

[72] Inventor **Heinz B. Fischer**
Covington, Va.
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[73] Assignee **Westvaco Corporation**
New York, N.Y.

Primary Examiner—Richard E. Aegerter
Attorney—James L. Neal

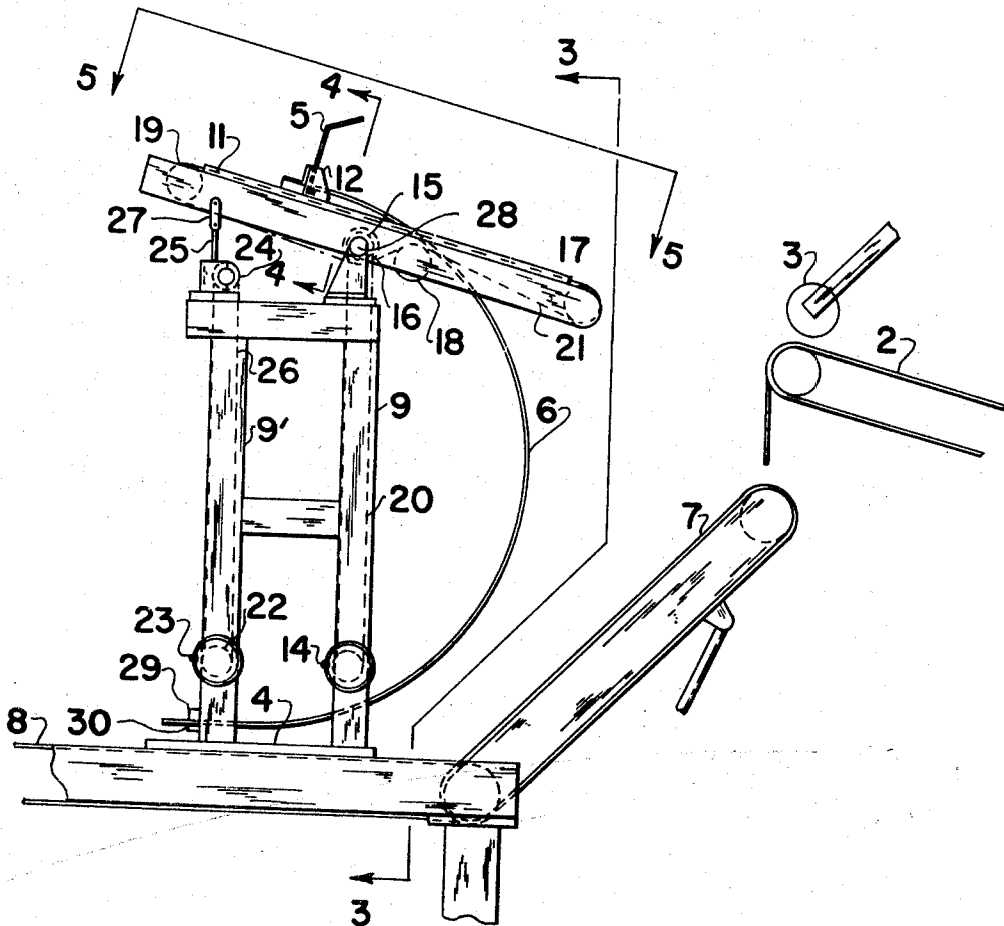
[54] **BLANK TURNING APPARATUS**
10 Claims, 9 Drawing Figs.

