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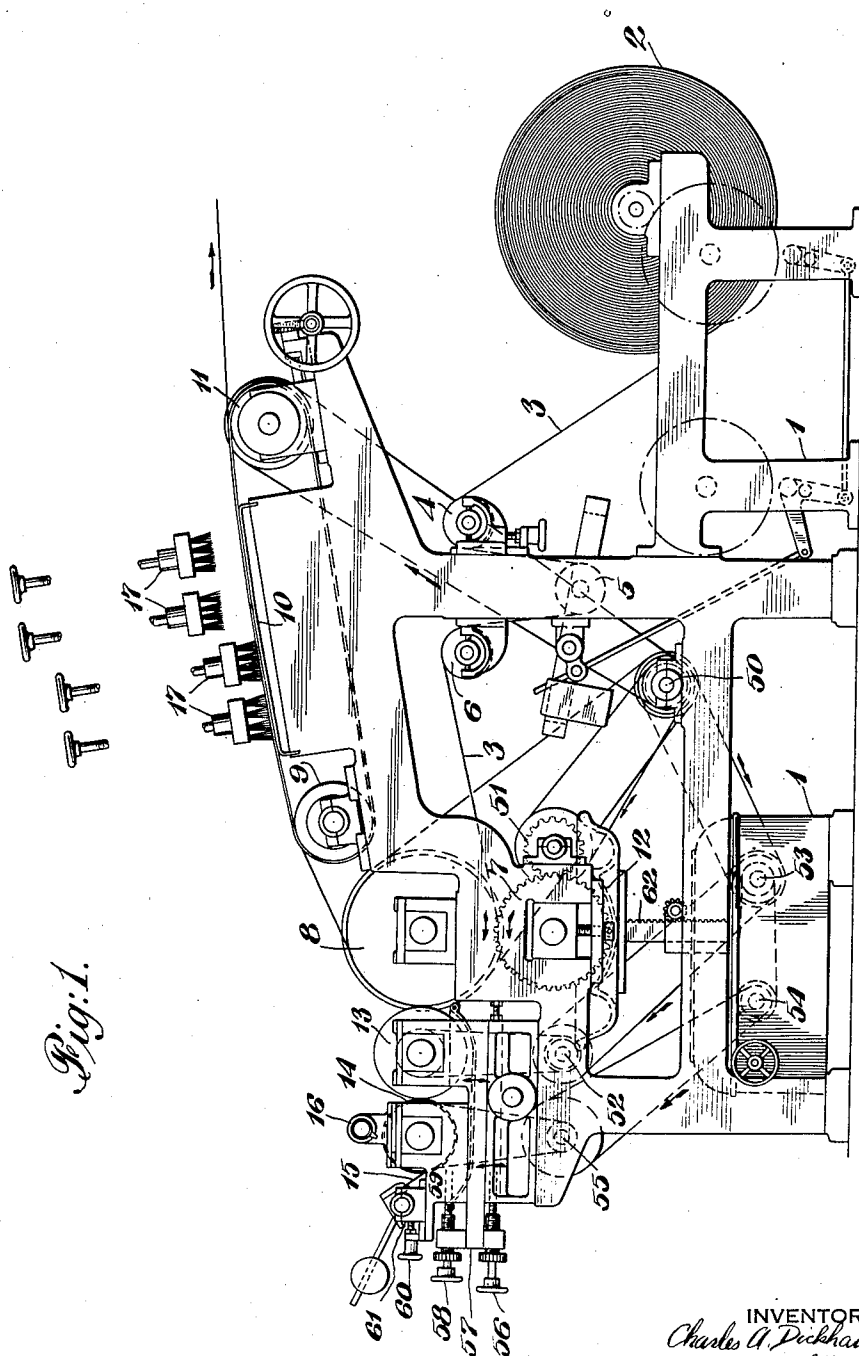
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1,987,183

APPARATUS FOR ROLL COATING

Filed June 25, 1932

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 2.

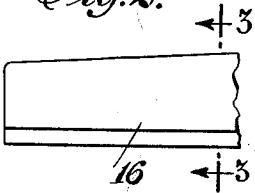


Fig. 3.



Fig. 4.

