United States Patent [19]

Daily

[11] **3,758,104**

[45] **Sept. 11, 1973**

[54] **TURNING APPARATUS**

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[73] Assignee: **R. A. Jones & Co., Inc.**, Covington, Ky.

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[52] **U.S. Cl.** ..... **271/75**, 198/33 AB

[51] **Int. Cl.** **B65h 29/14**

[58] **Field of Search** ..... 198/33 AB; 271/69, 271/75, 49, 52, 51, 45

[56] **References Cited**

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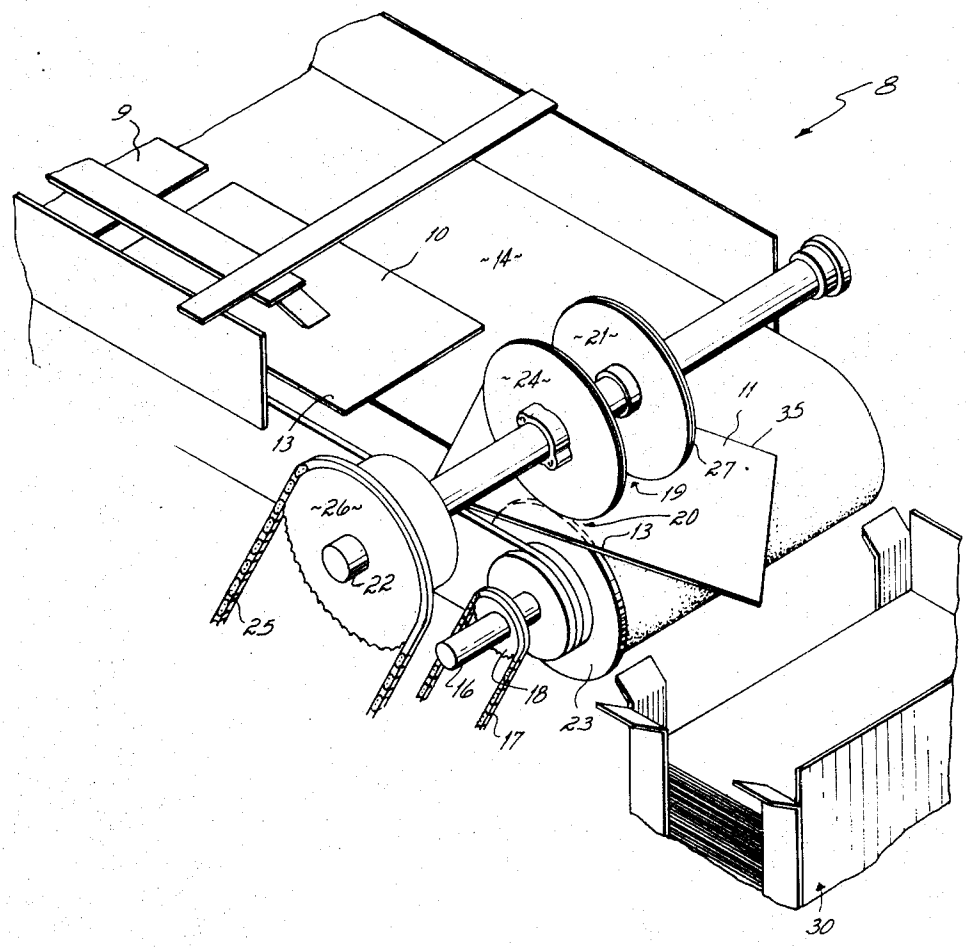
[57] **ABSTRACT**

Apparatus for turning carton blanks or the like comprising a conveyor and means forming two nips generally transverse to the conveyor. An inward free-wheeling disk forms a blank engaging nip with the conveyor for maintaining a portion of the carton at conveyor velocity and an outward disk forms a second blank engaging nip with a third free-wheeling disk located beneath it. The outward disk is driven at a circumferential velocity which is greater than the conveyor velocity so as to drive a portion of a blank at greater speed than the portion engaged by the first nip. The difference of the velocities acting on the blank turns it. The speeds and axial distance between the inward and outward disks may be adjusted to provide various turning results.