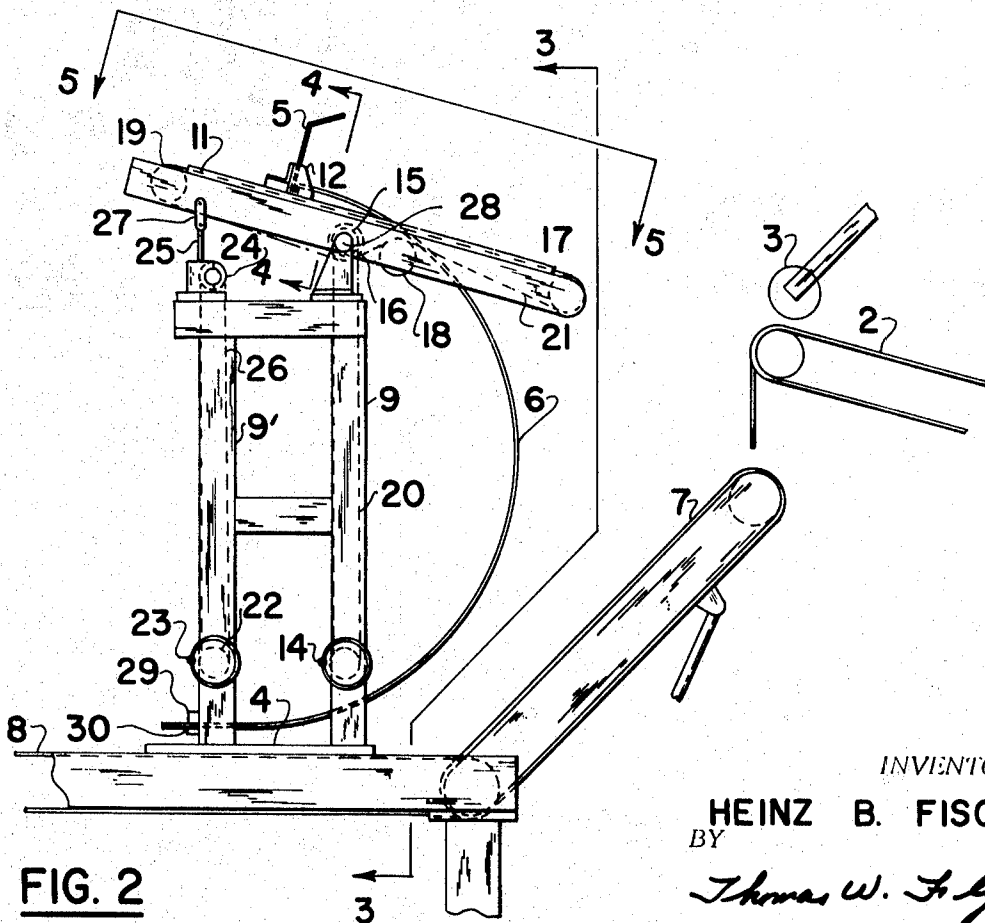
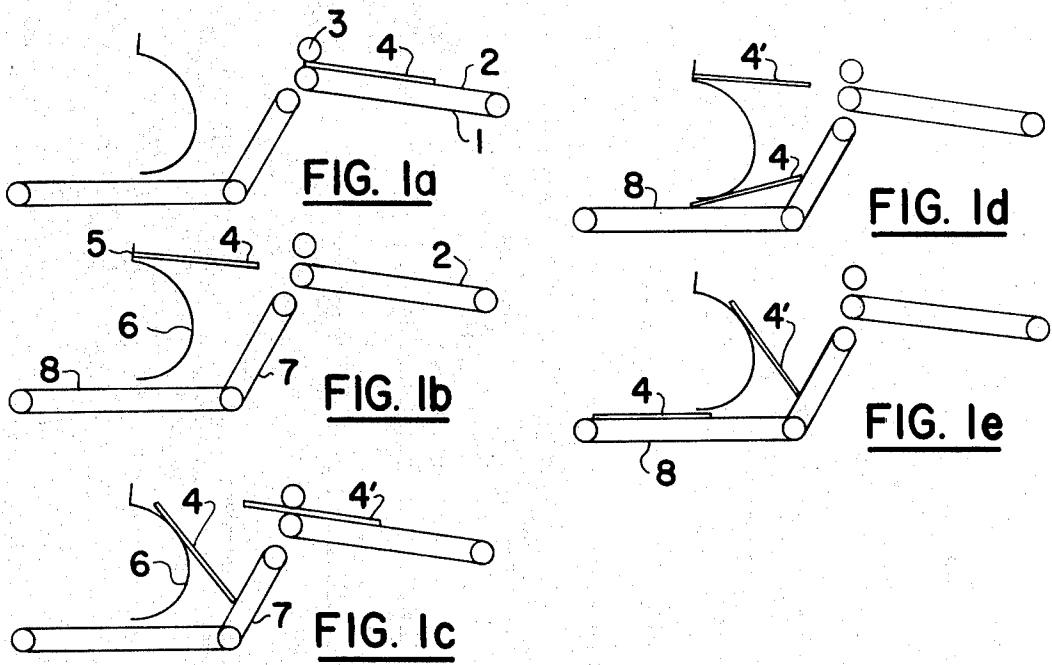
[52] U.S. Cl. 198/33
[51] Int. Cl. B65g 47/24
[50] Field of Search 198/33.4;
214/1(R), 69, 65, 70; 101/231, 267

