June 21, 1927.

C. C. COLBERT ET AL

1,632,885

WEB COATING APPARATUS

Filed Feb. 6, 1924

3 Sheets-Sheet 1

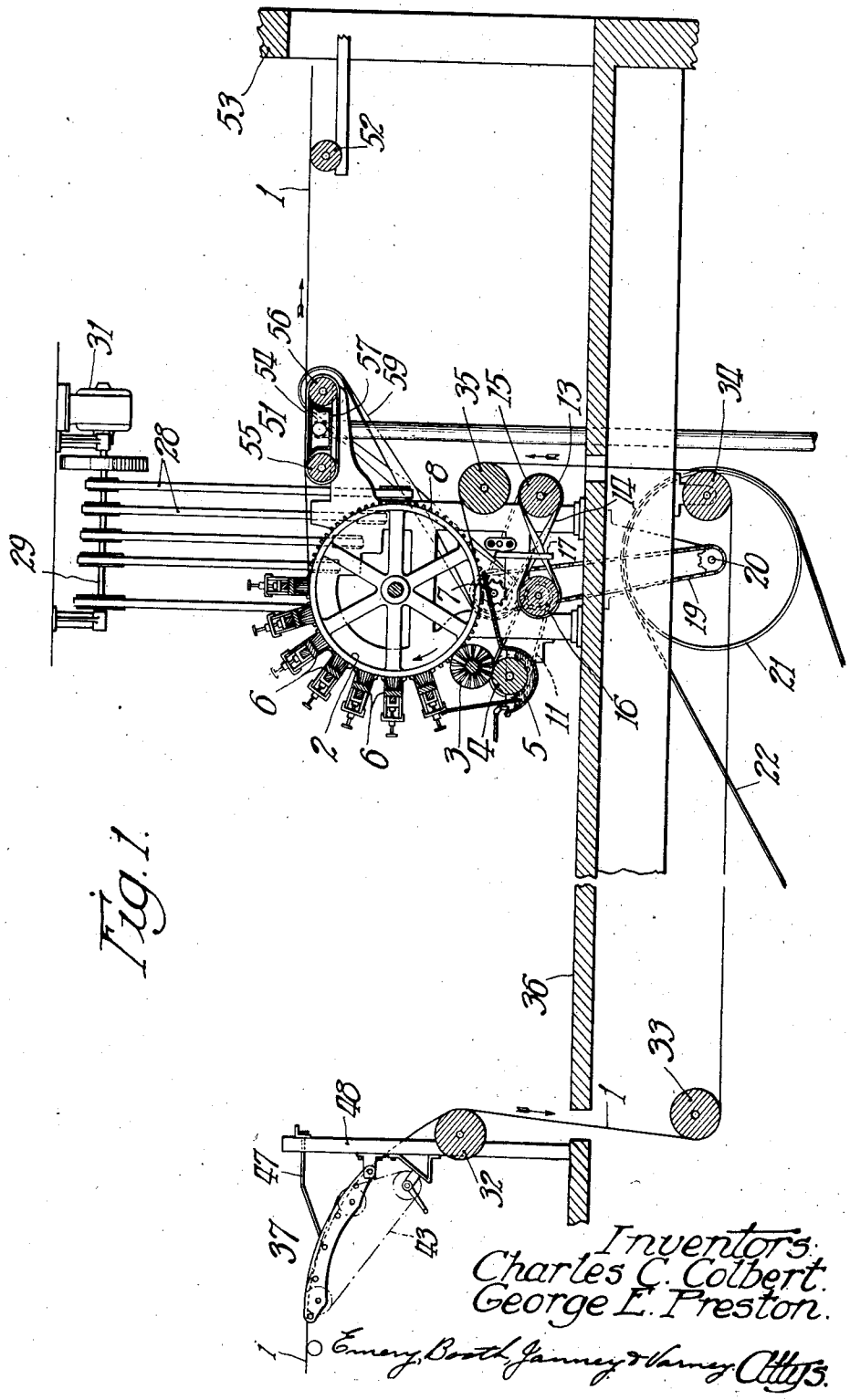


Fig. 1.