11 Claims, 3 Drawing Figures



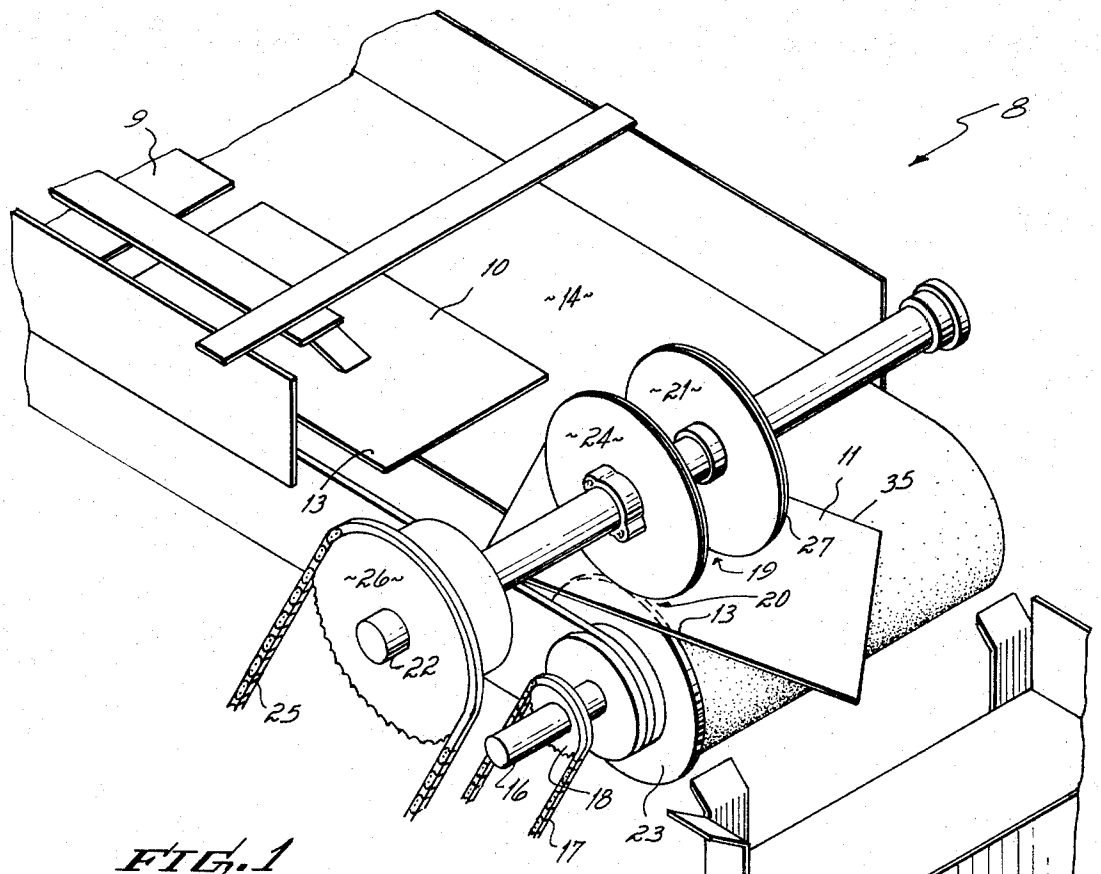


FIG. 1

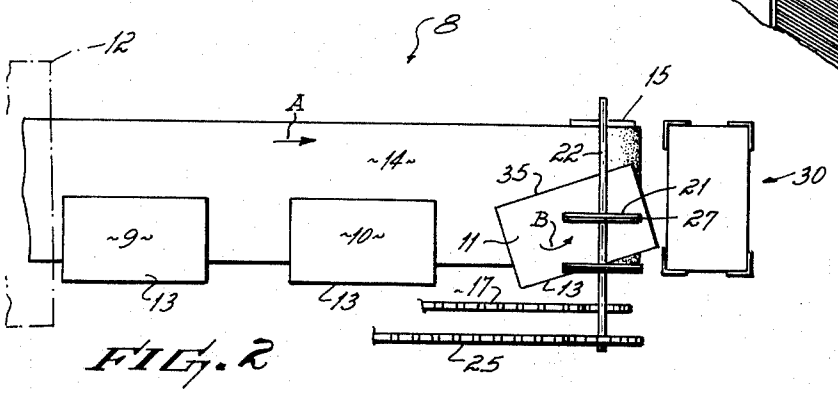


FIG. 2

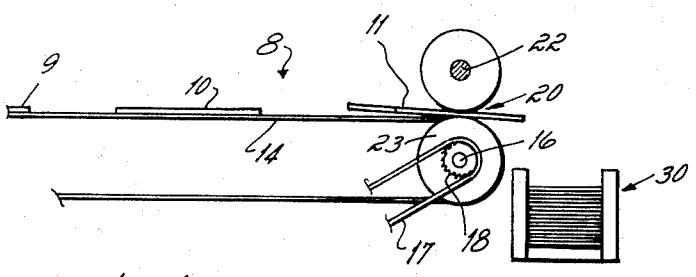


FIG. 3

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TURNING APPARATUS

The present invention relates to a carton turner and more specifically to apparatus for turning a carton blank 90° to facilitate feeding the blank into a receptacle in the proper orientation for further processing.

The apparatus is especially useful, although not limited thereto, in providing a transition between a side seam glueing apparatus and cartoning apparatus. In side seam glueing apparatus, a carton blank is folded and glued along its seam. The nature of the side seam gluer is such that the carton blank is fed with its seam extending in a longitudinal direction.

The nature of the cartoning apparatus is such that the carton blank is fed with the side seam extending in a transverse direction. In order to have the cartoning apparatus in line with the side seam gluer, the carton blank from the side seam gluer must be rotated through an angle of 90° and deposited into the magazine of the cartoner with its seam in the transverse direction.

One objective of my invention has thus been to provide a relatively simple, continuously operating apparatus for turning carton blanks 90° about their centers.

Another objective of the invention has been to provide a method and apparatus for moving carton blanks along a path in a first orientation and changing the velocity of one side of the carton blank so as to turn the carton blank with respect to the other side of the blank.

Another objective of the invention has been to provide apparatus including a conveyor and means for feeding carton blanks onto the conveyor with one side of the carton blank projecting laterally beyond the conveyor. In this attitude, the portion of the carton blank riding on the conveyor can be held to conveyor speed and the portion projecting beyond the conveyor can be positively gripped to reduce or increase its speed with respect to that of the conveyor, thereby effecting the rotation of the blank.

Briefly, my invention includes a conveyor for transporting carton blanks and means for turning the blanks. The turning means includes means forming two nips for engaging and turning the blank. An inward disk is mounted on a shaft above the conveyor and is free-wheeling with respect to the shaft in order to form a first blank engaging nip with the conveyor. An outward disk is secured to the shaft and forms a second blank engaging nip with a third disk freely mounted beneath the outward disk on a shaft which drives an end roll of the conveyor. The outward disk is driven at a speed greater than that attained by the inward disk by virtue of its engagement with the conveyor or a moving carton thereon.

When a carton blank is conveyed toward the disks, a portion is caught in the nip formed by the outward disk and the third disk and this portion of the blank is accelerated while the portion of the blank between the conveyor and the free-wheeling disk remains at conveyor velocity. The carton is thus turned about that area between the conveyor and the free-wheeling disk and is discharged from the conveyor to further apparatus such as a magazine.

Another objective of the invention has been to provide for the adjustability of the turning relationship so as to accommodate the apparatus for changed conditions, including different sizes of cartons. The two major parameters which can be changed are the speed of one of the nips and the distance between nips. Preferably, the invention contemplates the adjustment of the latter by simply providing for the axial adjustment of the free-wheeling disk overlying the conveyor.

The speeds of the conveyor and the inward disk and the speed of the outward disk or the axial distance between the disks may be adjusted so as to cause a variation in the turning result obtained.

Thus, my invention has the advantage of providing a relatively simple, yet highly reliable, turning apparatus for carton blanks.

A further advantage is that it is continuously operable to act on a successive number of blanks without the necessity of critical timing or sensing apparatus or the like.

These and other objects and advantages will become readily apparent from the following detailed description and drawings in which:

FIG. 1 is a perspective view of the invention showing the conveyor, the carton blanks, the disks and a receiving magazine,

FIG. 2 is a top view of the apparatus showing a blank in a partially turned position, and

FIG. 3 is a side view of the invention also showing a blank in a partially turned position, and with the disk driving chain and sprocket removed.

Referring to FIG. 1, there is shown the turning apparatus indicated generally at 8. The apparatus may be located in a carton assembly line, for instance between a side seam gluer and an erecting apparatus, or it may be utilized for turning carton blanks or the like wherever such re-orientation is required. A conveyor for transporting carton blanks, indicated at 9, 10 and 11, includes a belt 14 which is supported by a typical belt conveyor end roll 15. Upstream of the belt are means 12 for feeding the blanks onto the belt in a longitudinal orientation with a side edge portion 13 projecting laterally beyond said belt. The belt 14 is driven in the direction of arrow "A" by the roll 15 which is rotated by a conveyor drive shaft 16. A chain 17 and sprocket 18 are utilized to connect the drive shaft 16 to a motor (not shown). The blanks are positioned on the conveyor belt such that an outward portion 13 extends past the edge of the belt as shown in FIGS. 1 and 2 in order that the blank may be engaged by a nip as will be described.

Two adjacent blank engaging nips 19 and 20 are provided in conjunction with the conveyor for engaging and turning the carton blanks. The first nip 19 is formed by a free-wheeling idler disk 21 mounted on a shaft 22 above the belt 14. Disk 21 is mounted on shaft 22 so as to permit axial adjustment. The shaft 22 is generally parallel to the shaft 16. The circumferential surface 27 of the disk 21 is provided with a rubber tire or a coating of like material and the disk is mounted closely enough to the belt 14 to form the nip 19. The nip 19 engages an inward portion of the carton blanks, such as the blank 11, when they are conveyed under the disk 21.

The second nip 20 includes a free-wheeling idler disk 23, which is freely mounted on the conveyor drive shaft 16, and a driven disk 24 which is also provided with a rubber tire or a coating of like material. The disk 24 is secured on shaft 22 and is driven thereby. The shaft 22 is rotated by a motor (not shown) through chain 25 and sprocket 26 at an angular velocity which provides a peripheral speed of disk 24 which is substantially greater than that of belt 14. Thus, nip 20 is formed by the coop-

eration of disks **23** and **24.** The disk **23** is located outwardly of the conveyor belt **14** and moves independently of it.

A magazine or receptacle such as that shown at **30** is provided to receive the turned blanks and to feed them to further apparatus such as a cartoner.

In operation, carton blanks are fed onto the belt **14** from the compression section of a side seam gluer, for instance. The blanks are generally longitudinally disposed on the belt and are conveyed by it in the direction of arrow "A" toward the nips **19** and **20.**

It will be noted that since shafts **16** and **22** are parallel, the nips **19** and **20** will engage the blanks at approximately the same time. When the inward portion **35** of a blank engages the free-wheeling disk **21,** the disk is merely driven by the blank at the velocity at which the conveyor belt **14** and the blank are moving. Disk **24,** however, is driven by shaft **22** at a peripheral velocity greater than that of the conveyor belt **14** and the free-wheeling disk **21.** Thus, when the outward portion **13** of the blank is engaged by the disks **23** and **24,** the portion is driven through nip **20** at a greater velocity than inward portion **35** is conveyed through nip **19.** This difference in velocities of two portions of the same blank tends to turn the blank about the nip **19** in the direction of arrow "B" in FIG. **2.** The turning angle may be adjusted by axial movement of disk **21** to change the distance between its nip **19** and nip **20.** This velocity of the driven disk **24** may be regulated; however, beneficial results have been obtained when it is 40 to 50 percent greater than that of the conveyor belt **14** and disk **21.**

FIGS. **2** and **3** show a blank **13** in a partially turned position. As disk **24** continues to drive the outward portion **13** of the blank, the blank is further turned and discharged into the magazine **30** in a transverse position which is turned **90°** from the previous longitudinal position of the blank.

My invention offers a very inexpensive solution to the problem or necessity of reorienting carton blanks between different apparatus in an assembly line wherein each apparatus will accept the blanks only in respective dissimilar positions.

A further advantage of my invention is that it operates continuously regardless of the spacing of the blanks on the conveyor and does not require the utilization of any sensing device of elements which move intermittently to engage and turn the blanks.

Other objects and advantages will become readily apparent to those of ordinary skill in the art, without departing from the scope of my invention, and I intend to be bound only by the appended claims.

