

[54] REVERSIBLE COATER

[75] Inventors: James J. Melead, Roscoe; William P. Wentworth, Rockford, both of Ill.

[73] Assignee: Beloit Corporation, Beloit, Wis.

[22] Filed: May 11, 1972

[21] Appl. No.: 252,277

[52] U.S. Cl. 118/65

[51] Int. Cl. B05c 11/12

[58] Field of Search..... 118/65, 68, 244, 118/258, 419

[56] References Cited

UNITED STATES PATENTS

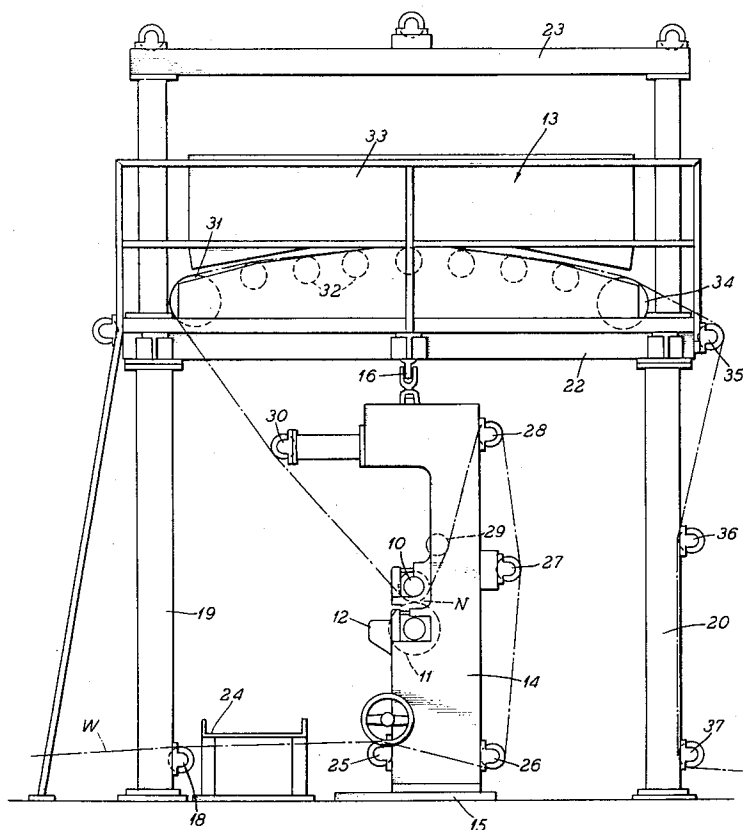
3,596,634 8/1971 Fuchs..... 118/65

Primary Examiner—Louis K. Rimrodt
Attorney—Benjamin H. Sherman et al.

[57] ABSTRACT

A coating mechanism for applying a coating to a traveling web wherein the web is received from a feed direction and the machine is to be used for coating either the upper or lower side of the web. The machine includes a pair of coating rolls forming a horizontal coating nip with the lower roll applying coating to the web, guide rolls for turning and guiding the web from the feed direction to the coating nip, an overhead dryer receiving the web from the nip, a frame supporting the guide rolls and coating rolls and pivotal about a vertical axis 180° between a first position wherein the web is wrapped in one direction around a lower guide roll to coat one surface of the web and a second position wherein the web is wrapped in the other direction around the lower guide roll to coat the opposite surface of the web.

