a controlled speed with respect to each other whereby the quantity of coating material passed from the surface of gate roll 1 to the distributing roll 9 is controlled.

Positioned beneath the gate rolls 1 and 2 and spaced from each other is a pair of sup-

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porting blocks 17 which may be secured to a suitable supporting foundation 18. A channel beam 19 is secured at each of its ends by means of bolts 20 or the like to the blocks 17. As will be hereinafter more fully described, the beam 19 comprises the runway or track which supports the carrier. The beam 19 is disposed parallel to the longitudinal axes of the rolls 1 and 2.

The beam 19 is of channel iron form having an upper flange 20' and a lower flange 21 upon which a carrier 22 is movably supported. The carrier 22 comprises a frame 23 having divergently extending arms 24. Carried at the outer ends of the two upper arms 24 are bearing housings 25 and similarly carried at the outer ends of the two lower arms are bearing housings 26.

A roller 27 is mounted upon each of the bearing housings 25, said roller having a shaft 28 of relatively restricted diameter. The restricted shaft 28 is positioned within the housing 25 and is rotatably supported therein by ball bearing assemblies 29. A nut 30 is threadedly positioned upon the end of the shaft 28 and confines the ball bearing assemblies in proper position upon the shaft within the housing. The bearing housing 25 carries a closure plate 31 which may be secured to the housing by means of screws 32 or the like. A conventional grease gun nipple or fitting 33 is positioned upon the plate 31 whereby the ball bearings carried within the housing may be lubricated. The roller 27 projects from the housing 25 and is adapted to ride upon the upper surface of the upper flange 20' of the beam 19.

The housings 26 are substantially similar in construction to the housings 25, each housing 26 rotatably supporting a roller 34 which is adapted to ride upon the lower face of the lower flange 21 of the beam 19. Each of the housings 26, however, is provided with a relatively flat seating face 35 at its upper side which is adapted to support a bracket 36 secured to the housing 26 by means of a screw 37. A pin 38 is positioned in an aperture in bracket 36 and projects into the seat portion 35 of the housing whereby rotary movement of the bracket 36 upon the housing 26 is prevented.

A shaft 39 is carried by an upstanding portion 40 of each bracket 36, each shaft being embraced by a sleeve bearing 41. Roller 42 is rotatably positioned upon the shaft 39. The purpose of the roller 42 will be hereinafter more fully described. Shaft 39 is secured to the upstanding portion 40 of the bracket 36 by means of a nut 43 and a conventional grease gun fitting 44 connects into the end of the shaft whereby the bearings 41 may be lubricated.

A bearing housing 45 is mounted in an aperture 46 provided adjacent one end of the beam 19. The bearing housing 45 carries ball bearing assemblies 47 which function as frictionless bearings for shaft 48. The shaft 48 projects from the bearing housing at one end and terminates in a tapered seat 49 which carries a hub 50. The end of the tapered portion 49 of the shaft 48 is threaded and a nut 51 functions to secure the hub 50 upon the tapered seat 49.

A nut 52 threadedly engages a portion of the shaft 48 which is confined within the housing 45 whereby the ball bearing assemblies 47 are retained in proper position within the housing. A closure 53 is mounted upon the housing 45 and is secured thereto by means of screws 54 or the like. The closure 53 is provided with a central aperture 55 through which an extension 56 of

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shaft 48 projects. A hub 57 is mounted upon the projecting portion 56 and is secured thereto by means of set screw 58 and key 58'. A sprocket wheel 59 is secured to an annular flange 60 formed integral with the hub 57 by means of screws 61 or the like.

Adjacent an end of the beam 19 an electric motor 62 is mounted upon a suitable foundation 63. A speed reducing mechanism 64 is operatively associated with the motor 62, the output shaft 65 of the speed reducer 64 carrying a sprocket wheel 66. A sprocket chain 67 is trained around the sprocket wheel 66 and is also trained around sprocket wheel 59. The motor 62 and speed reducer 64 are mounted upon a slidable plate 68 whereby the chain 67 may be brought to a desired degree of tension by means of set screw 69. As can readily be seen, operation of the motor 62 results in rotary movement of the sprocket wheel 59 and inasmuch as said wheel is rigidly secured to shaft 48 the tapered portion 49 of said shaft together with the hub 50 carried thereon is also rotated.

