Jan. 5, 1965 R. A. REED 3,164,239

CONVEYED ARTICLE CONTROLLING DEVICES

Filed Oct. 29, 1962 3 Sheets-Sheet 1

Fig. 1

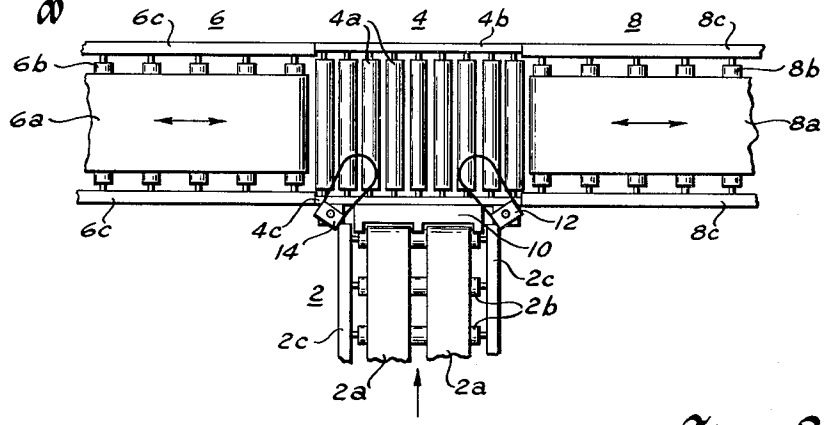
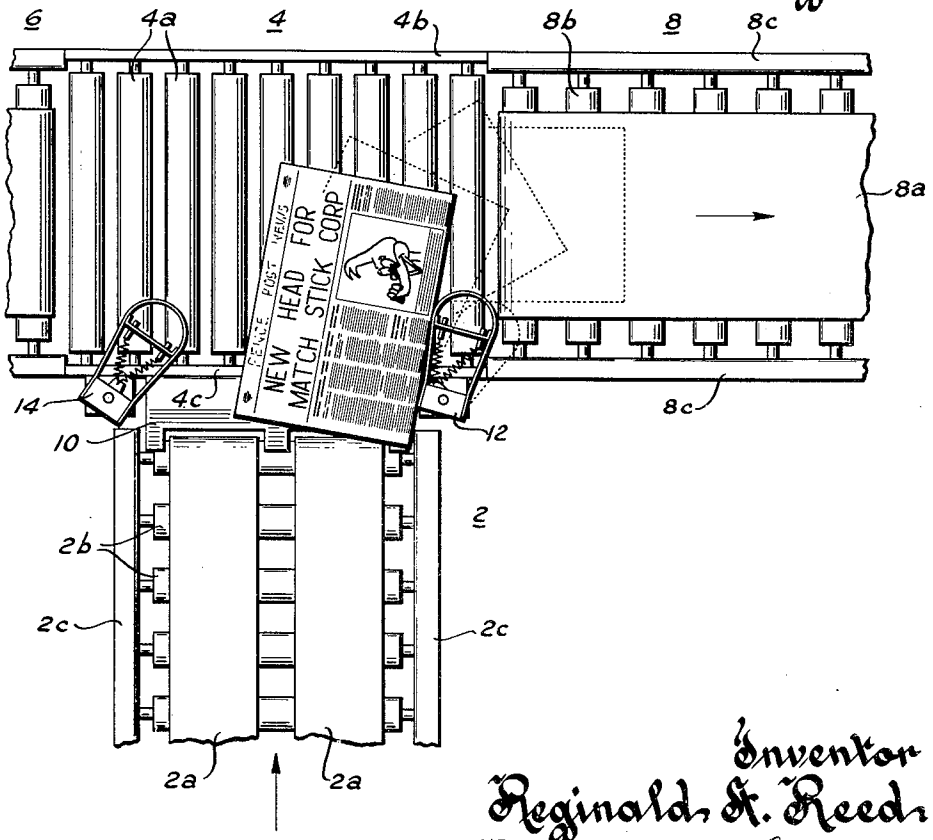


Fig. 2



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Jan. 5, 1965 R. A. REED 3,164,239