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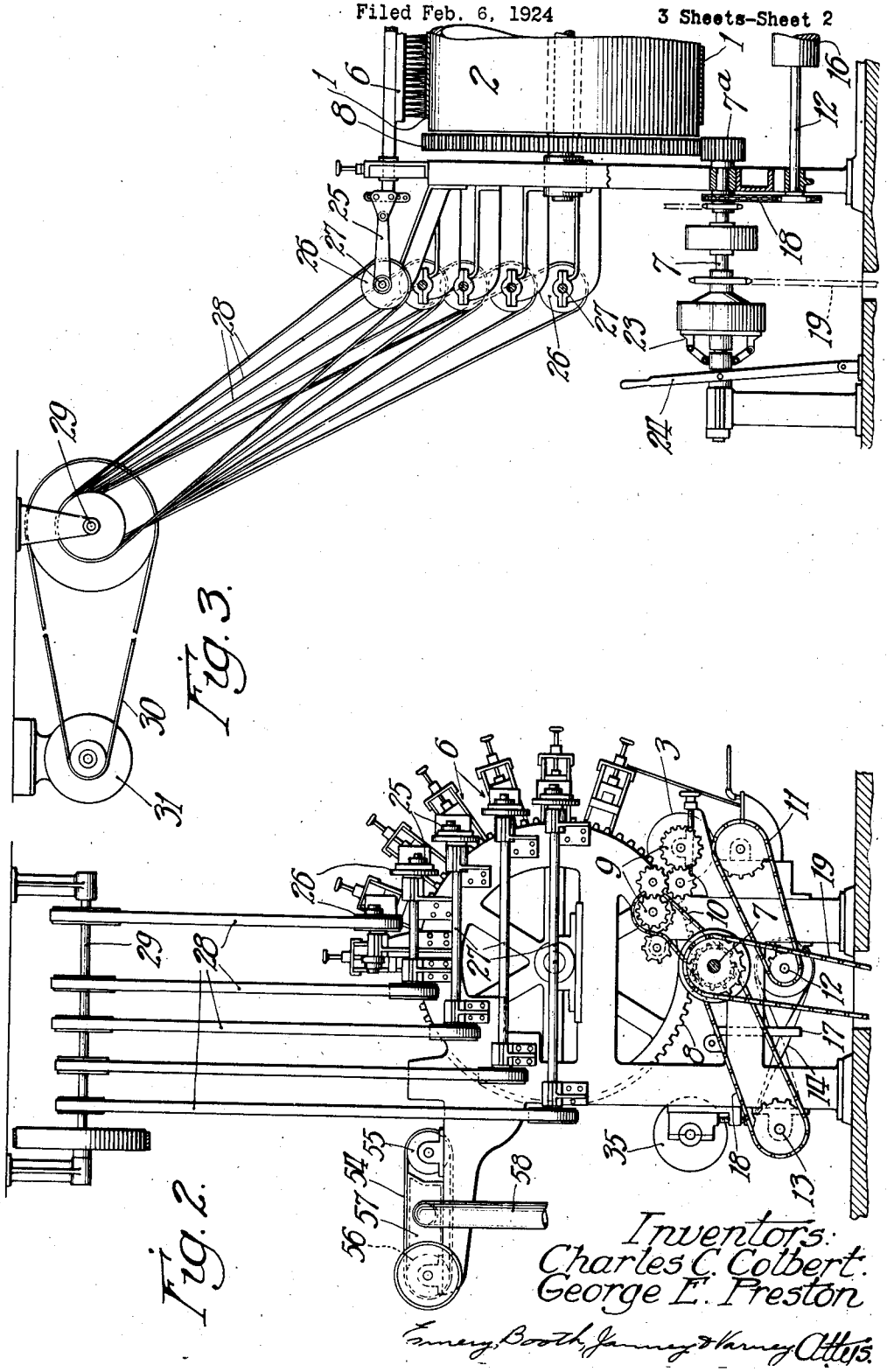


Fig. 3.

Fig. 2.

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Fig. 4.