The hub 50 carries two spaced annular flanges 70 and a sprocket wheel 71 is secured to each of the flanges by means of screws or the like 72. A sprocket chain 73 is trained around each of the sprocket wheels 71 and is hence driven when the shaft 48 is rotated by motor 62.

Adjacent the opposite end of the beam 19 a bearing plate 73' is mounted, said plate being secured to the web of the beam 19 by means of screws 74 or the like which pass through slots 75 provided in the plate 73'. A bearing housing (not shown) similar to the housing 45 is carried upon the plate 73', said housing, in turn, carrying a shaft 76 similar to shaft 48 with the exception that the shaft 76 does not carry an extension corresponding to the extension 56 upon the shaft 48. However, the shaft 76, similar to shaft 48 carries a tapered seat 49 upon which a hub 77 is positioned, the hub carrying a spaced pair of sprocket wheels 78 similar to the sprocket wheels 71 carried by hub 50. A set screw 79 threaded in a lug 80 carried upon the web of beam 19 functions to longitudinally adjust the bearing plate 73' along the length of beam 19. The sprocket chains 73 are also trained around sprocket wheels 78 and hence manipulation of the set screw 79 functions to tighten the sprocket chains 73. Intermediate the length of the beam 19 and positioned between the sprocket chains 73 are a plurality of idler sprocket wheels 81 which function to maintain the sprocket chains 73 in desired spaced relationship with respect to each other.

A pair of lugs 82 are carried upon opposite links of the sprocket chains 73, each of said lugs having a supporting face upon which a bearing member 83 is carried. The bearing member 83 functions as a support for shaft 84 upon which roller 85 is mounted. It can readily be seen that when motor 62 is operated chains 73 are driven around the sprocket wheels 71 and 78 and the roller 85 is carried by the chain, the roller moving longitudinally forwardly and backwardly along the length of the beam 19.

A bracket 86 is supported by frame 23 being secured thereto by screws 87 or the like. The end of the bracket is bifurcated as indicated at 88 in Figs. 3 and 6. Two such brackets are mounted upon the frame 23, said brackets and the bifurcated arms being in substantial vertical alignment with each other and spaced from each other upon said frame. In the operation of the

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device roller 85 carried by the twin chains positions itself in one or the other of the forks 88. During the upper pass of the roller 85, said roller is positioned in the upper fork and in the lower pass of the roller, said roller is positioned in the lower fork. By virtue of the fact that the roller positions itself in one of the forks, movement of the twin chains results in movement of the carrier 22, said carrier moving along the length of the beam 19 in the direction that the roller 85 moves. In other words, when the roller 85 moves through its upper pass the carrier 22 is moved to the left, as viewed in Figs. 1 and 3. When the roller 85 moves through its lower pass the carrier is moved to the right as viewed in these figures. When, however, the carrier moves to its extreme position either to the left or to the right, the roller 85 passes around one or the other pair of sprocket wheels 71 or 78. In moving around the sprocket wheels the roller leaves one fork 88 and enters the vertically aligned fork. In this fashion the roller alternately engages the upper and lower fork, moving the carrier in one direction or the other and changing fork engagement at the extreme ends of the travel of the carrier.

As one of the features of the present invention a pair of brackets 89 are mounted in spaced relationship upon the beam 19, each bracket being secured to the web of the beam by means of screws or bolts 90 which engage in slots 91 provided in the web of the beam. The brackets 89 are disposed in alignment with each other and in alignment with the shafts 48 and 76 and are positioned in spaced relationship longitudinally of the beam so as to limit the travel of the carrier in both directions. Each bracket carries an annular extending portion 92 upon which a permanent magnet 93 is carried, said permanent magnet being secured to the angularly extending plate 92 by means of bolts or the like 94. The operative faces of the permanent magnets 93 face each other and are so positioned as to make contact with the opposite sides of the frame 23 as said frame is moved to its extreme right or left position. The frame 23 carries an abutment plate 95 on each side thereof, said plate being constructed of ferro-magnetic material and functioning to offer a planar surface for good magnetic contact with the operative faces of the magnets 93. The arrangement is such that when roller 85 moves the carrier 22 to its extreme right or left position the abutment plate 95 on one or the other side of the frame 23 is brought into contact with an operative face of one or the other magnet and by magnetic attraction said frame is maintained in this position while the roller disengages itself from one of the forks 88 and engages itself with the opposite fork. Hence, during movement of the carrier 22 the carrier is under the control of the roller 85 and moves therewith. When the roller disengages itself from one of the forks 88 it does so at a period of operation when the carrier is maintained stationary by the attractive force of one of the magnets. Consequently, the roller 85 moving around one or the other pair of sprocket wheels 71 or 78 readily positions itself in the opposite fork since the carrier is maintained stationary by the attractive force of the magnets.