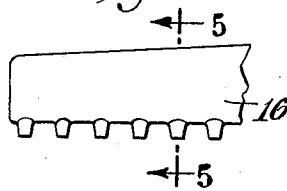


Fig. 5.



Fig. 6.

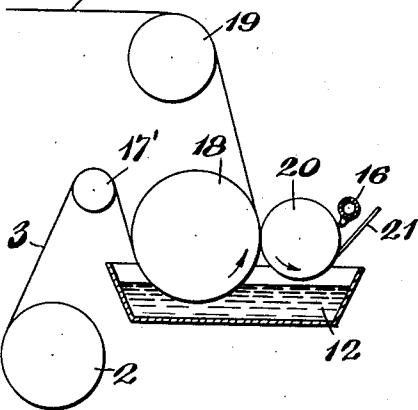


Fig. 7.

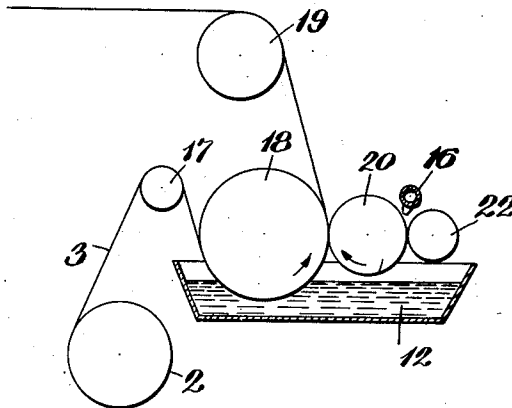


Fig. 8.

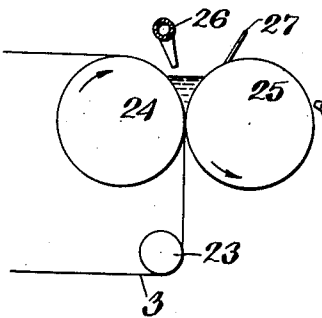


Fig. 10.

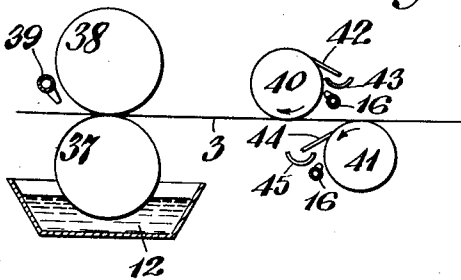
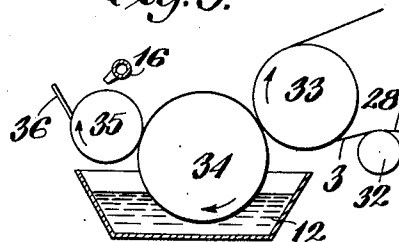


Fig. 9.



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APPARATUS FOR ROLL COATING

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10 Claims. (Cl. 91—55)

This invention relates to roll coating.

There are many methods of coating paper having the desired object of applying a coating that will be smooth, uniform in appearance and of a desired thickness. One of the methods of applying color which is commonly used is a combination of rolls to smooth and lay the color on the material to be coated. In such combination a doctor blade or a doctor roll may be utilized to remove excess color and to form the color evenly on the applying roll. Both the surface of the applying roll and the doctor roll are of great importance. I have found that it is desirable to remove all the color remaining on the doctor roll by a doctor blade. Such removal prevents the transfer of the coating from the doctor roll with a ribbing effect back upon the transfer or applying roll thereby eliminating an uneven ribbed surface. I have further found that the cleaning doctor blade will leave surface moisture on the doctor roll. Such surface moisture might be advantageous were it not for the fact that it is not uniform on the surface of the roll and such difference in moisture or surface tension on the doctor roll affects the smoothness of color laid on the web or transfer roll. I have therefore found that if a jet of air is applied to the cleaned surface of the doctor roll immediately after the doctor roll leaves the doctor blade the surface moisture is dried giving a much more uniform surface condition to the doctor roll and causing a smoother surface of the coating on the transfer roll and its consequent product.

Referring to the drawings:

Figure 1 is a view in side elevation of a coating machine embodying the principles of my invention.

Figure 2 is a detail view of one form of air nozzle.

