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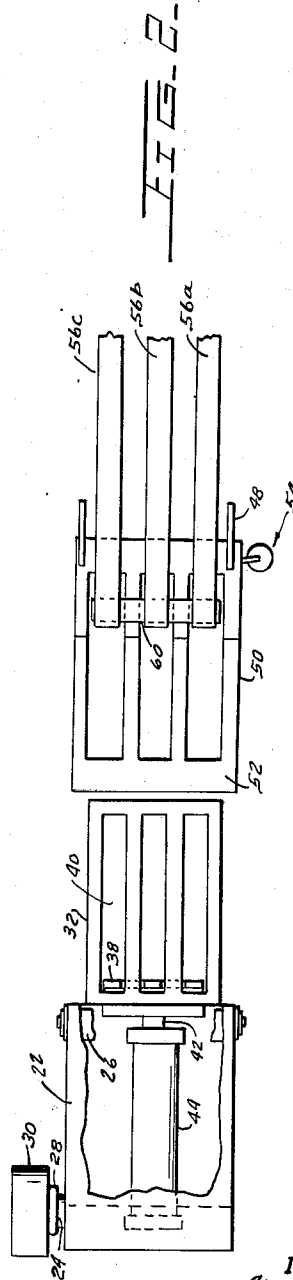
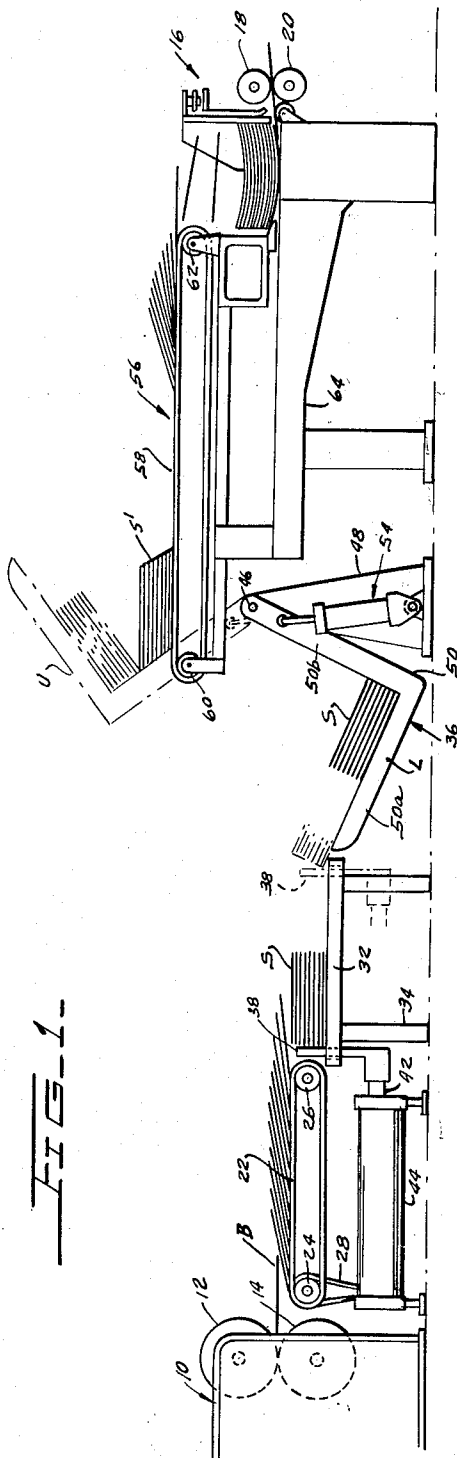
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SHEET INVERTING MECHANISM

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2 Sheets-Sheet 1



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1

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SHEET INVERTING MECHANISM

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5 Claims. (Cl. 270—1)

The present invention relates to inverting mechanisms for sheet material and particularly to a combined conveyor and feeder for inverting and delivering the output of one machine to the input of another machine.

In the manufacture of fiber board and corrugated containers, a printer-slotter is employed for cutting and shaping sheet stock into blanks, each of predetermined configuration, and for further providing the respective blanks with single color or multi-color printings. Following the printing and cutting operations, the blanks are usually fed to a folder for scoring and creasing at selected locations prior to folding up and pasting into the desired form.