CONVEYED ARTICLE CONTROLLING DEVICES

Filed Oct. 29, 1962 3 Sheets-Sheet 2

Fig. 3

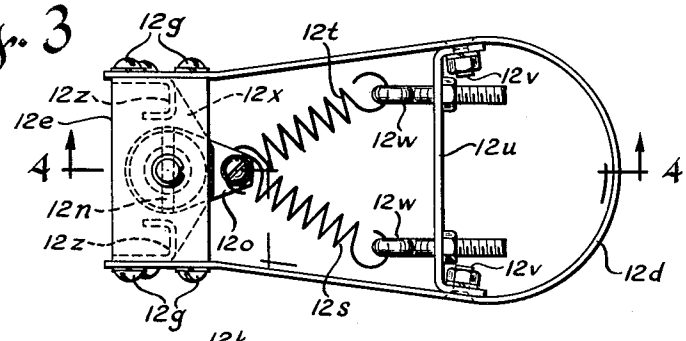
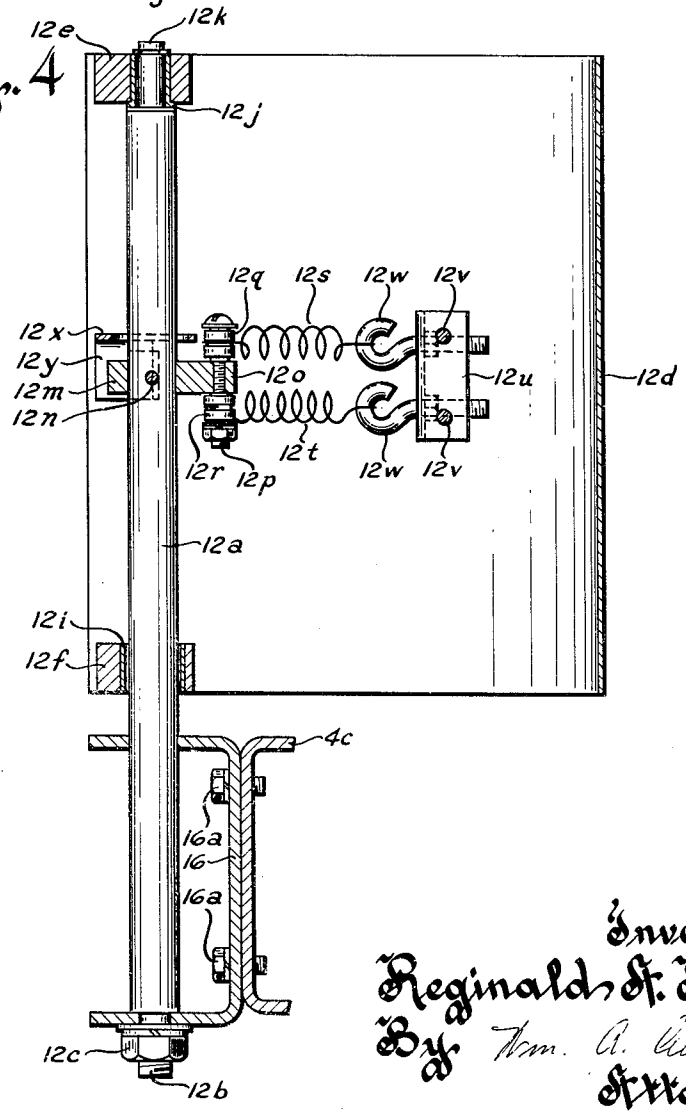


Fig. 4



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Jan. 5, 1965 R. A. REED 3,164,239