[56] **References Cited**
UNITED STATES PATENTS

2,628,098 2/1953 Bauerschmidt 198/33.4
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ABSTRACT: Apparatus for reversing a box blank after it has been treated, e.g., coated, on one side so that it may then be treated on its reverse side. The apparatus includes a roller, positioned adjacent the downstream end of a conveyor carrying the blank from the first coater, which cooperates with the conveyor to grip the blank on both sides and propel it against a flat plate stop member. After striking the stop member the blank is allowed to fall downwardly against a curved pivot plate member which curves downwardly from the flat plate member and outwardly toward a second conveyor which extends downwardly from the first conveyor. As the blank falls against the pivot plate member its end opposite the end which struck stop member begins pivoting downwardly until it strikes the second conveyor and, through frictional engagement of this end with a second conveyor and engagement of the intermediate portion of the blank with a curved plate member, the blank is pivoted so that it is dropped on a third conveyor with its sides and ends reversed from its position on the first conveyor.





INVENTOR.
HEINZ B. FISCHER
BY
Thomas W. Fryer

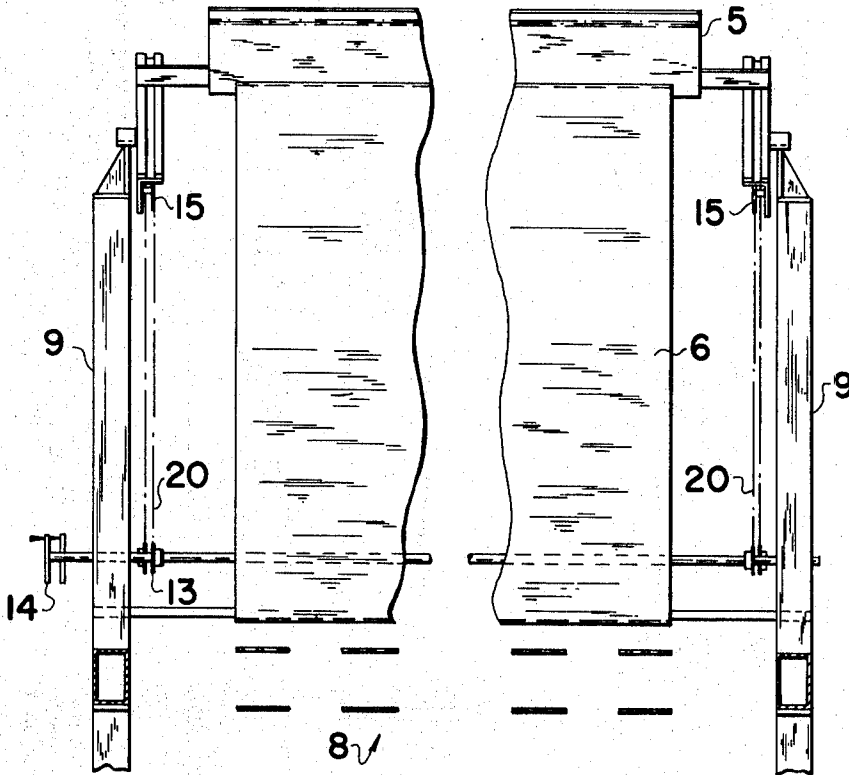


FIG. 3

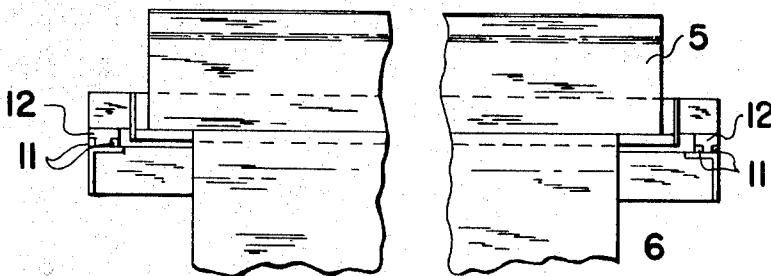


FIG. 4

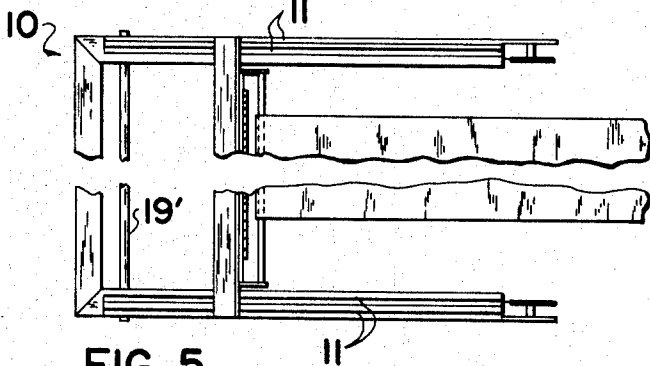


FIG. 5

INVENTOR.
HEINZ B. FISCHER
BY
Thomas W. Flynn

BLANK TURNING APPARATUS

BACKGROUND OF THE INVENTION

1 Field of the Invention

Turning of blanks so that they may be treated on both sides.

2. DESCRIPTION OF THE PRIOR ART

In the conventional blank turning operation, the blank is gripped between a pair of opposing conveyor belts which are twisted and trained about diagonally opposed rollers. As the belts turn in passing from the upstream to the downstream rollers, the blank gripped between the belts is turned also. In this type of operation there is a tendency for the blank to become skewed as it travels downstream between the opposing belts. A further, and probably more undesirable disadvantage of this type of operation, is the excessive amount of floor space required for the turning mechanism.

SUMMARY OF THE INVENTION

