Dec. 6, 1966 T. J. ROSEMA 3,289,814

APPARATUS FOR DRYING COATED SHEET STOCK

Filed Jan. 23, 1964 3 Sheets-Sheet 1

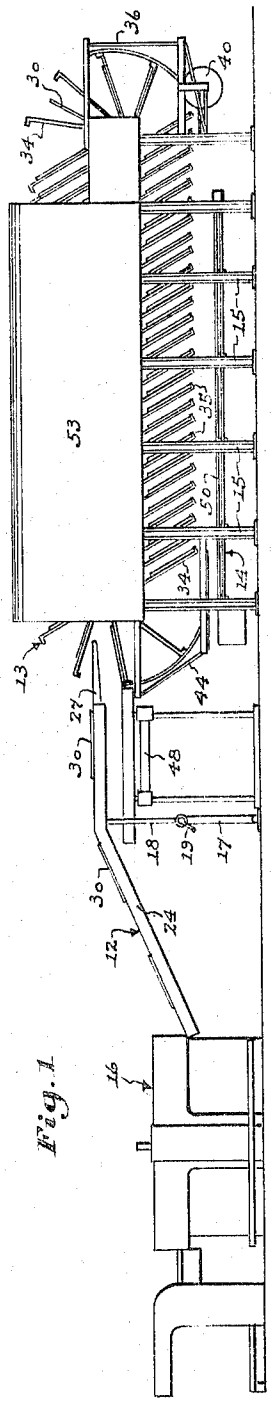


Fig. 1

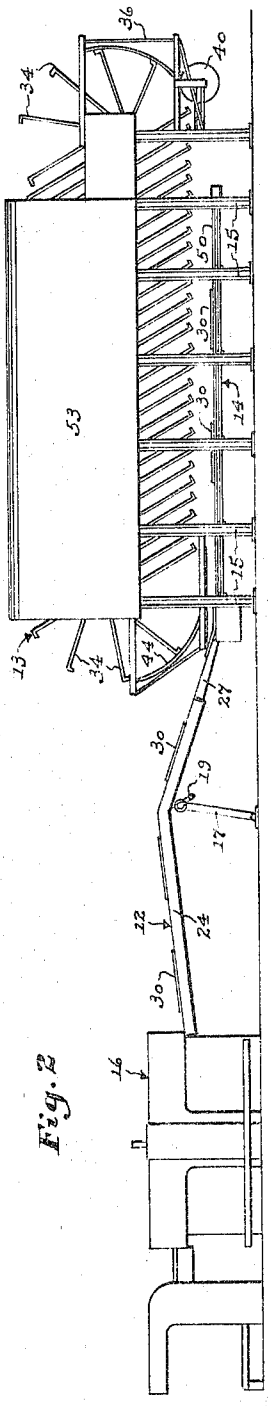


Fig. 2

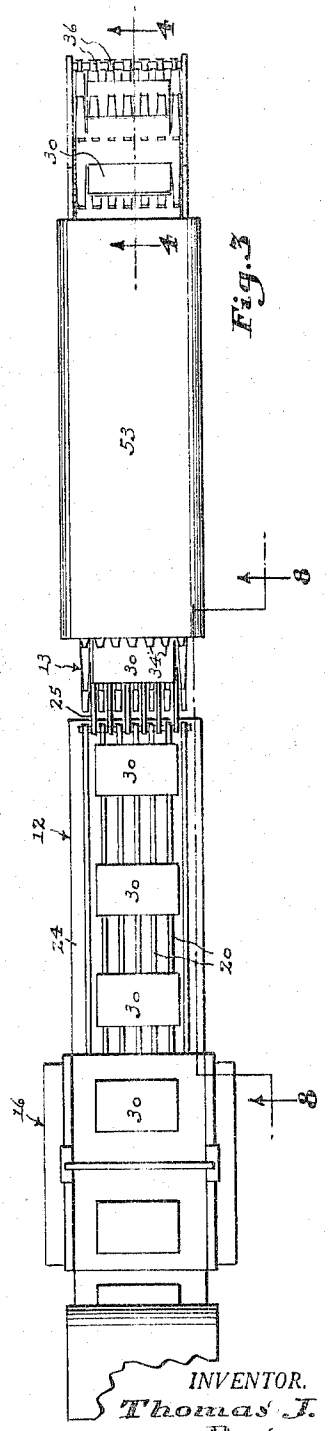


Fig. 3

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APPARATUS FOR DRYING COATED SHEET STOCK

Filed Jan. 23, 1964 3 Sheets-Sheet 2

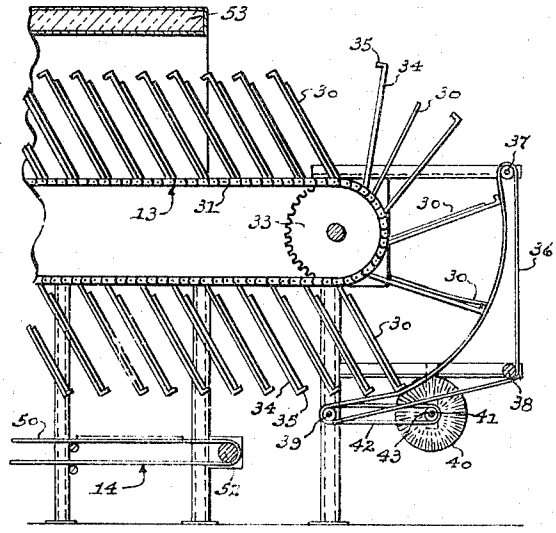


Fig. 4

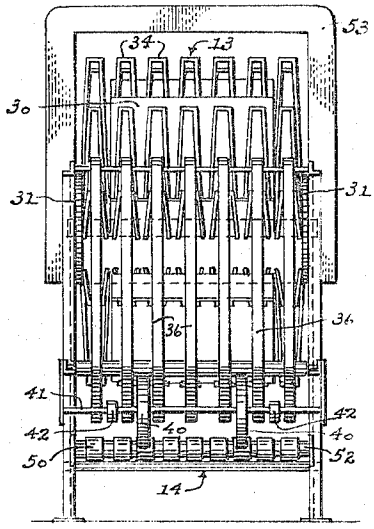


Fig. 5

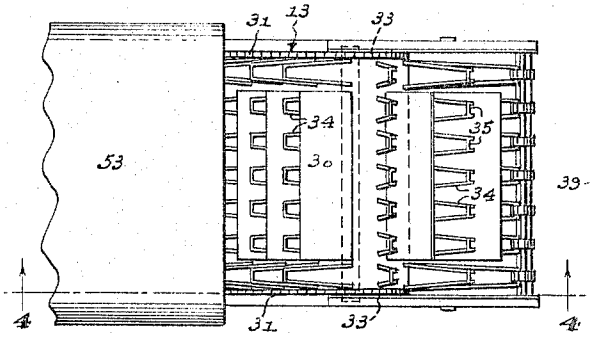


Fig. 6

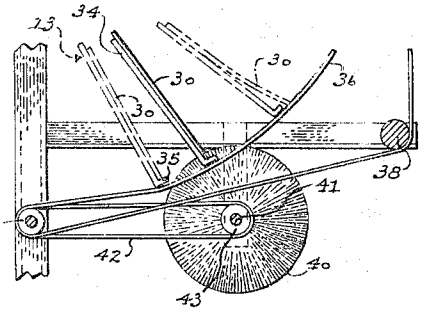


Fig. 7

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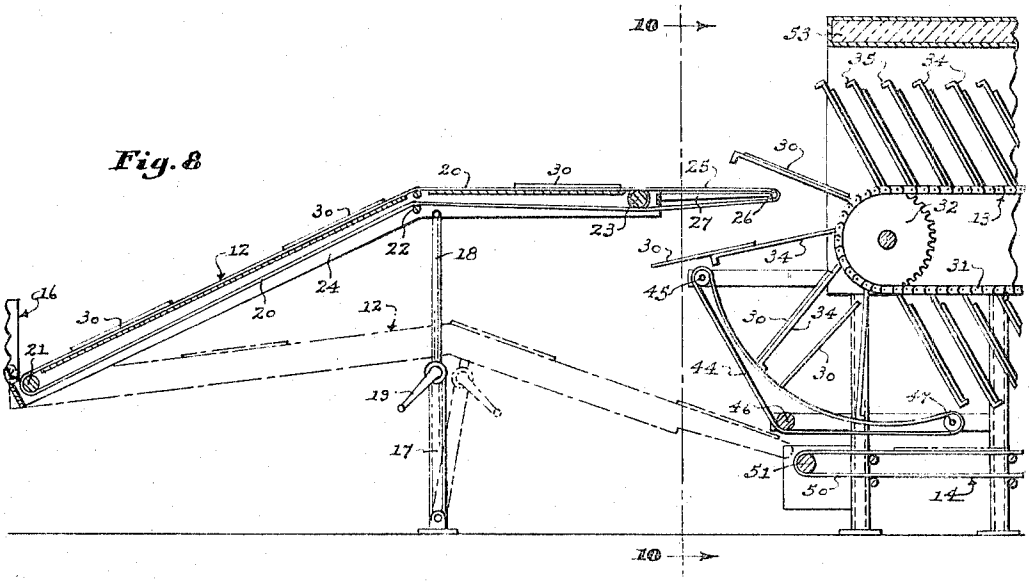
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APPARATUS FOR DRYING COATED SHEET STOCK

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Fig. 8



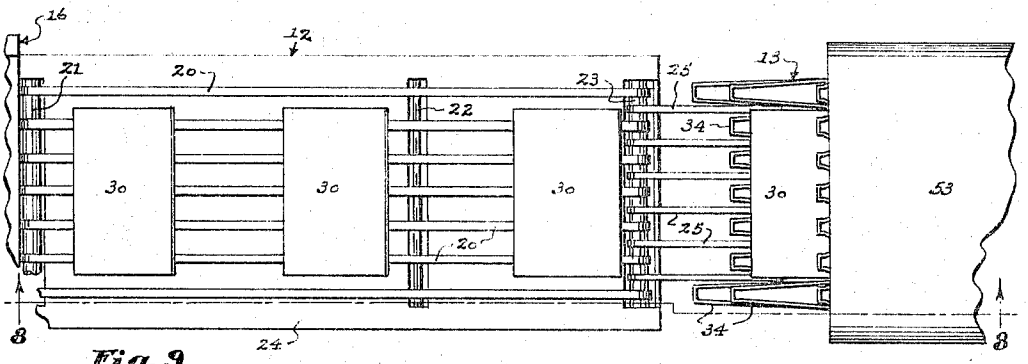
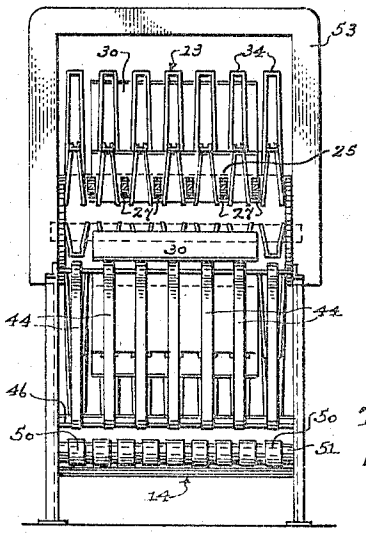


Fig. 9

Fig. 10



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United States Patent Office 3,289,814 Patented Dec. 6, 1966

3,289,814
APPARATUS FOR DRYING COATED SHEET STOCK

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Filed Jan. 23, 1964, Ser. No. 339,788
6 Claims. (Cl. 198—134)

The present invention relates to apparatus for drying coated sheet stock, and more particularly to such apparatus adapted for association with a screen stencil printing machine for drying coated sheet stock coated thereby.

The primary objects of the invention are to provide coated sheet drying apparatus which is especially well adapted for drying coated sheets delivered to the apparatus from a screen stencil machine; to provide apparatus for drying sheet stock which is coated with either quick-drying or slow-drying materials; to provide such drying apparatus which includes an endless wicket-type conveyor for drying sheets which are coated with slow-drying material, and in which the coated sheets are advanced from a receiving station across an upper reach of the wicket conveyor to a transfer station, and then returned across a lower reach of the conveyor to a delivery station; to provide means at the transfer station, where each sheet is transferred from its advance trip wicket carrier to the next preceding wicket carrier for the return trip, whereby the sheets are positively prevented from falling off the conveyor during the transfer; to provide similar means near the delivery station of the endless wicket conveyor for retaining the sheets on the conveyor; and in general to provide such coated sheet drying apparatus which is efficient and versatile in performance, and also compact and reasonably economical in construction.

An illustrative embodiment of the invention is shown in the accompanying drawings, wherein:

FIGURE 1 is a side elevational view of the new coated sheet drying apparatus associated with a screen stencil printing machine shown somewhat diagrammatically at the left side of this view, the drying apparatus being here shown set up for drying sheet stock coated with slow-drying material on an endless wicket conveyor;

FIGURE 2 is a side elevational view of the same but with the drying apparatus set up for drying sheet stock coated with fast-drying material on an endless tape conveyor;

FIGURE 3 is a top plan view of the same;

FIGURE 4 is an enlarged, fragmentary, vertical sectional view of parts of the drying apparatus seen at the right side of FIGURES 1–3, the plane of section being indicated at lines 4—4 of FIGURES 3 and 6;

FIGURE 5 is an end elevational view of the same;

FIGURE 6 is a top plan view of the same;

FIGURE 7 is a further enlarged, fragmentary, vertical sectional view of parts of the machine seen at the lower right in FIGURE 4;

FIGURE 8 is an enlarged, fragmentary, vertical sectional view of parts of the drying apparatus, the plane of section being indicated at lines 8—8 of FIGURES 3 and 9;

FIGURE 9 is a top plan view of the same; and

FIGURE 10 is a vertical sectional view thereof taken on line 10—10 of FIGURE 8.

Referring now in detail to these drawings wherein like parts are designated by the same numerals in the several views, the new coated sheet drying apparatus there shown comprises a system of three conveyers: an endless tape shunt conveyor generally designated 12; an upper, endless, wicket-type drying conveyor generally designated 13; and a lower, endless, tape drying conveyor generally designated 14. The upper and lower drying conveyors 13 and

14 are mounted on a framework comprising spaced upright posts 15 mounted by any suitable means on the floor.

The shunt conveyor 12, which is of downwardly opening obtuse angular form, has one end thereof—the left end as viewed in FIGURES 1–3, 8 and 9—mounted for pivotal movement about a horizontal axis at the delivery end of the screen stencil printing press generally designated 16. The shunt conveyor 12 is supported in the middle by a vertically adjustable standard comprising a lower tubular part 17 pivotally mounted on the floor, an upper part 18 telescoping with the lower part 17, and on operating crank 19 by means of which the standard's upper part 18 can be raised and lowered and the shunt conveyor thus be raised and lowered about its pivotal connection to the printing press 16. These parts are all shown more or less diagrammatically in FIGURES 1, 2 and 8. The shunt conveyor comprises horizontally spaced, endless conveyor tapes 20 which pass around rollers 21, 22 and 23 mounted on the conveyor's framework 24 (see FIGURES 8 and 9). Other endless tapes pass around the rollers 23 and rollers 26 mounted on the ends of horizontally spaced arms 27 at the delivery end of the shunt conveyor. Conventional means (not shown) are provided for driving the rollers and tapes so as to convey coated sheets 30 from the delivery end of the printing press to the receiving ends of the drying conveyors.

The upper, endless, wicket drying conveyor 13 comprises endless sprocket chains 31 which pass around sprocket wheels 32 at the receiving end of the wicket conveyor (see FIGURE 8) and around other sprocket wheels 33 at the opposite or transfer end of the wicket conveyor (see FIGURE 4). Outwardly projecting, wicket-type sheet carriers 34 are mounted on the sprocket chains 31. Conventional means (not shown) are provided for driving the sprocket wheels and chains so as to advance the sheet carriers 34 from the receiving station of this conveyor, seen in FIGURE 8, to the transfer station of the conveyor, seen in FIGURE 4, and to return the carriers 34 from the transfer station to the delivery station, also seen in FIGURE 8.

Each sheet carrier 34 comprises a plurality of horizontally spaced wire wickets and each wicket has a lip 35 on its outer end for supporting a coated sheet 30 thereon during the sheet's return travel on the lower reach of the conveyor. The carriers are rigidly affixed to the endless sprocket chain or conveyor 31 in such a manner that the angle between a specified carrier and the plane containing the segment of the sprocket chain to which a specified carrier is attached remains substantially constant throughout the path traveled by the endless conveyor. The sheet carriers 34 traverse the upper reach of the wicket conveyor in an upwardly and rearwardly extending position and traverse the lower reach of the conveyor in a downwardly and rearwardly extending position. At the transfer station seen in FIGURE 4 each stock sheet 30 falls from its advancing sheet carrier onto the next preceding carrier for its return trip.

Up to this point the description is of a more-or-less conventional wicket-type drying conveyor. In such a conventional conveyor, many of the coated sheets would fall off the conveyor at the transfer station and inasmuch as these sheets were not yet completely dry they were spoiled. In the present invention means are provided for positively maintaining the sheets on the conveyor at the transfer station. These means comprise a plurality of endless tapes 36 (see FIGURES 4–7) which pass around rollers 37, 38 and 39 mounted on the frame of the apparatus. These tapes are so mounted at the transfer station as to be engaged by the outer ends of the sheet carriers 34

and driven thereby so as to maintain the coated sheets on the conveyor during their fall from one carrier to the next preceding carrier.

Other means are provided at the transfer station for insuring that each coated sheet is correctly positioned on its return trip carrier and supported on said carrier's lip **35**. These means comprise a pair of cylindrically formed brushes **40** mounted adjacent the endless tapes **36** for rotation about a horizontal axis. As shown, the brushes **40** are mounted on a shaft **41** which is driven by belts **42** passing around the roller **39** and around pulleys **43** on the shaft **41**. The peripheries of the brushes **40** are adapted to contact the outer edge of each sheet so as to "kick" the sheet forwardly-upwardly onto the return carrier's lip **35**. FIGURE 7 illustrates in broken lines a coated sheet **30** which in its fall from its advance trip carrier missed the return trip carrier's lip **35** but is still maintained on the conveyor by the tapes **36**. In full lines in this view is illustrated the same sheet **30** after it has been kicked forwardly and upwardly beyond the lip **35**, and in dotted lines the sheet is shown after it has come to rest with the carrier's lip **35** supporting it in correct position for the return trip.

Means similar to the tapes **36** are provided at the wicket conveyor's delivery station seen in FIGURES 1 and 8. As each sheet approaches the conveyor's delivery station it falls from its return trip carrier **34** onto the next succeeding carrier, during which fall the sheet is maintained on the conveyor by endless tapes **44** which pass around rollers **45**, **46** and **47** and which tapes are driven by the outer ends of the carriers **34**. As each sheet **30** passes upwardly beyond the endless tapes **44**, it slides by gravity off its carrier and onto a suitable receiving pallet **48** (see FIGURE 1) which may desirably be of the type which automatically lowers as the pile of dried sheets thereon increases in depth.

The lower endless tape drying conveyor **14** is of more-or-less conventional type, and comprises spaced endless tapes **50** which pass around rollers **51** and **52** mounted for rotation about horizontal axes, on the frame of the apparatus.

Operation

The new coated sheet drying apparatus is equipped for drying sheet stock which is coated with either quick-drying or slow-drying coating materials.

When drying sheets coated with quick-drying material, the shunt conveyor **12** is swung to its lowered position seen in full lines in FIGURE 2 and indicated in broken lines in FIGURE 8. Coated sheets **30** are conveyed by the shunt conveyor from the delivery end of the printing press **16** to the receiving end of the lower, endless tape drying conveyor **14** from which the sheets are delivered in dried condition onto a suitable pallet (not shown) at the left hand side of the machine as viewed in FIGURE 2.

When drying sheets coated with slow-drying material, the shunt conveyor **12** is moved to its elevated position seen in full lines in FIGURES 1 and 6. The coated sheets **30** are then conveyed by the shunt conveyor to the upper endless wicket-type drying conveyor **13**. The wire wickets of each sheet carrier **34** pass between the spaced arms **27** and conveyor tapes **25** of the shunt conveyor, picking up a coated sheet **30** and advancing it to the right as seen in the drawings across the upper reach of the conveyor. This upper reach of the wicket conveyor, as shown, passes through a heated enclosure **53**. When each coated sheet **30** arrives at the transfer station seen in FIGURE 4, it falls from its advance trip carrier **34** onto the next preceding carrier for the return trip. During this transfer, the sheets are prevented from falling off the conveyor by the endless tapes **36** which are driven by the outer ends of the sheets carriers themselves. After the transfer of each sheet from one carrier to the next preceding carrier, the sheet is kicked forwardly and upwardly by the rotating brushes **40** to insure that it is in correct position resting on the carrier's lip **35** for the return trip across the lower reach of the conveyor.

As each sheet **30** approaches the delivery station of the wicket conveyor (see FIGURE 8) it falls from its return trip carrier **34** onto the next succeeding carrier **34**. During this fall the sheets are prevented from falling off the conveyor by the endless tapes **44** which are likewise driven by the outer ends of the sheet carriers themselves. As the dried sheets **30** pass upwardly beyond the tapes **44**, they slide by gravity off their carriers **34** and onto a suitable receiving pallet **48** as seen in FIGURE 1.

It will thus be seen that the invention provides a novel and efficient apparatus for drying sheet stock which is coated with either quick-drying or slow-drying coating material, and while but one specific embodiment of the invention has been herein shown and described, it will be understood that numerous details thereof may be altered or omitted without departing from the spirit of the invention as defined by the following claims.

I claim:

1. An endless conveyor for drying coated sheet stock, comprising:

means for driving said conveyor so that its upper reach advances from a receiving station to a transfer station while its lower reach returns from the transfer station to a delivery station;

a plurality of outwardly projecting sheet carriers mounted on said conveyor, each of said carriers having means for supporting coated sheets during the conveyor's advance trip and other means for supporting coated sheets during the conveyor's return trip, said carriers being rigidly affixed to said conveyor in such a manner that the angle between a specified carrier and the plane containing that segment of the conveyor to which said specified carrier is attached remains substantially constant throughout the traverse of said conveyor, whereby as each sheet arrives at the transfer station it falls from one carrier onto the next preceding carrier for the return trip such that said sheets are contacted by said carriers on the opposite side during the return trip from the side on which they were contacted by said carriers during the advance trip;

an endless tape means mounted at said transfer station on guide means so as to be simultaneously engaged by and span the ends of at least two adjacent carriers during the period in which a sheet is falling between them; and

means for moving said tape means in endless fashion at a lineal speed equivalent to the lineal speed at which the ends of said simultaneously engaging carriers are traveling whereby the coated sheets are retained on said conveyor during their fall from one carrier to the next preceding carrier at said transfer station.

2. An endless conveyor for drying coated sheet stock according to claim **1** in which the outwardly projecting sheet carriers are of the wicket type.

3. The apparatus as set forth in claim **1** which further comprises means for insuring that each coated sheet is correctly positioned on its return trip carrier and supported on said carrier's lip comprises a cylindrically formed brush mounted adjacent the endless tape at the transfer station for rotation about a horizontal axis, the periphery of said brush being adapted to contact the outer edge of each sheet so as to kick the sheet forwardly-upwardly onto the return trip carrier's supporting means.

4. An endless conveyor for drying coated sheet stock, comprising:

means for driving said conveyor so that its upper reach advances from a receiving station to a transfer station while its lower reach returns from the transfer station to a delivery station;

a plurality of outwardly projecting sheet carriers mounted on said conveyor, each of said carriers having

means for supporting coated sheets during the conveyor's advance trip and other means for supporting coated sheets during the conveyor's return trip, said carriers being rigidly affixed to said conveyor in such a manner that the angle between a specified carrier and the plane containing that segment of the conveyor to which said specified carrier is attached remains substantially constant throughout the traverse of said conveyor, whereby as each sheet approaches the delivery station it falls from one carrier onto the next succeeding carrier for delivery therefrom such that after said fall each said sheet is contacted by said succeeding carrier on the side opposite from that side on which it was contacted by said one carrier; and

an endless tape means mounted at said delivery station on guide means so as to be simultaneously engaged by and span the ends of at least two adjacent carriers during the period in which a sheet is falling between them, said tape being driven in endless fashion by said carriers engaged therewith at a lineal speed equivalent to the lineal speed of the outer ends of said engaged carriers whereby the coated sheets are retained on said conveyor during their fall from said one carrier to said next succeeding carriers at said delivery station.

5. An endless conveyor for drying coated sheet stock according to claim 4 in which the outwardly projecting sheet carriers are of the wicket type.

6. An endless conveyor for drying coated sheet stock comprising:

means for driving said conveyor so that its upper reach advances from a receiving station to a transfer station while its lower reach returns from the transfer station to a delivery station;

a plurality of outwardly projecting sheet carriers provided with lips on the outer ends thereof which extend rearwardly-upwardly during the conveyor's return trip for supporting coated sheets during the conveyor's return trip and other means for supporting coated sheets during the conveyor's advance trip,

said carriers being rigidly affixed to said conveyor in such a manner that the angle between a specified carrier and the plane containing that segment of the conveyor to which said specified carrier is attached remains substantially constant throughout the traverse of said conveyor, whereby as each sheet arrives at the transfer station it falls from one carrier onto the next preceding carrier for the return trip;

an endless tape so mounted at the transfer station as to be engaged by the outer ends of the carriers and driven thereby so as to maintain the coated sheets on the conveyor during their fall from one carrier to the next preceding carrier at the transfer station, said outer ends adapted to engage the conveyor tape at the transfer station prior to each sheet's fall from one carrier to the next preceding carrier and disengage said conveyor tape after each sheet is securely supported by said next preceding carrier; and

a cylindrically formed brush mounted adjacent the endless tape at the transfer station for rotation about a horizontal axis, the periphery of said brush being adapted to contact the outer edge of said sheet so as to kick the sheet forwardly-upwardly onto the return trip carrier's lip.

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