I claim:

1. Apparatus for turning substantially flat and rigid work pieces through an angle of approximately 90° comprising:

a blank transporting conveyor means operable at a first velocity to transport said blank in a predetermined direction,

means forming a single first blank engaging nip substantially stationary with respect to movement in said direction and cooperating with said conveyor to maintain one portion of an engaged blank at said first velocity,

said means forming said first blank engaging nip comprising said conveyor and a first idler disk cooperating with said conveyor, and

means forming a single second blank engaging nip, also substantially stationary with respect to movement in said direction and positioned laterally of said first nip and adjacent said conveyor for driving a second portion of said blank at a second velocity in order to turn said blank through an angle of approximately 90°,

said means forming said second blank engaging nip comprising a driven disk and a second idler disk cooperating with the driven disk.

2. Apparatus of claim **1** further comprising:

means for feeding blanks onto said conveyor means with a side edge portion projecting beyond said conveyor means,

said second nip being in the path of said projecting side edge portion.

3. Apparatus of claim **1** further comprising means for varying the distance between the adjacent nips to permit adjustment of the turning angle of said blanks.

4. Apparatus as in claim **1** wherein said first idler disk is freely mounted on a first shaft above said conveyor means to form a nip between said first idler disk and said conveyor means.

5. Apparatus as in claim **4** wherein said driven disk is secured to said first shaft and said second idler disk is freely mounted on a second shaft parallel to said first shaft, the second idler disk being positioned below said driven disk and adjacent said conveyor.

6. Apparatus as in claim **1** wherein said first free-wheeling disk and said driven disk are mounted upon a common first shaft located above and transverse to said conveyor.

7. Apparatus as in claim **6** wherein said first free-wheeling disk rotates with respect to said first shaft and said driven disk is secured to said shaft to receive driving force therefrom.

8. Apparatus as in claim **7** wherein said second free-wheeling disk is mounted on a conveyor shaft means parallel to said common first shaft and beneath said first shaft and said conveyor for supporting said second free-wheeling disk in a nip-forming position with respect to said driven disk.

9. Apparatus as in claim **1** including magazine means located at a discharge end of said conveyor for receiving the turned blanks.

10. Apparatus for turning a substantially flat rigid carton blank through an angle of approximately 90° comprising

a blank transporting belt conveyor means operable to transport a blank at a first velocity in a direction toward a discharge end of said conveyor, said discharge end including a belt supporting pulley rotatable about a first axis, said belt moving in said direction toward said pulley, then around said pulley and in a generally opposite direction,

a first freewheeling disk mounted on a second axis located above and parallel to said first axis, said first disk forming a first nip with said conveyor belt for engaging and maintaining a portion of said blank at said first velocity, said first nip being substantially stationary with respect to movement in said direction,

a freewheeling second disk mounted on said first axis adjacent said conveyor belt,

a driven third disk mounted on said second axis directly above said second disk, and forming with said second disk a second nip spaced laterally of

said first nip for engaging and driving an outwardly extending second portion of said blank at a second velocity greater than said first velocity in order to turn said blank, said second nip being substantially stationary with respect to movement in said direction, and

the relationship between said first and second velocities and the spacing apart of said nips being adjusted to turn said blank through an angle of approximately 90°.

11. Apparatus for turning a substantially flat rigid carton blank through an angle of approximately 90° comprising:

a blank transporting conveyor means operable to transport a blank of a first velocity in a first direction, a portion of said blank extending outwardly of said conveyor,

a first axis of rotation location located above and generally transverse to said conveyor,

a first disk freewheeling about said axis above said conveyor and forming with said conveyor a first blank engaging nip for engaging and maintaining a second portion of said blank at said first velocity, said nip being substantially stationary with respect to movement in said first direction,

a second disk on said axis, said disk being connected to a rotatable driving source driving said disk at a peripheral velocity different from said first velocity,

a second axis of rotation located below and generally transverse to said conveyor,

a third disk freewheeling about said second axis and forming with said second disk a second blank engaging nip for engaging and maintaining said outwardly extending portion of said blank at said peripheral velocity in order to turn said blank through an angle of approximately 90°.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,758,104 Dated September 11, 1973

Inventor(s) William C. Daily

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

Column 5, line 18, delete "location"

Signed and sealed this 14th day of May 1974.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

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