Figure 3 is a cross sectional view of Figure 2 along the line 3, 3, looking in the direction of the arrows.

Figure 4 is a modified form of air nozzle showing jets.

Figure 5 is a cross sectional view along the line 5, 5, of Figure 4.

Figure 6 is a diagrammatic view of a modified form of arrangement of coating rolls.

Figure 7 is another diagrammatic view of a modified form of coating rolls.

Figure 8 is a further modified form of coating rolls.

Figure 9 is still another form of coating rolls.

Figure 10 is an arrangement for double coating.

In carrying out my invention, I provide a frame 1 supporting paper roll 2. The paper 3 from roll 2 passes over roll 4 around tension roll 5 and over roll 6 and between roll 7 and 8 and around roll 8 and thence over roll 9, plate 10 and over roll 11 to the dryer. Roll 7 rotates in bath 12 applying the color on paper 3. Roll 13 removes all the surface color from paper 3. Roll 14 removes the excess color from roll 13 and smooths the color remaining thereon. A knife doctor 15 removes all the color from roll 14. Air nozzle 16 dries roll 14 so that the surface of roll after passing the doctor is a smooth dry surface thereby obtaining a smoother surface to the color or coating remaining on roll 13. Roll 13 then applies the predetermined amount of color or coating back upon paper 3. Oscillating brushes 17 may, if desired, be utilized to brush the coating. I prefer to use two sets of brushes, one set being in operation while the other set is cleaned and ready in case the first set becomes filled with coating or requires cleaning so that there can be continuous operation of the machine. In a great many cases the brushes need not be used at all.

Nozzle 16 may be of the jet type shown in Figure 4 or of a single narrow opening type shown in Figure 2 extending lengthwise of roll 14. The nozzle is of greater diameter at the end where the air is admitted than at the opposite end so that a uniform flow of air will be had out of the nozzle or jets. I have found that the air blowing from the nozzle will hug the moistened surface of roll 14 thereby partially encircling same so that only a single nozzle is required. Instead of the arrangement shown in Figure 1 paper 3 may pass over roll 17' and around roll 18, the latter operating in bath 12 and thence around roll 19. A doctor roll 20 may operate to remove the excess color. A cleaning blade doctor 21 removes the color or coating from roll doctor 20. Jet 16 dries the surface of roll doctor 20.

As shown in Figure 7 cleaning blade doctor 21 may have substituted therefor cleaning doctor roll 22. In other respects the arrangement is the same as in Figure 6. As shown in modified form in Figure 8 the paper 3 passes between rolls 24, 25, and around roll 23. A coating spray 26 sprays the coating upon paper 3 which runs down and is dammed up by rolls 24, 25. A cleaning blade doctor 27 removes the color carried by roll 25, the color flowing back into the dam. Jet 16 dries roll 25. In Figure 9 web 3 passes over roll 32 around roll 33. Roll 34 rotating in bath 12 past doctor roll 35 applies the coating on paper 3 carried by roll 33. Doctor roll 35 being adjust-

able with respect to roll 34 removes the excess color and smooths same on the applying roll. Cleaning doctor blade 36 removes the color or coating from the surface of roll 35 and jet 16 dries the surface. In the case of double coating as shown in Figure 10 the paper 3 passes between rolls 37, 38. Roll 37 rotates in bath 12 and applies the color to the undersurface of paper 3. A spray 39 applies the color to the upper surface, rolls 37, 38, being adjustable with respect to each other controls the depth of coating functioning as nip rolls. A smoothing roller 40 removes the ribbing effect and smooths and irons out the coating. A cleaning doctor blade 42 removes any excess color picked up by smoothing roll 40 which runs down doctor blade 42 into trough 43 communicating with bath 12. A jet 16 located below cleaning doctor blade 42 dries the surface of roll 40. In a similar manner smoothing roll 41 has cleaning doctor blade 44 to remove the excess color from roll 41 and deposit same in trough 45. Jet 16 dries the surface of roll 41.

The drive of the machine may be varied in accordance with general practice. I have shown roll 8 driven by belting from shaft 50 through the usual pulleys. Roll 11 is likewise driven from shaft 50. Roll 7 is driven through gearing 51 through pulleys and belting from shaft 50. Roll 13 is driven through pulleys and belting by shaft 52 which is in turn driven through pulleys and belting by shaft 53 and the latter is likewise driven through pulleys and belting by shaft 50. Roll 14 is driven through pulleys and belting by shaft 55 which in turn is driven by pulleys and belting by shaft 54, the latter being the driven shaft of the reeves. Handwheel 56 controls the position of carriage 57 and thereby permits of adjustment of roll 13 with respect to roll 8. Handwheel 58 likewise controls the position of carriage 59 thereby permitting of adjustment of roll 14 with respect to roll 13. Handwheel 60 controls the adjustment of carriage 61 thereby determining the positioning of cleaning doctor blade 15 with respect to roll 14. Roll 7 is adjustable with respect to roll 8 by means of threaded supporting rods 62. Shaft 50 is driven in the usual manner such as by individual motor or from any well known source of power.

It will thus be seen that various combinations may be utilized to either lay the amount of color directly on the sheet and to regulate the amount of color laid on or to lay the color or coating on a transfer roll which in turn transfers the color or coating to the web, but that in all these combinations a smooth and uniformly dried doctor roll is utilized in order to properly procure the desired result of a uniform coating of smooth appearance on the paper.

It is further seen that in order to obtain the essential condition of a uniform surface of the doctor roll that the cleaning must be augmented by a thorough drying of the doctor roll which I accomplish by means of an air jet. By my invention, one of the greatest difficulties present in roll coating is overcome for by my invention the doctor roll always has the same uniform surface. The element of surface tension, uneven distribution of moisture on the doctor roll of dry and wet spots or streaking with the consequent marring of the surface of the coated product are entirely obviated. Various modifications may be made in the arrangement of the rolls and structure and still fall within the scope of my invention.

What I claim is:

1. In a coating machine in combination, means for applying coating to the paper, a roll to remove excess coating, means for cleaning said roll and an air jet to dry the cleaned surface of said roll.

2. In a coating machine in combination a coating transfer roll to remove the surface coating while moist, means for removing excess coating from said transfer roll, said means having a doctor to clean the surface thereof and an air nozzle to dry the surface thereof, said transfer roll reapplying the same coating to the paper.

3. In a coating machine in combination, means for applying a coating to a web of paper, means for removing the excess and smoothing the surface of the coating while moist and means for cleaning the surface of said removing and smoothing means and means for drying the surface of said removing and smoothing means.

4. In a coating machine in combination, means for applying a coating by means of a roll to a web of paper, means for predetermining the amount of coating applied, and smoothing the surface of the coating, said means comprising a roll, a cleaning doctor and an air nozzle to dry the clean surface of the roll.

5. In an apparatus for coating paper in combination, means for applying the coating, said means comprising a plurality of rolls consisting of a transfer roll and doctor roll, said doctor roll removing excess coating and smoothing the coating, means for cleaning said doctor roll of the excess color removed and an air nozzle to dry the cleaned surface of the doctor roll from which the coating is removed.

6. In a coating machine in combination, a roll for the paper, means for applying the coating as the paper passes around the roll to the surface of the paper, a roll to predetermine the thickness and surface condition of the coating, said roll having means to continuously clean a portion of the surface thereof, means for drying the clean portion of the surface.

7. In a coating machine in combination, a frame, a coating bath, a roll operating in said bath, said roll adapted to apply the coating of the bath to the paper, means for removing coating from the surface of the paper, said removing means having continuous cleaning means and an air nozzle to dry the clean surface.

8. In a coating machine for paper and the like in combination, a reverse turning roll to control the depth and surface condition of the coating applied to the paper, means for removing coating from a portion of the surface of the roll and means for drying the cleaned surface.

9. In a double coating machine for paper and the like in combination, means for applying coating to both sides of the paper, reverse turning rolls to smooth the surface of the coating and remove the excess of coating, doctors to remove the excess of coating deposited on the smoothing rolls and air jets to dry the cleaned surface of the reverse turning rolls.

10. In a roll coating machine in combination, a roll to apply the coating, means for controlling the depth and uniformity of the coating applied, said means comprising a smooth, uniformly dried surface to remove excess coating and smooth the surface of the coating remaining on the applying roll.

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