The turning apparatus of the present invention pivots the blank about lines running parallel to the cross machine direction rather than attempting to pivot the blank about the centerline thereof in the machine direction, as in the prior art. In this way, the machine is made exceptionally compact, requiring only a fraction of the floor space occupied by conventional turning mechanism. Because the edges of the blank are brought into abutting relationship with various components of the turning mechanism as the blank is being turned, the tendency for the blank to become skewed as it passes through the mechanism is considerably reduced as compared to the conventional practice. Where the length of the blanks to be processed may vary considerably from batch to batch, provision may be made for varying the spacing between the operative components.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. 1a through 1e are somewhat schematic representations of the apparatus of the present invention showing the operation thereof;

FIG. 2 is a side elevational view of the turning apparatus;

FIG. 3 is a front elevational view taken on line 3-3 of FIG. 2;

FIG. 4 is a cross-sectional view taken on line 4-4 of FIG. 2; and

FIG. 5 is a plan view taken on line 5-5 of FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

As seen in FIG. 1a of the drawings, the essential elements of the present invention include a conveyor 1, a portion of the operative reach 2 of which, cooperates with a roller 3 to grip a box blank 4 on opposite sides thereof and propel it, as seen in FIG. 1b against a flat plate stop member 5 having a downwardly and inwardly curved plate member 6 extending from adjacent the stop member 5 toward a second conveyor 7 and terminating adjacent a third conveyor 8. It will be seen in FIG. 1c that after the forward movement of the box blank has been terminated by the stop member 5 the blank falls against the curved plate member 6 with one end of the blank engaging the operative reach of the conveyor 7 to move downwardly, and, since the intermediate portion of the box blank is engaged by the curved plate member 6, the lower end of the blank is pivoted past the upper end thereof and onto the conveyor 8, as seen in FIG. 1d. The blank is then carried by the third conveyor 8 for further treatment. For example, the blank may require coating on both sides, printing and scoring on both sides or perhaps, coating on one side and printing and scoring on the opposite side. It will be noted that the process is a continuous one as seen in FIGS. 1c-1e a second box blank 4' is being moved into position as the first blank 4 is reversed and carried away by the conveyor 8.