CONVEYED ARTICLE CONTROLLING DEVICES

Filed Oct. 29, 1962 3 Sheets-Sheet 3

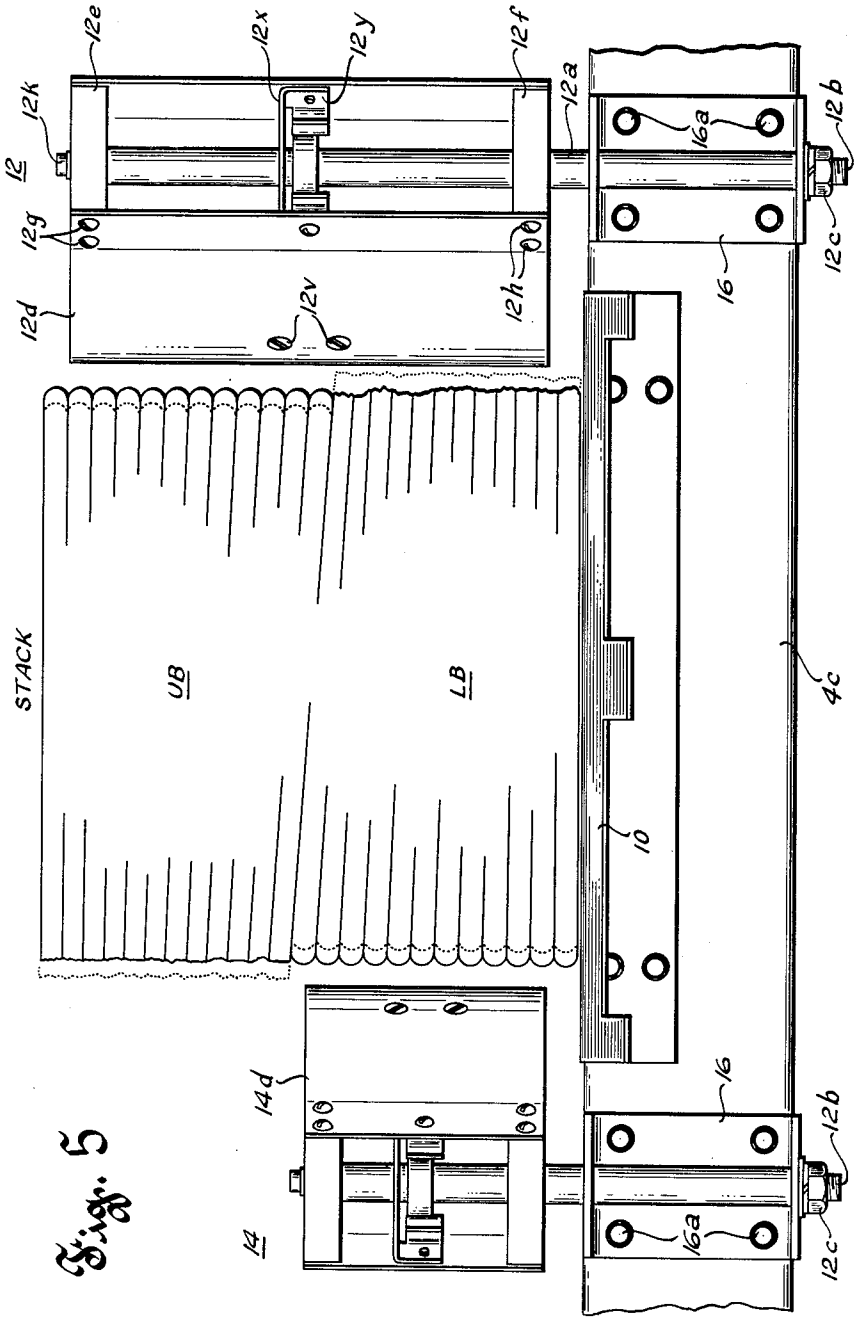


Fig. 5

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CONVEYED ARTICLE CONTROLLING DEVICES

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Filed Oct. 29, 1962, Ser. No. 233,813
12 Claims. (Cl. 198—20)

This invention relates to conveyed article controlling devices and more particularly to devices for absorbing the shock to which articles are subjected when transferred from one conveyor to another and for assisting in turning of articles traversing junctions of conveyors positioned at angles to one another.

While not limited thereto, the invention is especially applicable to newspaper conveyor systems for preventing stacks of newspapers from spilling and for causing improved turning movement of such stacks while being transferred from the end of one conveyor onto a transverse conveyor.

An object of the invention is to provide improved conveyed article controlling devices.

A more specific object of the invention is to provide improved shock absorber means at a junction between two conveyors to restrain articles in a stack from physical displacement relative to one another by the receiving conveyor.

Another specific object of the invention is to provide improved article turning means at a junction between two conveyors disposed at an angle to one another.

Another specific object of the invention is to provide improved means at a junction between two conveyors arranged at an angle to one another for holding articles in vertical alinement as the lowermost articles of a stack thereof are subjected to an angular force by the receiving conveyor and for concurrently enhancing the turning motion of such stack into the direction of the receiving conveyor.

A further object of the invention is to provide improved shock absorbing and guiding means at a junction between two conveyors disposed at an angle to one another to prevent newspapers of a stack thereof from sliding relative to one another, particularly of a stack having at least two batches of newspapers wherein the folded edges of the newspapers in such batches are on opposite sides of the stack.

Other objects and advantages of the invention will hereinafter appear.