Heretofore, delivery of the blanks from the printer-slotter to the folder has been accomplished by manually transporting the blanks, for example with the aid of hand-trucks and other well-known expedients. The manifest disadvantages of such arrangements are readily apparent and accordingly suggests resort to automatic mechanisms for delivering the output from the printer-slotter to the folder. However, the adaptation of well-known conveyor systems to this type of operation has been curtailed since the printed and cut blanks must be inverted prior to feeding into the folder due to the arrangement of the respective processing mechanisms at the printer-slotter and at the folder. Allied to the problem of inverting are the rather rigid requirements of reliability in the transferring and inverting at the relatively high operating speeds prevalent in the mass production of containers and the like.

Therefore, it is broadly an object of the present invention to provide a novel transfer and inverting mechanism for feeding the output of one processing machine to the input of a further processing machine.

More particularly, it is within the contemplation of the present invention to provide an exceptionally reliable yet mechanically simple conveying and feeding mechanism for inverting and delivering the output of a printer-slotter to the input of a folding machine.

The above objects and further features of the present invention will be best understood by reference to the following detailed description of an illustrative embodiment when taken in conjunction with the drawings wherein:

Figure 1 is an elevational view diagrammatically showing a combined conveyor and feeder embodying features of the present invention.

Figure 2 is a fragmentary top plan view of the combined conveyor and feeder of Figure 1.

Figure 3 is a side elevational view of a modified form of the combined conveyor and feeder embodying further features of the present invention.

Figure 4 is a side elevational view of a modified form of the combined conveyor and feeder embodying still further features of the present invention.

Referring now specifically to the drawings, and in particular to Figures 1 and 2, there is illustrated the combined conveyor and feeder which is adapted to be

2

interposed between the output of a printer-slotter 10 of known construction and having blank delivering rollers or mechanisms 12, 14 operated in accordance with well understood principles and practices and an equally well known folding machine 16 having input rollers or mechanisms 18, 20. The printer-slotter 10 and the folder 16 are arranged in spaced and aligned end to end relation. Contiguous to the output or delivery rollers 12, 14 of the printer-slotter is an endless belt conveyor 22 mounted on spaced apart supporting rollers 24, 26 and driven via belt coupling 28 from a suitable motor 30. The upper run of the endless belt conveyor 22 extends horizontally at a level slightly below the plane at which the blanks B are delivered from the output rollers 12, 14. Preferably, the endless conveyor is driven through a suitable reduction mechanism to obtain a belt speed somewhat slower than the speed at which the printer-slotter delivers the blanks B so that the blanks are shingled or feathered on the upper run of the conveyor 22 as clearly illustrated in Figure 1.

Arranged in end to end alignment with the belt conveyor 22 is a table 32 supported on uprights 34 and in a plane parallel to and downwardly offset relative to the upper run of the conveyor 22. As is apparent, the table 32 receives the feathered blanks B from the end of the conveyor remote from the printer-slotter in stacked formation, designated by the letter S.

Suitable transfer mechanisms are provided in operative relation to the table 32 for displacing the stack S from the table 32 to an inverter or carrier identified by the reference numeral 36. The illustrated transfer mechanism includes vertically extending pusher fingers 38 terminating below the upper run of the belt conveyor 22 and each accommodated in a longitudinally extending slot 40 provided in the table 32. The pusher fingers 38 are carried on a common ram shaft 42 operatively connected to a reciprocating cylinder head (not shown) within a cylinder housing 44 of a conventional hydraulic actuating mechanism.

The inverter 36, which is longitudinally aligned with the table 32 and arranged to receive the transferred stack S, is mounted for rocking movement about a transverse axle 46 carried on an upstanding bracket 48. The inverter is longitudinally slotted and constructed of a plurality of right angle members 50 arranged in side-by-side spaced and superposed relation, the respective members being joined together and pivoted adjacent one end by the transverse shaft 46 and including a transverse connecting bar 52 adjacent the other end. As clearly seen in Figure 1, the legs 50a of the members 50 arranged generally below the table 32 provide a shelf to receive the stacked blanks S which are subsequently supported within the upwardly opening cradle formed by the co-operating legs 50a, 50b of right angle members 50. A suitable operating mechanism 54 is connected to the inverter 36 at a point below the pivot 46 and periodically rocks the inverter or carrier from the loading position L illustrated by the full lines of Figure 1 to the unloading position U illustrated in phantom in Figure 1. As is apparent, the cradle provided by the carrier 36 opens downwardly when displaced about the axis 46 through a predetermined arc and into the transfer or unloading position U, whereby the stack S is inverted from the condition initially obtained at the output end of the printer-slotter 10.