As shown in more detail in FIG. 2 of the drawings, the blank turning mechanism comprises a pair of upright frame members 9 and 9' mounted on either side of the third conveyor 8 and supporting a substantially U-shaped frame member 10 (see FIG. 5). Each leg of the U-shaped frame member carries a pair of spaced-apart track bars 11 which form a guide slot for each of the spaced-apart stop member carriages 12. As seen in FIG. 4, the stop member 5 spans the legs of the U-shaped frame member and is attached at each end to one of the carriages 12. A toothed sprocket 13, having a handle 14, is journaled in the frame member 9 and a second sprocket 15 is mounted adjacent the upper end of member 9. A third sprocket 16 is journaled on the same shaft as the sprocket 15 and additional sprockets 17, 18, and 19 are mounted on one leg of the U-shaped frame member in substantial alignment with the sprocket 16. An endless chain 20 is trained about the sprocket 13 and upwardly about the sprocket 15. A second chain 21 is trained about rollers 16, 17, 18, and 19 are mounted on one leg of the U-shaped frame member in substantial alignment with the sprocket 16. An endless chain 20 is trained about the sprocket 13 and upwardly about the sprocket 15. A second chain 21 is trained about rollers 16, 17, 18, and 19 and has the free ends thereof attached to the front and rear ends of one carriage member 12. Sprocket 19 is mounted on a shaft 19' which extends across the U-shaped frame member and bears a corresponding sprocket at its opposite end where, with the use of sprockets corresponding to sprockets 16, 17, and 18 and a chain corresponding to chain 21 the carriage on the opposite leg of the U-shaped frame member is caused to move in unison with the carriage member 12. A sprocket 22 having a handle 23 is mounted adjacent the lower end of the other upright frame member 9'. An additional sprocket 24 is mounted on the upper end of frame member 9' in alignment with the sprocket 22 to form a rack and pinion arrangement with the shaft 25. A chain 26 is trained around the sprockets 22 and 24 so that upon rotation of the handle 23 the rod 25 is caused to move upwardly and, through the connecting link 27, pivot the U-shaped frame 10 about the pivot connection 28. A connecting shaft extends across the frame 10 and the sprocket 24 is mounted on one end thereof and a corresponding sprocket is mounted on the opposite end. Through this mechanism, and a rod and link corresponding to rod 25 and link 27, movement is transmitted from sprocket 22 to both sides of frame 10.

Each of the upright frame members 9' adjacent their lower ends is provided with an angle member 29 projecting inwardly and supporting, on their lower legs 30, one end of the curved plate member 6.

With the above-described arrangement, it will be seen that the spacing between the stop member 5 and the conveyor 1 and the inclination of the U-shaped frame member 10 may be varied to suit blanks of a wide variety of lengths. It may also be noted that clamp means may be provided on the angle members 29 so that the lower end of the plate member 6 may be clamped in position and the curvature thereof varied by moving the carriages 12 up and down their respective tracks.

While a specific embodiment of the invention has been described for purposes of illustration, it will be apparent that modifications thereof will readily occur to those skilled in the art within the scope of the appended claims.

I claim:

1. apparatus for turning an article comprising:
 - a. means for advancing said article in a first direction;
 - b. means spaced from said advancing means for engaging one end of said article and terminating movement thereof in said first direction;
 - c. means for engaging the opposite end of said article and moving said opposite end in a second direction; and
 - d. stationary means located along said second direction from said means for terminating movement of said article and spaced from said means for moving said opposite end in said second direction for engaging said article intermediate its ends as said opposite end moves in said second direction; whereby said opposite end is pivoted past said one end.