According to the invention, there is provided at the junction between an end of a supply conveyor and an intermediate portion of a receiving conveyor a device for controlling the transfer of a stack of newspapers or the like. This device is especially adapted to perform its functions hereinafter stated when the stack consists of at least two batches of newspapers with the folded edges of the newspapers in each batch being coincident and the upper batch rests upon and is disposed 180 degrees relative to the lower batch. As the receiving conveyor is arranged transversely of or at some other angle to the supply conveyor, the newspapers or the batches thereof tend to slide relative to one another in response to the lateral force or shock imparted to the lower newspapers of the stack by the receiving conveyor. Because the folded edges of the newspapers are thicker than the unfolded edges, the lower batch has an inclined upper surface on which the upper batch rests and this inclined surface tends to cause the upper batch to slide when the receiving conveyor diverts the stack from its entry direction. To prevent such sliding of the newspapers, a shock absorbing and turning device is mounted at the junction of the conveyors within the turning angle of the stack. This device comprises a supporting shaft secured to a

side frame of one of the conveyors and having a guide member pivoted thereon for limited rotary movement. This guide member is elongated and lobe-shaped in top view, overlies the receiving conveyor and extends diagonally toward the center line of the supply conveyor projected into the receiving conveyor. This guide member is provided with internal springs which bias it in the aforementioned position while allowing resilient rotary movement in either direction. When the receiving conveyor diverts a stack from its incoming path of travel, the stack engages one side of the projecting end of the guide member and the guide member resiliently rotates and absorbs the shock imparted to the stack. The guide member is provided with a rounded end which assists turning of the stack on the receiving conveyor. If the stack is oriented so that the folded edges of the newspapers in the upper batch engage the guide member, the latter is provided with a height at least equal to that of the stack. However, if the stack is oriented so that the folded edges of the lower batch engage the guide member, the latter is preferably provided with a height not more than that of the lower batch. The reason for this lower height is to provide for the condition wherein the upper batch is slightly displaced relative to the lower batch so that the unfolded edges of the newspapers in the upper batch extend beyond the folded edges of the newspapers in the lower batch. Under this condition which occurs in certain stacking machines, the lower height guide member avoids pushing of the upper batch down the inclined upper surface of the lower batch.

These and other objects and advantages of the invention and the manner of obtaining them will best be understood by reference to the following detailed description of two embodiments of the invention taken in conjunction with the accompanying drawings, wherein:

FIGURE 1 is a top plan view of the junction of two conveyors and including a schematic illustration of article controlling devices in their normal unoperated positions;

FIG. 2 is a top plan view like FIG. 1 showing a newspaper stack entering the receiving conveyor and an article controlling device in its operating position;

FIG. 3 is a top plan view of an article controlling device;

FIG. 4 is a cross-sectional view taken along line 4—4 of FIG. 3; and

FIG. 5 is a side elevation view of the receiving conveyor showing a pair of article controlling devices and their relation to a newspaper stack.

Referring to FIG. 1, there is shown a conveyor system comprising a first or supply conveyor 2 and a second or receiving conveyor 4 extending across the end of and for receiving stacks of newspapers from the supply conveyor. Supply conveyor 2 may be of any desired type capable of conveying stacks of newspapers therealong and from the end thereof onto the receiving conveyor. For purposes of description, supply conveyor 2 is shown as having a pair of conveying belts 2*a* suitably driven by a driving roller and traveling over and being supported by a plurality of supporting rollers 2*b* which are mounted for free rotation between a pair of side frame members 2*c*.

The portion of receiving conveyor 4 immediately adjacent the end of supply conveyor 2 is preferably of the belt driven roller type. This portion of the receiving conveyor comprises a series of smooth steel rollers 4*a* mounted for free rotation between a pair of side frame members 4*b* and 4*c*. Conveyors of the roller type are normally driven by an endless belt or the like which travels below the conveying rollers and frictionally engages the lower portions of the rollers to rotate the same. As viewed in FIG. 1, if such belt is driven in the left-

hand direction, rollers 4a will rotate to convey stacks in the right-hand direction and vice versa. The portions 6 and 8 of the receiving conveyor on opposite ends of the roller section just described may be of any desired type. For purposes of description, these extended portions of the receiving conveyor have been shown as being of the belt type having belts 6a and 8a driven by suitable motor driven drive rollers. These conveyor belts travel over and are supported by a series of supporting rollers 6b and 8b which are mounted for free rotation between pairs of side frame members 6c and 8c. As indicated by the double-ended arrows on these conveyors, it is contemplated that these conveyor sections and roller section 4 are capable of being driven or operated in opposite directions whereby to convey newspaper stacks received from supply conveyor 2 either to the left or to the right as viewed in FIGS. 1 and 2. A flat supporting member 10 of sheet metal or the like is provided between the end of the supply conveyor and the adjacent side frame member 4c of the receiving conveyor to support the stacks and to prevent papers from falling between the conveyors.