Arranged generally above the axis 46 of the inverter or carrier 36 and below the cradle thereof when in the inverted position U is a blank receiving mechanism generally designated by the numeral 56, arranged to receive the inverted stack S'. The blank receiving mechanism 56 is illustrated as an endless belt conveyor supported on rollers 60, 62 and driven from a suitable source (not

3

shown). As best seen in Figure 2, the conveyor includes plural separate belts 56a, 56b, 56c arranged in spaced side by side relation and supported on the rollers 60, 62. The spacing of the respective belts is selected to assure the unimpeded movement of the carrier or inverter 36 into the unloading position U wherein the shelf provided by the legs 50a is arranged generally above the belt conveyor 56 for depositing the blanks thereon. The blank receiving mechanism 56 is supported on a pedestal 64 in position to deliver the inverted blanks to the input bed of the folding machine 16 in accordance with well understood techniques. It is to be noted that the speed of the conveyor belt 56 is suitably coordinated with respect to the desired operating speed of the folding machine to avoid excessive piling of the inverted blanks on the input bed.

In the modified embodiment of Figure 3, the entire conveyor and feeder is the same except for replacing the table 32 and the reciprocating fingers 38 by a blank retaining gate 72 pivoted on a shaft 74. Gate 72 is provided to block blanks B on conveyor 22 while the inverter 50' moves from the solid line loading position to the dotted line delivery position. When inverter 50' returns to the loading solid line position, then gate 72 is opened to permit the group of blanks stacked behind it to move out and to permit additional blanks to be delivered individually. Gate 72 is tied in with inverter 50' so that it will be moved to closed position by, for instance, a connection to operating mechanism 54' or to inverter 50' just before inverter 50' is moved upwardly.

In this embodiment it is to be observed that the blanks are delivered first as a group. When a desired stack height is reached, the gate 72 is closed preventing further delivery of blanks from conveyor 22' to inverter 50'. Then the operating mechanism 54' is actuated to effect the inversion. The mechanism may operate cyclically in accordance with a predetermined time interval, or a switch 90 may be provided to be actuated when the desired stack height is reached or a desired count.

In Figure 4 there is shown a still further embodiment of the invention in which the conveyor 56 of Figure 3 is replaced by two endless chains 80 disposed at the outside of a fixed table 88 in position to receive the output of the inverter 50'. The two chains 80 are connected by a transverse plate 89 which is arranged to sweep over the table 88 from left to right when the chains 80 are actuated. The chains 80 with transverse plate 89 are operated from a single drive motor 84 by the provision of belt couplings 86. Suitable control is provided to operate motor 84 intermittently so that it remains at rest while the inverter makes its upward and return strokes. Then when the inverter is in its lower position at rest, motor 84 is actuated to cause pusher 89 to make one complete cycle and deliver the stack S' to the folder 16.

A typical conveying and inverting operation is as follows:

The printer-slotter delivers the blanks onto the conveyor mechanisms which may take any of the forms of Figures 1 to 4, including other variations apparent to those skilled in the art and within the scope of this disclosure, whereupon the blanks are delivered to the inverter or carrier 36 in the form of a stack S. Thereafter, through a suitable electrical or mechanical coordinating system, the carrier is rocked through a predetermined arc and into the unloading position U, whereupon the inverted stack S' is delivered onto the blank delivering mechanisms 56 for proper feed to the folding machine.

In the foregoing I have described my invention solely in connection with specific illustrative embodiments thereof. Since many variations and modifications of my invention will now be obvious to those skilled in the art, I prefer to be bound not by the specific disclosures herein contained but only by the appended claims.

I claim:

1. The combination in a machine for inverting blanks

4

delivered from one processing machine and delivering the same to another processing machine, of combined conveying and feeding mechanisms interposed between said machines, for inverting said blanks in groups prior to delivery to the second machine, said mechanisms including a rockable carrier movable between loading and unloading positions, first conveyor means interposed between said first machine and said carrier for feeding a predetermined number of said blanks to said carrier when in said loading position, said conveyor being operated at a speed slower than the delivery speed of the blanks from the first processing machine so as to feather the blanks, second conveyor means interposed between said second machine and said carrier for receiving said blanks from said carrier when the latter is rocked into said unloading position and for feeding said blanks to said second machine, and actuating means operatively connected to said carrier for periodically rocking said carrier at intervals corresponding to the feeding upon said carrier of said predetermined number of blanks.