A hollow casting 96 is mounted upon the lower portion of the frame 23 being secured thereto by means of screws 97 or the like. A nipple 98 is threadedly positioned in the casting 96 and functions to connect the hollow interior thereof with

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a flexible hose or conduit 99. The opposite end of the casting 96 is provided with an annular flange 100 which is secured to a companion flange 101 carried upon a vertically disposed pipe 102, said flanges being secured together by means of cap screws 103. The pipe 102 extends upwardly from its flanged connection and is bent around and above roll 2 as shown best at 104 in Fig. 2. The pipe 102 carries at its upper end an L pipe coupling 105 which opens immediately above the nip 6 between rolls 1 and 2.

In operation the flexible hose or conduit 99 is connected to a suitable source of coating material under pressure. Coating material is thus transferred into the casting 96 and thence upwardly through pipe 102 and is discharged into the nip 6. When the motor 62 is in operation the twin chains 73 are moved thereby moving roller 85. Roller 85 engages in one or the other forks 88, depending upon the direction of motion of the chain and functions to move the carrier from one extreme position to the opposite extreme position at which time the roller disengages itself from the engaging fork and moves to the opposite fork. Continued movement of the twin chains then results in opposite movement of the carrier 22. During the dwell of the carrier 22 at its extreme positions and while the roller is disengaging itself from one fork and engaging the other fork, the carrier is maintained stationary by the attractive force of one or the other of the magnets 93. Of course, the attractive force of the magnet is overcome by the engagement of the roller 85 and one of the forks 88 so that after such engagement the carrier may be readily pulled from one or the other of its extreme positions. During movement of the carrier lengthwise along the beam 19 the discharge end of the pipe 102 moves longitudinally along the length of the nip 6 and coating material discharged from the pipe is thereby uniformly distributed backwardly and forwardly along the length of said nip. In this fashion a pool of coating material is maintained in the nip 6 which is of substantially uniform depth throughout the entire coating operation.

In order to protect the carrier and the associated mechanism connected therewith from coating material or other foreign matter which may be splashed upon the mechanism, a cover 106 may embrace the upper portion and the side portions of the device. The cover may comprise an upwardly extending panel 107 secured to beam 19 by means of cap screws 108 or the like. A top panel 109 may be connected to the side panel 107 by means of angle iron 110 and said top panel may be, in turn, connected to a downwardly extending side panel 111 by means of angle iron 112. By the provision of the cover 106 coating material which may be splashed from the gate rolls will be prevented from injuring the carrier 22 and its associated mechanism.

During movement of the carrier 22 forwardly and backwardly along the beam 19 rollers 42 function to support the chains 71 at their lower passes, preventing said chains from sagging.

Referring particularly to Figs. 7, 8 and 9 a beam 113 may be mounted at opposite ends upon supporting members 114 which in turn may be carried upon a suitable foundation 115. The beam 113 may be disposed in a position relative to the gate rolls 1 and 2 similar to that hereinbefore described in conjunction with beam 19. The beam 113 may carry on its web portion a pair of bearings 116 and 117 in which the ends

of a double threaded screw member 118 may be journaled.

The bearing 117 may comprise a housing 119 within which a ball bearing assembly 120 may be positioned. The housing 119 carries a cover plate 121 which is provided with a central aperture 122 through which an extension 123 of the screw member 118 is positioned. At the end of the extension 123 exteriorly of the bearing housing 119 a bevel gear 124 may be carried which meshes with a companion bevel gear 125 mounted upon shaft 126. Shaft 126 may carry a sprocket wheel 127 over which a sprocket chain 128 is trained. Sprocket wheel 128 may also be trained around a companion sprocket wheel which may comprise the output shaft of a suitable prime mover (not shown).