13 Claims, 4 Drawing Figures



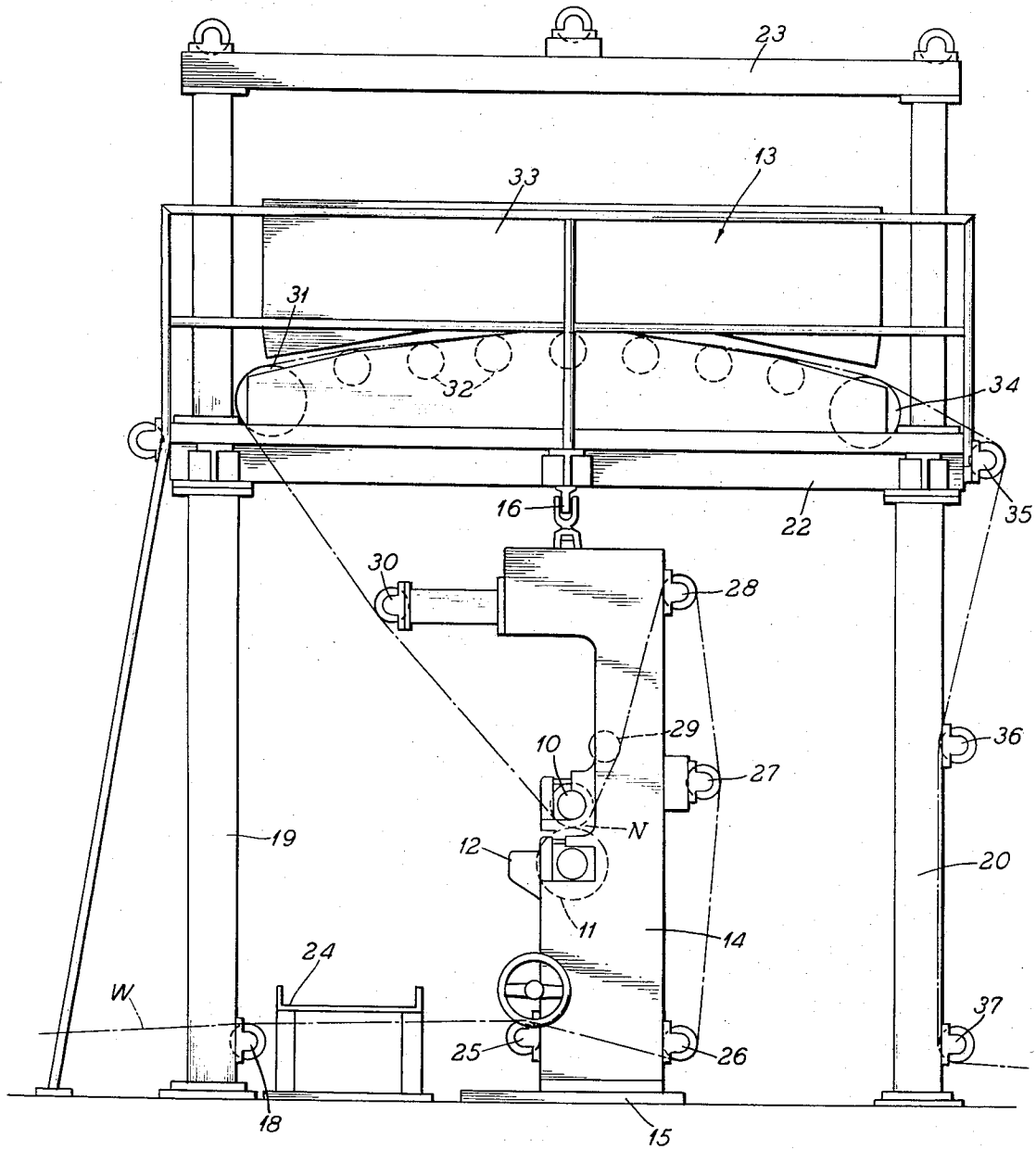


Fig. 1

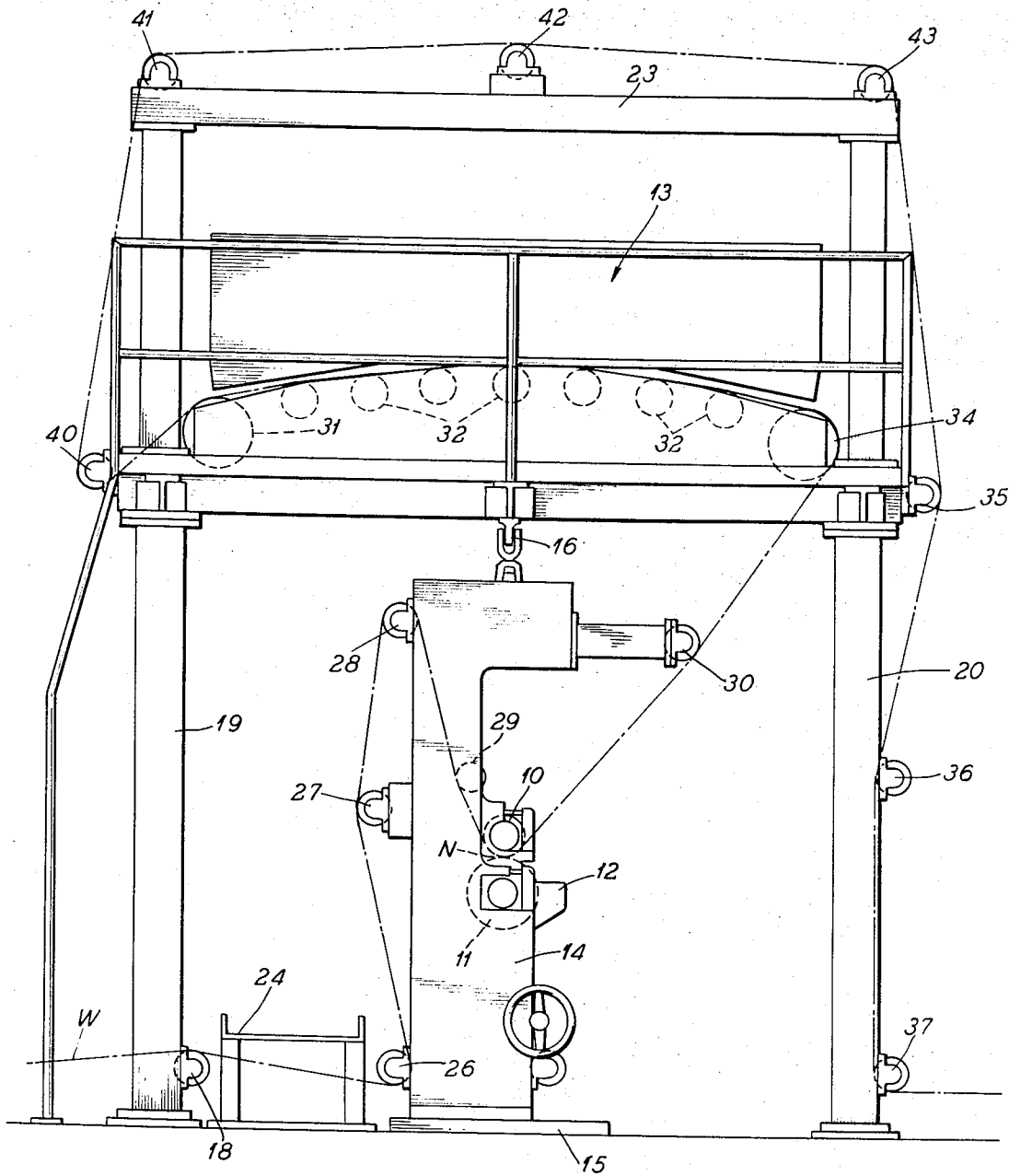


Fig. 2

Fig. 3

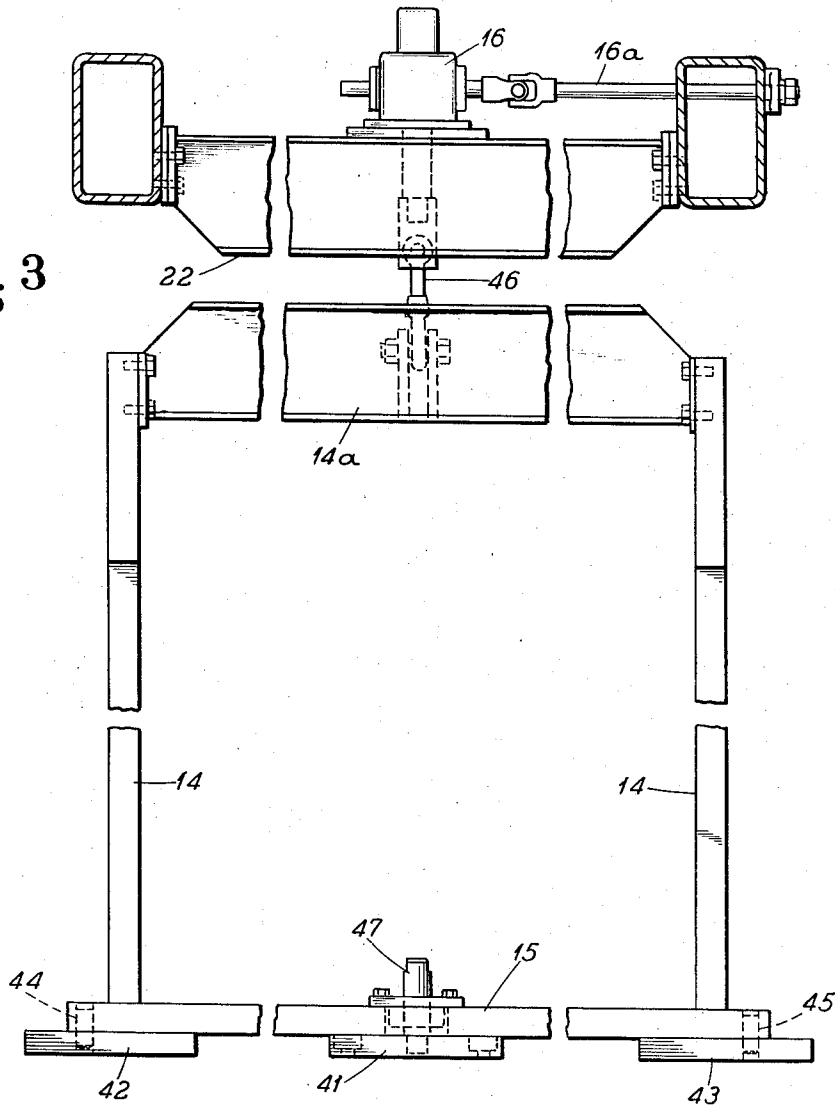
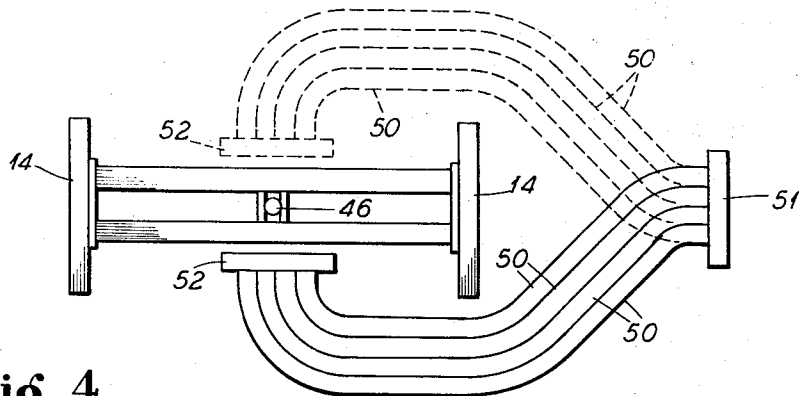


Fig. 4



REVERSIBLE COATER

BACKGROUND OF THE INVENTION

The invention relates to improvements in coating machines and more particularly to an improved reversible gravure coater wherein the web passes through the machine from a feed direction and the coater is reversible to coat either surface of the web without changing the feed direction of the web or without major reassembly or reconstruction of the machine.

As will be appreciated from the disclosure of the invention, the principles are well suited to use in coating various materials and in various types of coaters, but the principles are particularly well suited for use in a gravure coater, and the invention will be described in that environment. In a gravure coater the paper web will be fed from an unwinding roll in a feed direction to pass through a coating mechanism for first coating one surface of a web and subsequently coating the other surface. The functions of the machine may require coating a first surface at a first coating station with a subsequent operation on that surface and thereafter in a separate coater at a second coater station applying a coating to the other surface, and thereafter performing a subsequent operation on said other surface. It is advantageous if the same coater structure can be used at the different coating stations without reconstruction or without having to supply separate and distinct machines. It is also advantageous if the same machine can be constructed so that it is reversible and adaptable to coat either side of the oncoming web received from a single feed direction.

As an example of this type of operation, a traveling paper web is fed to a gravure coater for coating the upper surface of the web, and the coating is applied and dried, and the web is then fed to a laminator where the coated surface has a layer of plastic applied. The coating coats with the lamination application for an improved operation. Following the lamination, the web is fed to a second coating station where coating is applied to the lower surface of the paper web, and this coating is dried and the web is then fed to another laminator which applies a layer of plastic to the lower surface of the web.

In the past where both sides of the web had to be coated and a coater had to be flexible to coat either side, it was necessary to either roll the coater out into the aisle and rotate it for the change. Or, in some cases, it was necessary to have two separate machines of different construction.

It is an object of the invention to provide an improved coating mechanism capable of coating a traveling web on either side with the web approaching from the same direction of feed.

A further object of the invention is to provide an improved gravure coater which can be positioned at different stations in a line for coating from different sides of the paper without changing machine construction and which can be reversed by simple rapidly performed mechanical steps.

Other objects, advantages and features will become more apparent, as will equivalent structures which are to be covered hereby, with the disclosure of the principles of the invention in the description of the preferred embodiments, claims and drawings, in which:

DESCRIPTION OF THE DRAWINGS

FIG. 1 is an elevational view somewhat in schematic form of a coater embodying the principles of the present invention;

FIG. 2 is an elevational view in somewhat schematic form showing the coater reversed for coating on the other side of a web;

FIG. 3 is an elevational view with parts broken away for clarity of portions of the machine in FIGS. 1 and 2; and

FIG. 4 is a schematic top plan view illustrating the flexible supply cables for the structure.

DESCRIPTION OF THE PREFERRED EMBODIMENT

As shown in FIGS. 1 and 2 any suitable traveling web W such as paper, foil, and/or film enters from a feed direction to be coated. In FIG. 1 the upper surface of the web W is coated, and FIG. 2 the mechanism is arranged so that the lower surface is coated. The coating is applied in the adjustable nip N between coating rolls 10 and 11. The roll 10 is backup roll to carry the web through the nip, and the roll 11 applies coating to the roll surface. Coating is obtained from a pan 12. In a gravure coater the coating roll 11 has a coating pattern on the surface for carrying the coating against the web. As an example, the screen pattern on the roll may have 200 cells per square inch, 160 cells per square inch, or 120, or cells in other densities, and these cells may be arranged in patterns or in other instances, a smooth roll may be used. The cells basically meter an exact amount of coating onto the web. The operator can change patterns to change the amount of coating applied. Other types of coaters control the amount of coating applied by controlling the gap or pressure in the nip. With a gravure roll, an oscillating doctor is employed which moves across the face of the applicator roll 11, and the oscillation meters the coating and removes the specks which get caught on the gravure roll in the coating supply pan. The power for the oscillation is supplied by hydraulic and air pressure lines or an electric motor led from outside the machine, and these supply lines create a problem which is to be encountered in any changing of position of machine parts. Air pressure may also be employed in loading the nip for the rolls.

Coating is supplied to the coating applicator roll 11 from a pan 12. The applicator and backup roll and additional guide rolls are supported on a frame 14 which has end pieces to support the roll bearings. The frame is mounted on a support base 15 which is uniquely supported to be rotatable about a vertical axis. The axis is in alignment with a power lift 16 which operates to raise the heavy weight of the frame and its supported rolls when rotation from the position of FIG. 1 to the position of FIG. 2 is to be accomplished.

As the web leaves the coater, it passes to an overhead dryer 13 which is so arranged that the web can pass therethrough in either direction for operation in the position of FIG. 1 or in the position of FIG. 2.

The web will, in position 1 of FIG. 1 and in position 2 of FIG. 2, enter the nip N between the rolls from the same direction, which can be referred to as the onrunning side of the nip. The web leaves the coating applicator on the offrunning side and passes upwardly to the dryer. In some instances it may be desirable to provide smoothing or metering means for the coating on the of-

frunning side of the coating applicator. In one form the smoothing or metering means will include a small bar with a guide roll so as to cause the web to wrap over the bar. The bar will be on the lower coated side. A second bar may be employed with an additional guide roll to provide a wrap over the second smoothing bar. These smoothing bars may also be termed metering bars, and a saveall pan may be placed below them in case there is any drippage. The smoothing means can be mounted on the main frame and can be pulled off or jacked out of the web path to be stored in an upper position.

Referring in greater detail to the path of the web through the coater, as the web approaches from the feed direction, as shown in FIG. 1, it passes over an idler roll 18 which is mounted on an upright stanchion 19. The structure for carrying the coater 13 includes the stanchion 19 and another stanchion 20 and a cross-beam 22 extends across between the stanchions to support the jack lift mechanism 16 which can be driven by any suitable means not shown. A higher cross-beam 23 at the top of the stanchions supports additional idler or guide rolls which come into play in the threading of the web through the path of FIG. 2.

Returning to FIG. 1, the web passes from the roll 18 past a walkway 24 over a guide roll 25 and is threaded around a lower guide roll 26, up over an intermediate guide roll 27 and over an upper guide roll 28 and then down past a spreader roll 29 to enter the coating applicator nip. From a general standpoint, it is the guide roll 26 or a similar roll which is essential and is located at an elevation different from the nip. When the upper side of the web is to be coated, as it is in FIG. 1, the web is wrapped around the lower guide roll from one direction to pass up over additional guides into the nip. In the position of FIG. 2, the web is wrapped over the lower guide roll 26 from the opposite direction so that the lower surface of the web is coated.

In the position of FIG. 2, the web feeds from the same feed direction, is threaded past a walkway 24 and wraps the lower guide roll 26. It passes upwardly over the guide roll 27 and wraps the upper guide roll 28 to pass down over the spreader 29 and into the nip between the back-up and applicator rolls 10 and 11.

Returning again to FIG. 1, as the web leaves the off-running side of the nip, it passes up over a steadying guide 30 and up onto the first roll 31 of the dryer. The web is supported in its travel through the dryer over a series of rolls 32 and is subjected to a flow of heated air from an aircap 33 for drying the coating. The web leaves the last roll 34 of the dryer and is guided down over guide rolls 35, 36 and 37 mounted on the stanchion 20, and then passes on horizontally to the next succeeding piece of web treating equipment. Suitable heated drying means (when required) are provided for the aircap 33 such as by providing a flow of heated air through openings in the bottom of the dryer.

In the position of FIG. 2, the web passes through the dryer in the opposite direction being threaded upwardly first around the dryer roll 34 and then over the support rolls 32 and finally over the roll 31 where it is wrapped around a roll 40 on the stanchion 19. The web then passes upwardly over rolls 41, 42 and 43 on the upper beam 23 and is threaded downwardly over the rolls 35, 36 and 37 to exit horizontally and pass onto the next piece of web treating equipment.

FIG. 3 shows in more detail the mechanism for rotating the frame 14 and its supported rolls. The base plate

15 is supported on a center plate 41 on the floor which has a hole so as to be journaled on a vertical axis pivot pin 47 which is long enough to permit lifting the equipment slightly. This accommodates rotation of the mechanism through 180° from the first position shown in FIG. 1 to the second position shown in FIG. 2. At each position the base plate 15 is locked by positioning pins 44 and 45. Additionally, hold-down bolts may be provided extending through holes in the plate 15 and threaded into the members 42 and 43 which are rigidly attached to the floor. The pins 44 and 45 in the holes are so located that the rolls are accurately positioned to be in alignment with the feed direction of the web.

The frame members 14 at the ends of the rolls have an upper cross-frame member 14a to which is attached the lift 16 which is provided with suitable shackle linkage 46 which permits manual rotation of the frame 14 through 180° when lifted. The lift 16 is a worm gear arrangement and is driven through a shaft 16a.

When the mechanism is to be lifted, the shaft 16a is driven to raise the weight of the frame and the rolls so that it can be readily rotated between position 1 and position 2, and when the positioning pins are in place, the driving means is reversed to lower the frame 14 into operating position.

FIG. 4 shows schematically the supply lines leading to the coating mechanism on the frame 14. These lines 50 may include the coating conduits, the pneumatic conduits, the hydraulic conduits and any electrical conduits. The lines shown at 50 are flexible tubes and lead from stationary supply header 51 to a header 52 on the machine. As the machine is rotated between its positions, the flexible tubes will accommodate this rotation as shown by the dotted line position of the tubes and header 52.

Another advantage is to rotate the frames 14 90° toward the isle for rapid removal of the back-up roll 10 and/or the gravure roll 12, or other mounted unit that may require changing or storing.

This invention makes it possible to design and manufacture a single direction coater without any compromises in functional design or operation and at minimum cost and then rotate this unit to the second position for opposite side coating. The set up time is minimal and all parts are not required to be refitted as is usual in other coaters.

Thus, it will be seen that we have provided an improved coating mechanism which meets the objectives and advantages set forth. The mechanism can quickly and readily be set within a matter of minutes between its positions to coat either side of the traveling web. Also, a single mechanism can be manufactured for furnishing to customers to operate in a location for receiving the web from either side.

We claim as our invention:

1. A coating mechanism for applying a coating to the surface of a traveling web comprising in combination, a horizontally extending coating applicator roll for applying coating to a traveling web, a horizontally extending backing roll above the applicator roll forming a coating nip with said applicator roll for the web to pass through from the oncoming side of the nip to leave on the offrunning side of the nip, offrunning guide means for guiding the web away from the nip, a frame supporting said guide means and said rolls,

a vertical axis rotary support for the frame means accommodating rotation of the frame, rolls and guide means from a first to a second position substantially 180° apart for receiving web supplied from a feed direction, and for rotation in intermediary positions therebetween,
locking means for selectively locking said frame at either said first or said second position,
and oncoming feed guide roll means for guiding the web from the web feed direction to the nip to be wrapped in different directions in said first and second positions with one surface of the web being coated in the first position and the other surface being coated in said second position.

2. A coating mechanism for applying a coating to the surface of a traveling web constructed in accordance with claim 1 and including flexible supply lines means extending in an axial direction from one end of the rolls accommodating rotation of the frame from said first to said second position.

3. A coating mechanism for applying a coating to a surface of a traveling web comprising in combination, means defining a horizontally extending coating applicator for applying a coating to one surface of a web with the web entering an oncoming side of the applicator and leaving from an offrunning side of the applicator,

a support for the applicator accommodating rotation about a vertical axis from a first coating position to a second coating position substantially 180° from the first said support accommodating rotation to intermediate positions therebetween, and feed roll means for directing the web approaching from a web feed direction to said oncoming side directing the web to coat one surface in said first position and the other surface in said second position.

4. A coating mechanism for applying a coating to a surface of a traveling web constructed in accordance with claim 3 and including a frame means carrying the feed roll means and applicator and mounted on said support.

5. A coating mechanism for applying a coating to a surface of a traveling web constructed in accordance with claim 3 wherein said feed guide means has a web guide element located at a different elevation than said coating applicator so that the web can be wrapped in one direction around said element in said first position and in the other direction in said second position.

6. A coating mechanism for applying a coating to a surface of a traveling web constructed in accordance with claim 3 wherein said feed guide means includes an upper guide roll and a lower guide roll with the lower guide roll receiving the web from said feed direction and the web thereafter traveling over the upper guide

roll to the oncoming side of the applicator with the web wrapped in one direction around the lower roll in said first position and in the opposite direction in said second position.

7. A coating mechanism for applying a coating to a surface of a traveling web constructed in accordance with claim 3 and including an overhead dryer positioned to receive the web from the offrunning side of the applicator.

8. A coating mechanism for applying a coating to a surface of a traveling web constructed in accordance with claim 7 wherein said dryer extends above the applicator and is adapted to receive the web from either side so that the web can be discharged in the direction opposite said web feed direction in either said first or said second position of the applicator.

9. A coating mechanism for applying a coating to a surface of a traveling web constructed in accordance with claim 3 wherein said coating applicator includes upper and lower rolls forming a coating nip therebetween with the lower roll adapted to carrying a coating on its surface for application to the surface of the web.

10. A coating mechanism for applying a coating to a surface of a traveling web constructed in accordance with claim 3 and including flexible supply tubes extending axially from one end of the coating applicator in a direction lateral to the web feed direction and accommodating movement of the applicator between said first and second positions.

11. A coating mechanism for applying a coating to a surface of a traveling web constructed in accordance with claim 3 and including means to meter the coating on the offrunning side of the coating applicator, said metering means being moveable into or out of the web path.

12. A coating mechanism for applying a coating to a surface of a traveling web constructed in accordance with claim 3 wherein an intermediate third position is provided at approximately 90° from the first or second position for rotation of the frame, said third position to allow for easy access to removeable structures.

13. A coating mechanism for applying a coating to a surface of a traveling web comprising in combination, means defining a coating applicator structure for applying a coating to one surface of a web with the web entering an oncoming side of the applicator structure leaving from an offrunning side of the applicator structure,

a support for the applicator structure accommodating rotation about a vertical axis, and means to rotate the applicator structure around said support structure.

* * * * *

55

60

65