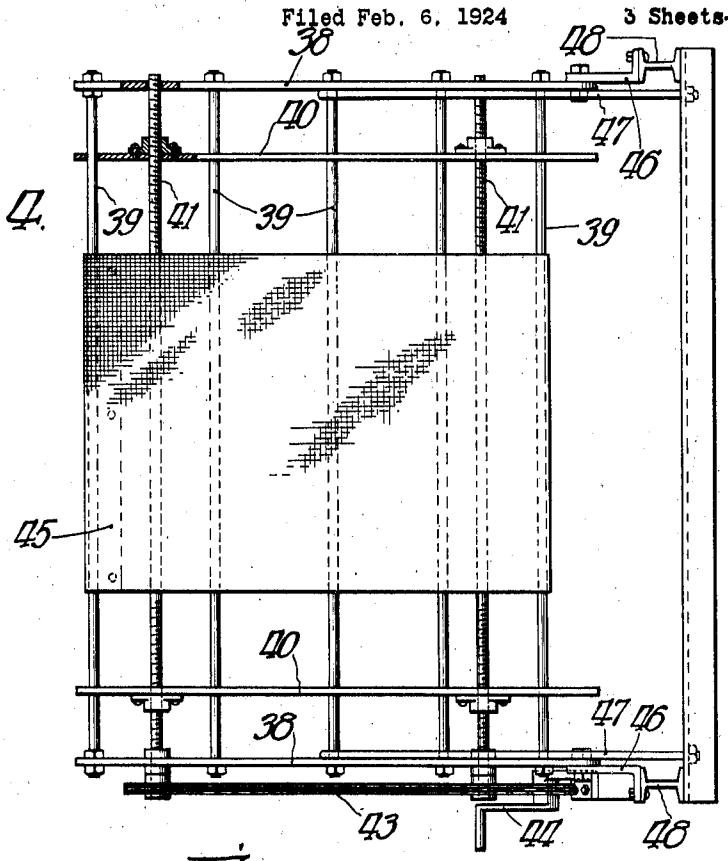
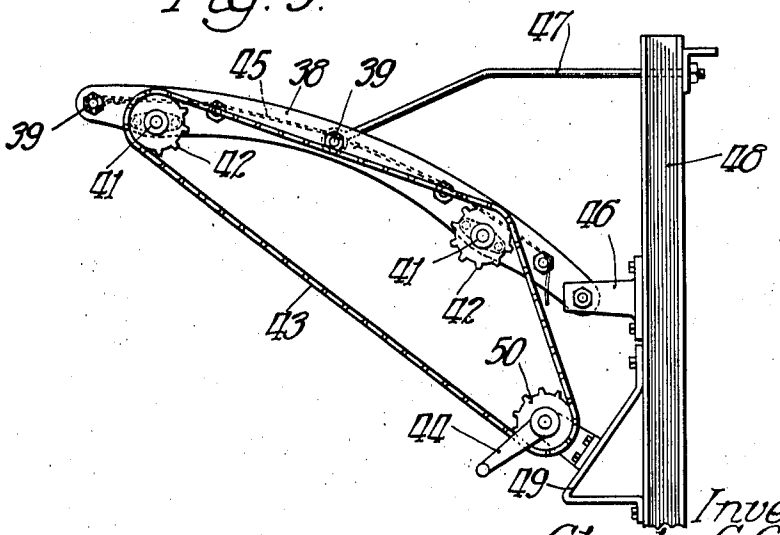


Fig. 5.



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UNITED STATES PATENT OFFICE.

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WEB-COATING APPARATUS.

Application filed February 6, 1924. Serial No. 690,905.

The present invention aims to provide an improved apparatus for use in conducting a web coating operation, having in view advantageous handling and conditioning of the web while drawing the same from a source preceding the coating appliance, and other advantages including permissive speed changing without affecting speed of the reciprocating brushes which brush the coating liquid applied to the web.

The nature of the invention will be readily understood by reference to one practicable apparatus containing an embodiment of the invention, which is shown for illustration in the annexed drawings.

In said drawings:

Fig. 1 is a longitudinal sectional elevation of the illustrative apparatus.

Fig. 2 is a side elevation of the coating machine employed in said apparatus, viewed from the side opposite to that shown in Fig. 1.

Fig. 3 is a front sectional elevation of the end of the coating machine shown in Fig. 2, parts being omitted.