The arrangement is such that movement of the sprocket chain 128 rotates bevel gear 125 which in turn rotates bevel gear 124 thereby rotating the double threaded screw 118. Bearing 116 may be similar to bearing 117 except that the cover plate 129 is not apertured.

A carrier member 130 embraces the double threaded screw 118, said carrier member comprising a block 131 having a central aperture 132. A sleeve 133 may be positioned in the aperture 132 and is adapted to circumscribe the screw 118. A pin 134 is mounted in the body of the block 131 and terminates in a restricted portion 135. A substantially oval follower member 136 may be pivotally mounted upon the restricted end 135 of pin 134. Spacer members 137 may be positioned upon the web of the beam 113 and may carry a pair of oppositely disposed tracks or guide plates 138. The block 131 is provided with opposite slots 139 in which extending portions of the tracks 138 engage.

The arrangement is such that the follower member 136 engages in the threads of the screw 118 and when the screw is rotated the carrier 130 moves longitudinally along the length of the screw. By the provision of the guides 138 the carrier 130 is prevented from rotating with the screw 118.

A hollow casting 140 is carried upon an angle member 141 which in turn is secured to the bottom portion of the carrier 130. A nipple 142 functions to connect the interior of the hollow casting 140 with a flexible conduit (not shown) through which a coating material may be introduced into the hollow casting from any suitable source of coating material under pressure (not shown). A pipe 143 having a flange 144 may be connected to flange 145 carried by the casting 140, the pipe 143 being substantially identical in construction with the pipe 102 hereinbefore described and the outlet of said pipe being positioned immediately above the nip 6 between the pair of gate rolls 1 and 2.

In the operation of this form of our invention rotation of the screw 118 results in longitudinal reciprocatory motion of the carrier 30 whereby the pipe 143 is carried backwardly and forwardly along the length of the nip 6. In this fashion coating material is discharged into the nip 6 and a bath of coating material of substantially uniform depth is maintained in said nip.

It is apparent that herein is provided a relatively simple, rugged mechanism which may be readily employed with existing coating machines, the present device functioning to maintain a uniform depth of coating material in the nip of the conventional gate rolls, whereby a more uniform

transfer of coating material from the gate rolls to the coating material applying rolls is obtained.

We claim as our invention:

1. A device for uniformly distributing a liquid coating suspension along the length of a nip between two gate rolls of a coating machine which comprises, a track disposed substantially parallel to the length of said gate rolls, a carrier positioned upon said track for movement thereon, means disposed adjacent and parallel to said track for moving said carrier forwardly and backwardly on said track, means for driving said carrier-moving means, and a coating material conduit mounted upon said carrier having its discharge end disposed above said nip to discharge coating material into said nip when the carrier is moved.

2. A device for uniformly distributing a liquid coating suspension along the length of a nip between two gate rolls of a coating machine which comprises, a track disposed substantially parallel to the length of said gate rolls, a carrier positioned upon said track for movement thereon, means disposed adjacent and parallel to said track for moving said carrier forwardly and backwardly on said track, unidirectional means for driving said carrier-moving means, and a coating material conduit mounted upon said carrier having its discharge end disposed above said nip to discharge coating material into said nip when the carrier is moved.

3. A device for uniformly distributing a liquid coating suspension along the length of a nip between two gate rolls of a coating machine which comprises, a track disposed substantially parallel to the length of said gate rolls, a carrier positioned upon said track for movement thereon, endless chain means disposed adjacent and parallel to said track for moving said carrier forwardly and backwardly on said track, means for driving said chain means, and a coating material conduit mounted upon said carrier having its discharge end disposed above said nip to discharge coating material into said nip when the carrier is moved.

4. A device for uniformly distributing a liquid coating suspension along the length of a nip between two gate rolls of a coating machine which comprises, a track disposed substantially parallel to the length of said gate rolls, a carrier positioned upon said track for movement thereon, screw means disposed adjacent and parallel to said track for moving said carrier forwardly and backwardly on said track, means for rotating said screw means, and a coating material conduit mounted upon said carrier having its discharge end disposed above said nip to discharge coating material into said nip when the carrier is moved.