2. Apparatus of claim 1 further comprising:

a. second means for engaging said opposite end and moving it in a third direction after said opposite end is moved in second direction.

3. Apparatus for turning an article comprising:

a. means for advancing said article in a first direction;

b. means spaced from said advancing means for engaging one end of said article and terminating movement thereof in said first direction wherein said means for terminating movement of said article extends substantially normal to said first direction;

c. means for engaging an opposite end of said article and moving said opposite end in a second direction;

d. stationary means for engaging said article intermediate its ends as said opposite end moves in said second direction; whereby said opposite end is pivoted past said one end; and

e. second means for engaging said opposite end and moving it in a third direction after said opposite end is moved in said second direction.

4. Apparatus of claim 3 wherein: a. said means for engaging said article intermediate its ends is positioned beneath said means for terminating movement thereof and spaced from said means for moving said opposite end in said second direction.

5. Apparatus of claim 4 wherein: a. said means for moving said article in said first direction comprises a first endless conveyor belt and a roller positioned above said conveyor to engage said article on a side opposite the side thereof engaged by said conveyor and advance said article in said first direction.

6. Apparatus of claim 5 wherein: a. said means for moving said opposite end of said article in said second direction comprises a second endless conveyor belt, the operative reach of which extends from adjacent said roller downwardly therefrom in said direction.

7. Apparatus of claim 6 wherein: a. said second means comprises a third endless conveyor belt, one end of the operative reach of which is positioned adjacent said second endless conveyor belt

8. Apparatus of claim 7 wherein:

a. said means for terminating movement of said article comprises a flat plate member;

b. said means for engaging said article intermediate its ends comprises a curved plate member;

c. one end of said curved plate member being positioned adjacent said flat plate member;

d. the opposite end of said curved plate member being posi-

tioned adjacent said third conveyor belt; and
e. the intermediate portion of said curved plate member is curved toward said second conveyor belt.

9. Apparatus of claim 8 including:

a. means for varying the spacing between said flat plate member and said first conveyor

10. Turning apparatus comprising:

a. a first conveyor belt, the operative reach of which extends in a generally horizontal direction;

b. a roller positioned adjacent one end of said operative reach of said conveyor with the axis of said roller in spaced, parallel relationship to said reach;

c. a second conveyor belt, the operative reach of which extends from adjacent said first conveyor belt downwardly and away therefrom;

d. a third conveyor belt, the operative reach of which extends in a substantially horizontal direction away from adjacent the lower end of the operative reach of said second conveyor belt;

e. a pair of upright frame members positioned on each side of said third conveyor belt;

f. a substantially U-shaped frame member;

g. means pivotally connecting distal portions of the legs of said U-shaped member to opposing upright frame members positioned on opposite sides of said third conveyor belt;

h. means defining a track positioned on each leg of said U-shaped member;

i. a carriage member engaging each of said tracks;

j. a flat plate stop member spanning the legs of said U-shaped frame member and attached at each end to one of said carriage members;

k. a curved plate member attached to said carriage members and extending therefrom, inwardly toward said second conveyor belt and downwardly toward said third conveyor belt;

l. sprocket means mounted on each of said legs of said U-shaped frame member;

m. a chain trained over each of said sprocket means and attached at each end to the front and rear of each said carriage members;

n. means for rotating said sprocket means; whereby said carriages are moved in unison along their respective tracks; and

o. means for pivoting said U-shaped frame member about its pivotal connection to said upright frame members.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,567,008 Dated March 2, 1971

Inventor(s) Heinz B. Fischer

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 1, line 68, following "Fig. 1d" insert
--.--. Column 2, line 8, following "legs of"
correct the spelling of --the--; line 18, delete
"are"; lines 19 through 22 inclusive, delete
entirely; line 23, delete "18, and 19". Column
3, line 3 (Claim 2, line 3), following "moved in"
insert --said--; line 35 (Claim 6, line 5),
following "said" insert --second--.

Signed and sealed this 20th day of July 1971.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents