

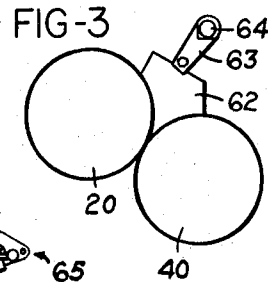
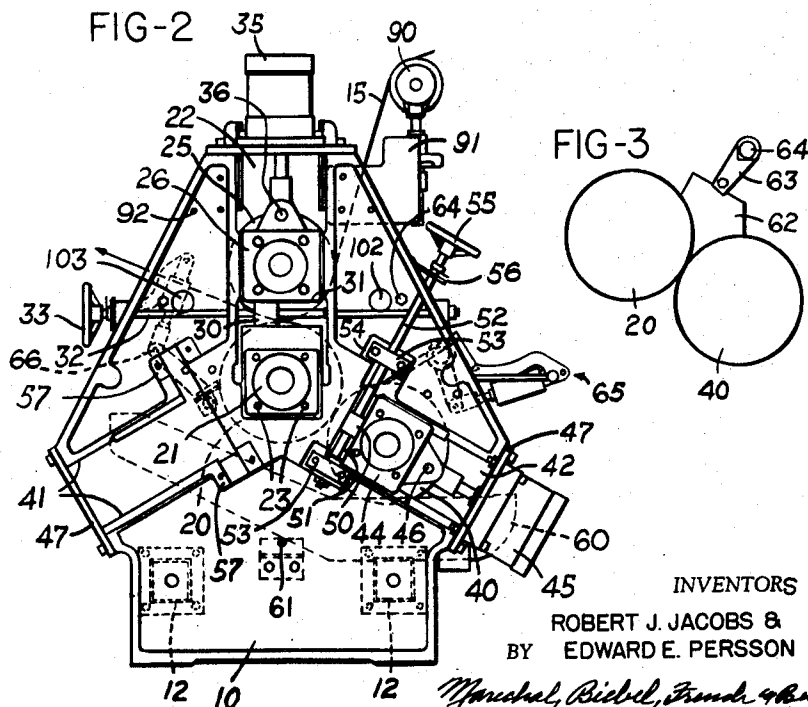
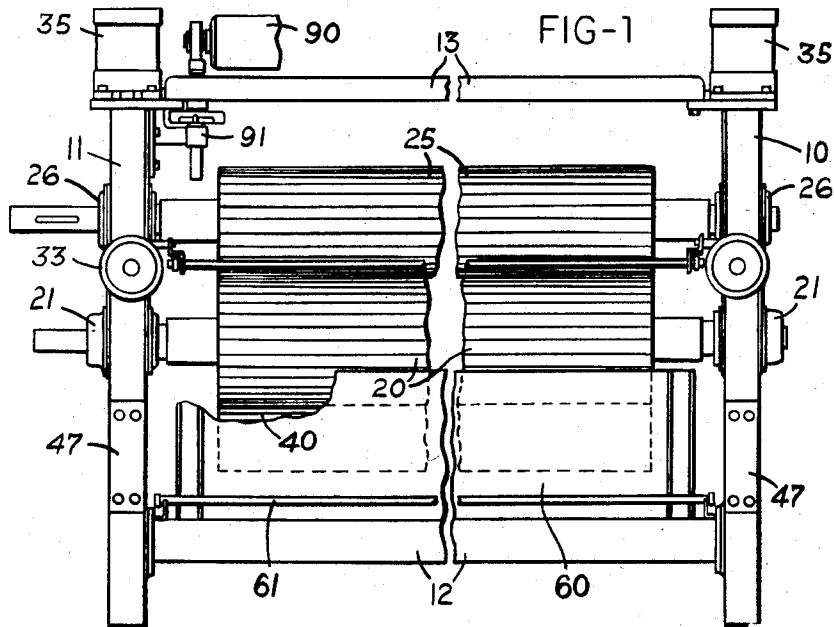
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PAPER COATING MACHINE

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3 Sheets-Sheet 1



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3 Sheets-Sheet 2

FIG-4

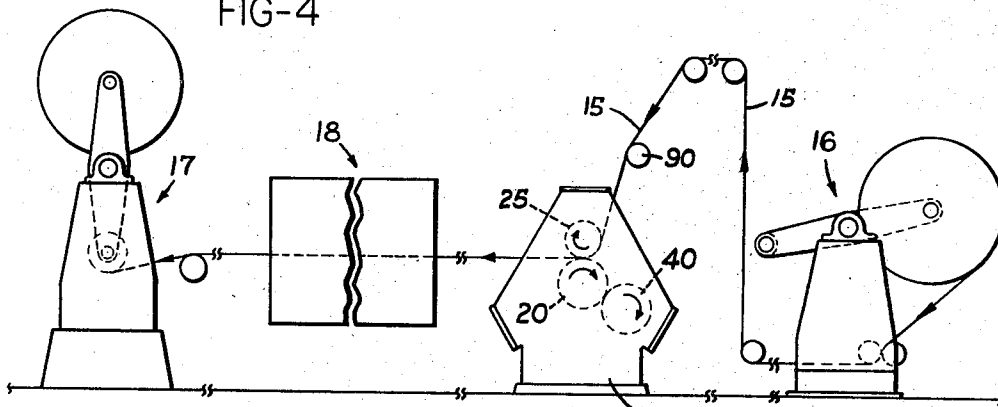


FIG-5

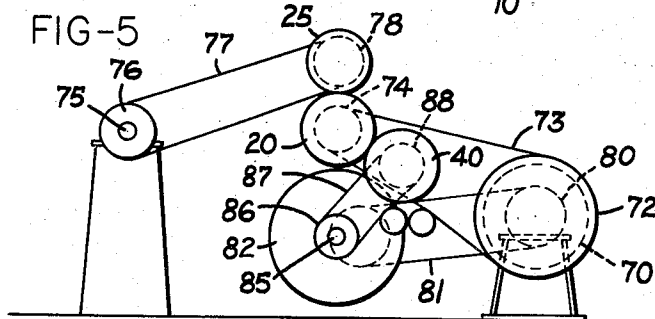


FIG-6

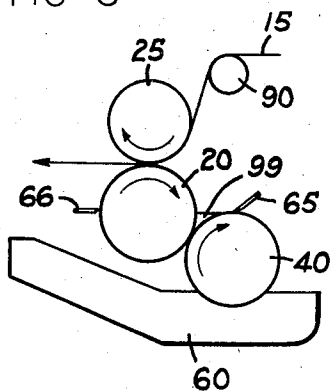
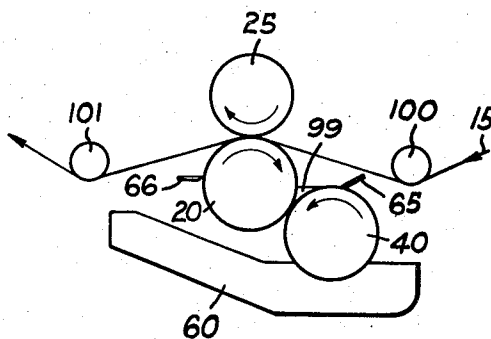


FIG-7



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FIG-8

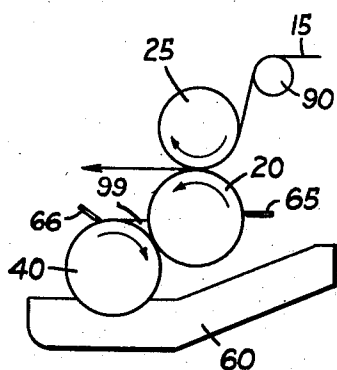


FIG-9

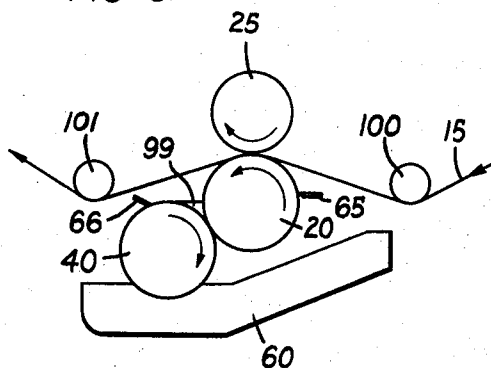


FIG-10

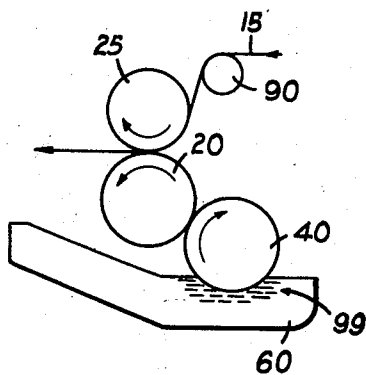
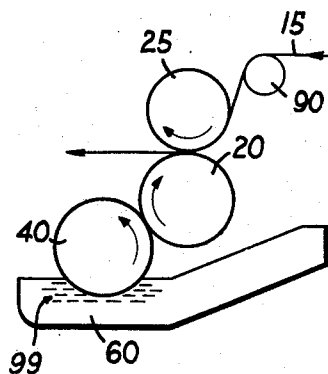


FIG-11



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PAPER COATING MACHINE

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1 Claim. (Cl. 118—249)

This invention relates to coating apparatus for paper and other web materials.

The invention is especially concerned with the provision of coating apparatus which will offer the maximum of versatility in a fixed location in a web fabricating line in a paper mill or converting plant. For example, coating apparatus in accordance with the invention is adapted for incorporation in a converting line which includes an unwinder and a rewinder for the web material to be coated and perhaps also otherwise converted as by laminating or the like, and such apparatus is capable of use with a wide variety of coating compositions requiring relatively different coating methods or techniques without affecting the operation of any other apparatus in the fabricating line. Similarly, the coating apparatus of the invention can be employed directly with a paper machine to coat a newly produced web as it advances from the paper machine to a reel or other winder.

It is a primary object of the invention to provide such coating apparatus which may be quickly and easily adjusted or modified in accordance with the particular coating composition employed therewith and the requirements with respect to coating technique of such composition without necessitating removal from the fabricating line and also without change in the direction of travel of the web therethrough.

A particular object of the invention is to provide such coating apparatus which can be quickly and easily shifted from direct coating to reverse coating and vice versa by simple rearrangement of the rolls carried by the main framework and without affecting the main direction of travel of the web therethrough.

It is accordingly a general object of the invention to provide web coating apparatus having outstanding characteristics of simplicity, versatility and economy from the standpoints of initial production as well as maintenance and adaptation in use to a variety of coating compositions and techniques, and which in particular will offer such advantages with a minimum of equipment and with a maximum variety of uses for the same equipment.

Additional objects and advantages of the invention will be apparent from the following description, the accompanying drawings and the appended claims.

In the drawings—

Fig. 1 is a view in side elevation of web coating apparatus constructed in accordance with the invention, the view being generally from left to right in Fig. 2;

Fig. 2 is an end elevation looking from right to left in Fig. 1;

Fig. 3 is a fragmentary view inside the side frame and looking in the same direction as Fig. 2;

Fig. 4 is a diagrammatic view illustrating the web coating apparatus in Figs. 1 and 2 incorporated in a fabricating line.

Fig. 5 is a diagrammatic showing of a suitable drive arrangement for the coating apparatus of Figs. 1-3; and

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Figs. 6-9 are further diagrammatic views illustrating different threading and coating arrangements of the coating apparatus of Figs. 1 and 2.

Referring to the drawings, which illustrate a preferred embodiment of the invention, the main framework of the coating apparatus is formed by a pair of complementary side frames 10 and 11 interconnected by suitable cross tie beams 12 and 13. As shown in Fig. 3, this framework is adapted for mounting at an intermediate location in a fabricating line for continuous coating of a web 15, and Fig. 4 accordingly shows the line as including an unwinder 16 and a winder 17. This converting line may include additional apparatus such, for example, as an oven or laminator represented diagrammatically at 18 between the coating apparatus and the winder. It will also be understood that the unwinder 16 and winder 17 are representative of other equipment which will similarly establish a fixed direction of travel for the web through the coating apparatus, such for example as a paper machine at the location of the unwinder 16 and a sheeting apparatus in the location of the winder 17.

The applicator roll 20 which applies coating composition to the web 15 during operation of the apparatus is mounted in a generally central location within the side frames 10 and 11 by means of journal bearing units 21 which are received from above in the slots 22 extending downwardly from the tops of the two side frames. As indicated in Fig. 2, the outer covers of the bearing units 21 are bolted directly to the side frames at 23 to secure the applicator roll in fixed position. The slots 22 also provide for adjustably mounting the pressure roll 25, which has journal bearing units 26 slidably received in the slots 22.

The width of the coating nip formed by the rolls 20 and 25 is predetermined by an adjusting mechanism shown as including a wedge member 30 movable between the upper surface of the bearing unit 21 and a wedge surface 31 on the under side of the bearing unit 26. A threaded adjusting shaft 32 for each of the wedges 30 extends transversely through each side frame and is provided with a hand wheel 33 at one end. Proper pressure engagement of the bearing units 21 and 26 is obtained by a fluid pressure cylinder 35 mounted on the top of each of the side frames and connected with the adjacent bearing unit 26 as indicated at 36 within the slot 22.

The metering roll 40 is mounted in either of two selected positions below and on opposite sides of the applicator roll 20, depending upon the particular desired coating method or technique. More specifically, the side frames are formed with a pair of slots or slideways 41 and 42 aligned with the axis of roll 20 and forming equal angles on opposite sides of the vertical plane through the axis of roll 20, and it has been found advantageous to have the slideways 41 and 42 also form equal angles with the slot 22. The metering roll 40 is accordingly provided with journal bearing units 44 which are slidably receivable in the slideways 41 and 42, and each of these bearing units is also provided with a fluid pressure cylinder 45 connected thereto at 46. The side frame is provided at the outer end of each of the slideways 41 and 42 with a mounting plate 47 for a cylinder 45.

Each side frame is also constructed adjacent each of the slideways 41 and 42 to receive an adjusting mechanism for controlling the spacing of the rolls 20 and 40. As shown in Fig. 2, a wedge 50 operates between the inner end of the slideway 42 and the wedge surface 51 on the inner side of the bearing unit 44 similarly to the wedge 30. A threaded adjusting shaft 52 for the wedge 50 is carried by a pair of brackets 53 mounted on boss

portions 54 of the side frame, and the shaft 52 is provided with a hand wheel 55 and also with an indicator plate 56 mounted on the side frame. When the metering roll 40 is mounted in the slideway 41, the adjusting mechanism 50—56 is transferred to the other side of the side frame, as shown by the bosses 57 adjacent slideway 41 for receiving the brackets 53.

A pan 60 is mounted between the side frames 10 and 11 to extend below rolls 20 and 40, as by means of one of the tie beams 12 and a cross rod 61. This pan 60 is reversible from front to back when the metering roll is shifted to the slots 41, and it may serve alternatively as a drip pan or as a reservoir of coating composition as described hereinafter in connection with the operation of the apparatus. In either case, it is desirable to provide doctor dams in the ends of the upwardly opening nip of rolls 20 and 40 as shown in Fig. 3 to retain a pond of coating composition in this nip, each of the pair of dams 62 being carried by an arm 63 depending from a rod 64 extending between the side frames. Additionally, Fig. 2 illustrates the metering roll 40 as provided with a doctor 65 of suitable conventional type mounted on the side frames, and the applicator roll 20 is also shown as provided with a doctor 66 of the interrupted edge type which is utilized when the apparatus is employed for applying strips of coating material on the web 15.

Fig. 5 illustrates a drive arrangement for this coating apparatus which includes a drive motor 70 having a drive shaft from which a sprocket 72 drives through a chain 73 to a sprocket 74 on the shaft of the applicator roll 20. The pressure roll 20 is shown as having a separate drive shaft 75 from which a sheave 76 drives through a belt 77 to a sheave 78 on the shaft of roll 25.

The metering roll 40 is driven independently of applicator roll 20 from the same motor 70. A second sprocket 80 on the shaft 71 drives through a chain 81 to a speed reduction unit 82 having an output jack shaft 85 located in the vertical plane of the axis of applicator roll 20. A sprocket 86 on shaft 85 drives through a chain 87 to a sprocket 88 on the shaft of the metering roll 40. This arrangement makes it possible by varying the adjustment of the speed reduction unit 82 to obtain desired differential speed relationships between rolls 20 and 40 in accordance with the particular coating conditions to be maintained. Additionally, with this drive arrangement the metering roll is driven in the same manner and from the same jack shaft in either of its two positions on opposite sides of the applicator roll.

Fig. 6 illustrates in simplified diagrammatic form the coating method being performed in the converting line of Fig. 4, which is a reverse coating operation. The web 15 is guided to and around the pressure roll 25 by means of fixed idler rolls and a guide roll 90 which is carried by a pair of brackets 91 mounted at the top of the side frames 10 and 11. Only a single guide roll 90 is shown, but a duplicate of this roll can be provided on the opposite side of the center line of the coating line if desired, as indicated by the bolt holes 92 in Fig. 2. In the operation of Fig. 6, the applicator roll 20 rotates in the opposite direction from the web through its coating nip with roll 25, and the metering nip of rolls 20 and 40 is shown as filled with a pond of coating composition 99, such as an adhesive or other composition. The roll 40 may rotate in either direction, and in either case it serves to meter the layer of coating composition carried by the roll 20 to the coating nip for application to the web 15. The doctor 65 aids in retaining the pond of coating composition in the metering nip, and the doctor 66 would be used in the position indicated for a strip coating operation.

Fig. 7 illustrates generally the same coating conditions as Fig. 6 except that the web is caused to wrap a portion of the surface of the applicator roll 20 adjacent the coating nip. For this operation, a guide roll 90 is

not necessary, and instead a pair of guide rolls 100 and 101 are mounted between the side frames in the positions represented by the bores 102 and 103 in Fig. 2. Accordingly, the only changing of the coating apparatus to shift from the method of Fig. 6 to that of Fig. 7 is with respect to these guide rolls and the threading of the web.

Fig. 8 illustrates the setup of the apparatus for direct kiss coating of the web 15. For this method, the metering roll 40 is shifted to the opposite side of the applicator roll, and the drive of the applicator roll is reversed to cause it to move in the same direction as the web through the coating nip. The positions of the doctors 65 and 66 are also changed as indicated in Fig. 8. Fig. 9 shows the setup of the apparatus to provide a modified form of the method of Fig. 8 in that the web is caused to wrap a portion of the surface of the applicator roll. For this method the guide rolls are employed in the same manner as described in connection with Fig. 7, but the drive can remain the same. In any of these arrangements, if the pan 60 is employed as a reservoir, the metering roll 40 should rotate in the direction to move upwardly from the pan to the upper side of the metering nip, i. e., in clockwise direction as viewed in Fig. 6, and the doctor 65 may be eliminated or it may be used as a strip doctor with a notched blade.

Fig. 10 illustrates in simplified diagrammatic form the setup of apparatus for direct kiss coating employing pan 60 to contain the coating supply. The web 15 is guided to and around the press roll 25 by means of fixed idler rolls and guide roll 90 which is carried by a pair of brackets 91 mounted at the top of the side frames 10 and 11. Only a single guide roll 90 is shown, but a duplicate of this roll can be provided on the opposite side of the center line of the coating line if desired as indicated by the bolt holes 92 in Fig. 2. In the operation of Fig. 9, the applicator roll 20 rotates in the opposite direction from the web through its coating nip with roll 25. The metering roll 40 will dip in a compound of coating composition, such as an adhesive or other composition.

Fig. 11 illustrates in simplified diagrammatic form the setup of apparatus for reverse kiss coating employing pan 60 to contain the coating supply. The web 15 is guided to and around the pressure roll 25 by means of fixed idler rolls and a guide roll 90 which is carried by a pair of brackets 91 mounted at the top of the side frames 10 and 11. Only a single guide roll 90 is shown but a duplicate of this roll can be provided on the opposite side of the center line of the coating line if desired, as indicated by the bolt holes 92 in Fig. 2. In the operation of Fig. 10 the applicator roll 20 rotates in the same direction as the web through its coating nip with roll 25 and the metering nip of rolls 20 and 40. Roll 40, the metering roll, will dip in a compound of coating composition 99, such as an adhesive or other composition.

While the form of apparatus herein described constitutes a preferred embodiment of the invention, it is to be understood that the invention is not limited to this precise form of apparatus, and that changes may be made therein without departing from the scope of the invention which is defined in the appended claim.

What is claimed is:

Web coating apparatus of the character described comprising means including a pair of opposed side frames forming a main framework, an applicator roll, means in each of said side frames for mounting said applicator roll in generally centered position in said framework, means for mounting a pressure roll in adjustably fixed position in said side frames above said applicator roll to form a coating nip therewith, each of said side frames having a pair of slideways therein extending downwardly on opposite sides thereof at substantially equal angles with the horizontal and in radially aligned relation with the axis of said applicator roll, a metering roll, bearing

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means for said metering roll constructed for sliding movement in said slideways to locate said metering roll in an operative position below and to one side of said applicator roll, a pan adapted to contain a supply of coating material, means in said framework for supporting said pan below said operative position in cooperative relation with said metering roll, pressure means for urging said metering roll toward said applicator roll, means on said side frames associated with each of said slideways for mounting said pressure means in operative position within said associated slideway, adjustable means for regulating the movement of said bearing means

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in said slideways to control the spacing of said metering roll and said applicator roll, and means on said side frames associated with each of said slideways for mounting said adjustable means in operative position with respect to the associated said slideway.

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