Fig. 4 is a plan view of a web guiding and tensioning device shown at the receiving end of the apparatus illustrated in Fig. 1.

Fig. 5 is a side elevation of the structure shown in Fig. 4.

The illustrative apparatus is described with reference to the coating of paper board. A web of paper board undergoing a coating operation is designated in the drawings by the numeral 1.

Paper board is usually formed as a laminated web of cheap paper stock, surfaced or lined with superior stock which is calendered with a smooth finish to receive application of a liquid coating, such for instance as a solution of clay and casein with or without coloring pigments.

The type of machine commercially used for coating board comprises a revolving cylinder about which the board is trained, together with a rotating brush for applying the liquid coating to the board as it travels on said cylinder, and also a number of reciprocating brushes for brushing the applied liquid thoroughly and uniformly on the board.

Such a machine is illustrated in the drawings, wherein 2 denotes the revolving cylinder of the machine; 3 the rotating brush for application of the coating liquid; 4 the roll contacting with said brush for supplying the coating liquid thereto; 5 the liquid tank; and 6 the reciprocating brushes for brushing the liquid on the board.

The numeral 7 denotes a drive shaft for the machine, the cylinder 2 of which is driven by the pinion 7^a meshing with the gear 8. The rotating brush 3 is driven by a train of gears 9 driven by the sprocket chain 10 from said shaft 7. The roll 4 is driven by a sprocket chain 11 from a shaft 12 which is driven from a shaft 13 by the crossed belt 14 engaging cone pulleys 15 and 16; said belt 14 being engaged by a belt shifter 17. Shaft 13 is driven by the sprocket chain 18 from the shaft 7.

The drive shaft 7 is shown connected by a sprocket chain 19 with a shaft 20 which is driven by the pulley 21 and belt 22 from any suitable source, the transmission means including a variable speed mechanism (not shown) whereby the speed of operation of the coating machine as a whole may be adjusted as required, while the speed of rotation of the liquid supplying roll 4 may be independently adjusted by the belt shifter 17 to control the amount of liquid applied to the board by the rotating brush, or in other words to regulate the thickness of the liquid coating.

By means of the clutch 23, operated by the lever 24, the drive shaft 7 may be connected and disconnected with the power so as to permit starting and stopping the coating machine as required; it being understood that the operation of the coating machine must occasionally be interrupted for cleansing brushes, changing colors or for other purposes.

The reciprocating brushes 6 are shown connected by pitmen 25 to crank wheels 26 on shafts 27 which are driven at different speeds by the belts 28 engaging pulleys of different sizes on an overhead shaft 29 which is driven by the belt 30 from an independent motor 31. This permits adjustment of the speed of operation of the reciprocating brushes independently of the speed of the coating machine, and permits the speed of the coating machine to be adjusted without affecting the speed of the reciprocating brushes, as may be desired, for example, where the speed of the machine is momentarily increased or reduced to compensate for an increase or reduction in the supply

of the web being drawn through the machine.

In the operation of the coating machine, the board is drawn around the cylinder 2 from a source of supply, while the coated board is discharged from the cylinder. It is necessary to expose on the cylinder the desired surface to be coated, which is usually the calendered top surface of the board as it comes from the board making machine; and it is also desirable to run the board coated side uppermost from the coating machine in order to discharge the board and hang it up for drying without contact of its freshly coated surface with supporting means or other objects.

In this instance the coating machine draws the board from a source of supply in front of the machine, while the coated board is discharged from the top side of the cylinder toward the rear, or in the same general direction as the incoming board. This unique arrangement is obtained by running the incoming board under the coating machine cylinder and thence reversely or backwardly under and around the front side of the cylinder and off from its top side. According to the specific construction shown in the drawings, the board is trained in engagement with a number of guide rollers 32, 33, 34 and 35, the rollers 33 and 34 being located under the floor 36 of the coating room or plant, and the roller 35 being located under and beyond the axis of the coating machine cylinder.