2. The combination with a first machine having output mechanisms and a second machine having input mechanisms of a combined conveyor and feeder arranged between said first and second machines for inverting said blanks in groups prior to delivery to said second machine, there being a predetermined number of blanks in each group, said combined conveyor and feeder comprising a carrier mounted for rocking movement about an axis, said carrier including a blank supporting shelf rockable through a predetermined arc from a loading position spaced below said axis to an unloading position spaced above said axis, means including a belt conveyor arranged between said output mechanisms and said carrier for feeding each group to said shelf when in said loading position, said belt conveyor being operated at a speed slower than the delivery speed of the said output mechanism so as to feather the blanks, means including another belt conveyor for receiving said groups in an inverted condition from said shelf when rocked into said unloading position and for delivering said inverted blanks to said input mechanisms, and operating means for rocking said carrier through said predetermined arc at intervals determined by the number of blanks in a group.

3. A combined blank conveyor and feeder adapted to be interposed between the output end of one machine and the input end of a second machine comprising a carrier having shelf-like parts cooperating in a loading position to form a cradle opening upwardly for receiving blanks in groups to be inverted, there being a predetermined number of blanks in each group means for mounting said carrier for rocking movement through a predetermined arc and into an unloading position wherein said cradle opens downwardly for discharging each group in an inverted condition, conveyor mechanisms extending between the output end of said one machine and said carrier said conveyor being operated at a speed slower than the delivery speed of the blanks from the output end of the said one machine, thereby feathering the blanks and including blank delivery means arranged generally above said cradle when in said loading position, further conveyor mechanisms extending between the input end of said second machine and said carrier and including blank receiving means arranged generally below said cradle when in said unloading position and actuating means operatively connected to said carrier for rocking said carrier through said predetermined arc at intervals depending on the number of blanks in a group.

4. A mechanism for inverting blanks in groups and conveying the same from the output mechanism of a printing machine to the input mechanism of a folding machine, there being a predetermined number of blanks in each group comprising a carrier having longitudinal slots and mounted for rocking movement about a transverse axis, said carrier including a group support shelf rockable through a predetermined arc from a loading po-

5

sition spaced below said transverse axis to an unloading position spaced above said transverse axis, means including at least one conveyor arranged between said output mechanism and said carrier for feeding said blanks to said shelf when in said loading position, said conveyor being operated at a speed slower than the delivery speed of the blanks from the output mechanism of the printing machine, thereby feathering the blanks, means including another conveyor arranged above said transverse axis and having plural side by side spaced belts adapted to receive a group from said carrier when in said unloading position, the longitudinal slots of said carrier being of a width sufficient to accommodate said belts and permitting unimpeded rocking of the shelf of said carrier into said unloading position, and operating means connected to said carrier for rocking said carrier through said predetermined arc at intervals determined by the number of blanks in a group.

5. A mechanism for inverting blanks in groups and conveying the same from a printing machine to a folding machine, there being a predetermined number of blanks in each group, said mechanisms including a rockable carrier movable between loading and unloading positions, first means interposed between said printing machine and said carrier for feeding said blanks to said carrier when in said loading position, second means interposed between said folding machine and said carrier for receiving said blanks from said carrier when rocked into said unloading position and for feeding said folding machine, and actuating means operatively connected to said carrier for

6

periodically rocking said carrier from said loading position into said unloading position at intervals determined by the number of blanks in a group, said first means including an endless belt conveyor arranged to receive blanks from said printing machine, said belt conveyor being operated at a speed slower than the delivery speed of the blanks from the printing machine, thereby feathering the blanks, a table arranged in end to end alignment with and below said endless belt conveyor for receiving the conveyed blanks, pusher fingers interleaved with said table and displaceable longitudinally thereof for advancing the conveyed blanks in successive groups onto said rockable carrier, and further actuating means adapted to be operated in timed relation to said first-named actuating means and operatively connected to said pusher fingers for displacing said pusher fingers longitudinally of said table.

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