5. A device for uniformly distributing a liquid coating material suspension along the length of the nip between two gate rolls of a coating machine which comprises, a track disposed substantially parallel to the length of said gate rolls, endless driving means disposed adjacent said track and having two parallel passes disposed substantially parallel to said track, a carrier positioned upon said track for movement thereon, engaging means carried by said driving means for detachable engagement with said carrier, said engaging means engaging and moving said carrier with the driving means when said engaging means moves through said two passes, and a coating material conduit carried by said carrier having its discharge end positioned above

said nip to discharge coating material along the length of the nip.

6. A device for uniformly distributing a liquid coating material suspension along the length of the nip between two gate rolls of a coating machine which comprises, a track disposed substantially parallel to the length of said gate rolls, endless driving means disposed adjacent said track and having two parallel passes disposed substantially parallel to said track, said endless driving means comprising an endless chain, a carrier positioned upon said track for movement thereon, engaging means carried by said driving means for detachable engagement with said carrier, said engaging means engaging and moving said carrier with the driving means when said engaging means moves through said two passes, and a coating material conduit carried by said carrier having its discharge end positioned above said nip to discharge coating material along the length of the nip.

7. A device for uniformly distributing a liquid coating suspension along the length of a nip between two gate rolls of a coating machine which comprises, a track disposed substantially parallel to the length of said gate rolls, an endless chain disposed adjacent said track and having two parallel passes disposed substantially parallel to said track, wheels over which said chains are trained at the ends of said passes, a carrier positioned upon said track for movement thereon, engaging means carried by said chain, a pair of spaced engaging means upon said carrier for alternate engagement with said chain engaging means, said chain engaging means breaking engagement with one of said carrier engaging means and making engagement with the other carrier engaging means at the end of each pass whereby said carrier is moved forwardly and backwardly upon said track, and a coating material conduit mounted upon said carrier having its discharge end positioned above said nip to discharge coating material along the length of the nip during movement of said carrier.

8. A device for uniformly distributing a liquid coating suspension along the length of a nip between two gate rolls of a coating machine which comprises, a track disposed substantially parallel to the length of said gate rolls, an endless chain disposed adjacent said track and having two parallel passes disposed substantially parallel to said track, wheels over which said chains are trained at the ends of said passes, a carrier positioned upon said track for movement thereon, a lug carried by said chain, a pair of spaced forks upon said carrier for alternate engagement with said chain lug, said chain lug breaking engagement with one of said forks and making engagement with the other forks at the end of each pass whereby said carrier is moved forwardly and backwardly upon said track, and a coating material conduit mounted upon said carrier having its discharge end positioned above said nip to discharge coating material along the length of the nip during movement of said carrier.

9. A device for uniformly distributing a liquid

coating suspension along the length of a nip between two gate rolls of a coating machine which comprises, a track disposed substantially parallel to the length of said gate rolls, an endless chain disposed adjacent said track and having two parallel passes disposed substantially parallel to said track, wheels over which said chains are trained at the ends of said passes, a carrier positioned upon said track for movement thereon, engaging means carried by said chain, a pair of spaced engaging means upon said carrier for alternate engagement with said chain engaging means, said chain engaging means breaking engagement with one of said carrier engaging means and making engagement with the other carrier engaging means at the end of each pass whereby said carrier is moved forwardly and backwardly upon said track, means for holding said carrier stationary during the period of disengagement and engagement of said chain engaging means, and a coating material conduit mounted upon said carrier having its discharge end positioned above said nip to discharge coating material along the length of the nip during movement of said carrier.

10. A device for uniformly distributing a liquid coating suspension along the length of a nip between two gate rolls of a coating machine which comprises, a track disposed substantially parallel to the length of said gate rolls, an endless chain disposed adjacent said track and having two parallel passes disposed substantially parallel to said track, wheels over which said chains are trained at the ends of said passes, a carrier positioned upon said track for movement thereon, engaging means carried by said chain, a pair of spaced engaging means upon said carrier for alternate engagement with said chain engaging means, said chain engaging means breaking engagement with one of said carrier engaging means and making engagement with the other carrier engaging means at the end of each pass whereby said carrier is moved forwardly and backwardly upon said track, magnetic means for holding said carrier stationary during the period of disengagement and engagement of said chain engaging means, and a coating material conduit mounted upon said carrier having its discharge end positioned above said nip to discharge coating material along the length of the nip during movement of said carrier.

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