It will be observed that the surface of the board exposed to the action of the brushes on the coating machine cylinder is the same as the top surface of the incoming board or in other words the board is run through the coating machine without inversion, while it is nevertheless discharged coated side uppermost and toward the rear. This arrangement enables the board to be supplied directly from a preceding board making machine, and to be drawn through the coating machine and to a drying room beyond without disturbing the alignment of the board in the consecutive operations of making or coating, and without requiring transportation of rolls of board from place to place in the plant.

There is shown in the drawings a curved guide designated as a whole by the numeral 37 in Fig. 1 and over which the board is drawn from its source of supply. This device, shown in detail in Figs. 4 and 5, is represented as comprising curved side bars 38 rigidly connected by transverse rods 39. Between the side bars are lateral guide members 40 for engaging the edges of the board to maintain its longitudinal alignment, it being understood that the board is drawn over the rods 39 between said guide members 40. These guide members 40 are slidably mounted on the rods and are simultaneously adjustable toward and away from each other by a pair of screws 41 having right and left-hand threads engaging said members. Said screws, rotatably but non-slidably mounted in the supporting side bars 38, are shown equipped with sprocket wheels 42 engaged by a sprocket chain 43, whereby the screws may be operated in unison by the crank 44 for adjusting the guide members 40 to accommodate the particular width of board undergoing treatment.

By drawing the board over a curved stationary support such as is provided by the rods 39 of the described structure, a frictional resistance or drag is exerted, with a resultant tensioning of the board beyond the guide. Should the board be in slack condition in advance of the guide, the frictional drag against the pulling action of the coating machine will effect a desirable slack elimination; and even if the board should be drawn against a preceding resistance, or if withdrawn from a supply in a roll, the drawing over the guide will be advantageous for tensioning purposes, it being desirable that the board be drawn in smooth taut condition through the coating machine. Moreover the drawing of the board from a succession of transverse rods will promote smoothing out any irregularities in case the board is more or less warped or bent at its source of supply, as for example where the board is withdrawn from a storage apparatus where it hangs in festoons.

The drag or frictional resistance of the coating and tensioning device may if desired be increased by spreading a sheet of felt 45 or other friction producing material over the device to increase the area of resisting surface in contact with the board. Such a sheet of felt is indicated at 45 in Figs. 4 and 5, said felt sheet being attached to the front rod of the device.

As shown in the drawings, the guiding and tensioning device is attached by brackets 46 and tie braces 47 to supporting uprights 48. A bracket 49 supports the bearing for the sprocket wheel 50 carrying the crank 44 for adjusting the screws 41 which regulate the width of the guiding and tensioning structure.

From the guide 37 the board is shown running over the roller 32 and down through an opening in the floor under the subjacent roller 33, and thence forwardly under the floor around the roller 34 and up through an opening in the floor and around the roller 35, and thence backwardly under and around the cylinder 2 of the coating machine, which draws the board from its source of supply through the course provided by the system of rollers mentioned. These rollers are or may be rotated by frictional engagement with the traveling board as it is drawn through the

coating machine. The drawing of the board about a set of guides or rollers arranged to deflect the course of the board contributes to the tensioning of the board, so as to insure a smooth condition during the application of the liquid coating. The tensioning of the board may be increased if necessary by braking or frictionally resisting the rotation of any of said rollers.

Where the board is drawn from a supply of slack, it is desirable to take up the slack gradually and to tension the board in advance of the coating operation without subjecting it to sharp flexing or sudden stress in its passage from the source of supply to the coating machine. This is accomplished by the method and apparatus described, by which the board is initially subjected to dragging action as it is drawn from the guide 37, and then drawn around a system of rollers arranged to deflect the course of the board and also to cause the web to reverse the direction of its travel; so that the board is drawn sufficiently taut through the coating machine but without undue stretching or sudden tensioning in transition from slack to taut condition.

By running the board under the floor of the plant a suitable distance in advance of the coating machine cylinder, and thence upwardly and around the cylinder, as shown, a clear floor space and transverse aisle from side to side of the plant is provided in front of the coating machine, as is required for the use of operatives and attendants at the coating machine. In other words the board is drawn through the coating machine from a preceding source of supply while at the same time maintaining the necessary clear floor space in front of the machine; and in addition to this advantage the board is drawn through the coating machine without inversion, as already stated, so that, assuming that the desired surface to be coated is the top surface of the incoming board, that surface is exposed to the action of the brushes on the coating machine cylinder.

The board is shown running from the coating machine cylinder over a suction appliance 51 and thence over a supporting roller 52 into a drying room, the front wall of which is indicated at 53. The said suction appliance may comprise an endless cloth 54 traveling around power driven rollers 55 and 56 and over a stationary suction box 57, the latter being connected by pipe 58 with any appropriate vacuum producing apparatus. The endless cloth 54 is driven by the roller 56 which is driven by the cross belt 59 from the shaft 7.

Obviously the present invention is not limited to the precise details of construction and arrangement of the illustrative apparatus since the same may be varied to suit different conditions and requirements. Moreover it is not indispensable that all the features of the invention be used conjointly since they may be advantageously used in various different combinations and subcombinations.

We claim as our invention:

1. An apparatus of the class described comprising, in combination, a web coating machine having a rotating cylinder around which the web is drawn and means for coating the web on the side thereof exposed on said cylinder; preceding equipment in engagement with which the web is drawn against a frictional resistance; said preceding equipment arranged substantially remote from said machine, with an intervening clear floor space in front of said machine; and a set of rollers engaged by the web between said preceding equipment and machine, said rollers arranged to cause the web to travel from said equipment downwardly through the floor and thence along under the floor and up therethrough to a point below said machine and thence reversely around said cylinder on the side thereof confronting said preceding equipment; whereby the web is drawn through said machine under tension and in such manner as to expose on said cylinder the top side of the incoming web and to discharge the web coated side up from the top side of said cylinder in the same direction away from the apparatus that the web is drawn toward the apparatus.

2. An apparatus of the class described comprising, in combination, a web coating machine having a rotating cylinder around which the web is drawn and means for coating the web on the side thereof exposed on said cylinder; preceding equipment in engagement with which the web is drawn against a frictional resistance; means associated with said equipment for aligning the web; said preceding equipment arranged substantially remote from said machine, with an intervening clear floor space in front of said machine; and a set of rollers engaged by the web between said preceding equipment and machine, said rollers arranged to cause the web to travel from said equipment downwardly through the floor and thence along under the floor and up therethrough to a point below said machine and thence reversely around said cylinder on the side thereof confronting said preceding equipment; whereby the web is drawn through said machine under tension and in such manner as to expose on said cylinder the top side of the incoming web and to discharge the web coated side up from the top side of said cylinder in the same direction away from the apparatus that the web is drawn toward the apparatus.

3. An apparatus of the class described comprising, in combination, a coating ma-

chine; means located a substantial distance in advance of said coating machine for aligning a web drawn by said machine from a preceding source, including a curved supporting structure over which the web is drawn against frictional resistance by rubbing engagement with said structure; and a plurality of guides engaged by and arranged to deflect the course of the web between said curved supporting structure and coating machine.

4. In an apparatus of the class described, a web coating machine comprising a cylinder; means for guiding the web drawn around said cylinder; a rotating brush for applying liquid coating to said cylinder; reciprocating brushes for brushing the applied liquid on the web; driving means for said cylinder and liquid applying brush; and an independent motor for operating said reciprocating brushes, whereby the speed of the machine may be adjusted without affecting the speed of the reciprocating brushes or the speed of the reciprocating brushes may be adjusted independently of the speed of the coating machine.

5. An apparatus of the class described comprising, in combination, a coating machine including a cylinder; preceding web guiding and smoothing means through which the web is drawn by said coating machine from a source of supply; and interposed web guiding means arranged to carry the incoming web under the floor of the apparatus to a distance beyond the axis of the cylinder of said coating machine and thence upwardly and around said cylinder on side thereof confronting said preceding means and in a direction to expose on said cylinder the side of the web which is the top of the incoming web and to discharge the same coated side uppermost; said arrangement leaving a clear floor space in front of the said coating machine between said machine and the said preceding means.

6. An apparatus of the class described comprising, in combination, a coating appliance; a preceding web guide comprising parallel guide members between which the web is drawn from its source of supply; means for simultaneously adjusting said guide members to suit the width of the web; and means interposed between said coating appliance and guide for guiding the web.

In testimony whereof, we have signed our names to this specification.

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