As shown in FIGS. 1, 2 and 5, a first article controlling device 12 is located at the junction between the right-hand side of supply conveyor 2 and the adjacent side of receiving conveyor 4 for controlling stacks turning to the right. A second article controlling device 14 is located at the junction between the left-hand side of supply conveyor 2 and the adjacent side of receiving conveyor 4 for controlling stacks turning to the left when the direction of operation of the receiving conveyor sections 4, 6 and 8 is reversed.

The details of the article controlling devices are illustrated in FIGS. 3 and 4. As article controlling devices 12 and 14 are identical to one another except that device 14 is vertically shorter than device 12 as shown in FIG. 5, only device 12 will be described in detail. As shown in FIGS. 4 and 5, device 12 is provided with a vertically disposed supporting member or shaft 12a secured at its lower end by a channel shaped bracket 16 to the adjacent side frame member 4c of the receiving conveyor. The outer flat surface of the yoke portion of bracket 16 abuts the outer flat surface of side frame member 4c and the bracket is secured to the side frame member by a plurality of screws 16a or the like so that the sides of the channel-shaped bracket extend horizontally. The upper side of the bracket is provided with a hole to receive the body portion of shaft 12a and the lower side of the bracket is provided with a smaller hole to receive the lower reduced end portion 12b of the shaft. This lower reduced end portion of the shaft is threaded to receive a washer and nut 12c below the lower side of the bracket whereby the shaft is rigidly secured to the bracket.

The operating part of the article controlling device comprises a guide member 12d which is engaged by the stack of newspapers as it enters the receiving conveyor. This guide member comprises a rectangular piece of sheet metal or the like having its opposite ends bent back in spaced apart and parallel relation to one another whereby the midportion of such sheet forms a rounded, forwardly projecting lobe when viewed from the top as shown in FIG. 3. The parallel end portions of such sheet at the rear portion of the lobe are connected to one another by an upper bearing block 12e and a lower bearing block 12f. To this end, pairs of screws 12g extend through holes in the upper rear corners of such parallel end portions into threaded engagement in tapped holes in the opposite ends of upper bearing block 12e. In a similar manner, pairs of screws 12h rigidly secure the lower rear corners of such parallel end portions of guide member 12d to the opposite ends of lower bearing block 12f as shown in FIG. 5.

Lower bearing block 12f is provided at its midportion with a hole having an oil impregnated bushing 12i or the like therein for accommodating the body portion of shaft 12a. Upper bearing block 12e is provided with a smaller

hole in alinement with the hole in the lower bearing block. This hole in the midportion of the upper bearing block is provided with an oil impregnated bushing 12j or the like for accommodating the reduced end portion 12k of the shaft. Bushing 12j is preferably provided with a small flange at its lower end which rests on a washer or the like whereby guide member 12d is rotatably supported on the shoulder at the lower end of reduced end portion 12k of the shaft. The extreme end of reduced portion 12k is provided with an annular groove into which a split ring is snapped to secure the guide member assembly to the shaft.

The portion of shaft 12a substantially midway between bearing blocks 12e and 12f is provided with a transverse hole into which a pin is driven rigidly to secure a stop block 12m to the shaft. For this purpose, stop block 12m is provided with a hole for accommodating the body portion of the shaft and is provided with pin holes in alinement with the hole in the shaft into which a pin 12n is frictionally driven to secure these parts together.

In order resiliently to bias the rotatable guide member to its normal angular position relative to the stationary shaft, stop block 12m is provided with a projecting portion 12o extending toward the rounded end of the guide member. This projecting portion is provided with a hole vertically therethrough for accommodating a bolt 12p having a bushing 12q above and a bushing 12r below such projecting portion. These bushings are provided with an annular groove for retaining the end hooks of biasing tension springs 12s and 12t, respectively.

An assembly for retaining the other ends of the biasing springs is secured within the guide member 12d adjacent to the rounded end portion thereof. This assembly comprises a bracket 12u having bent end portions secured by pairs of bolts 12v to the inner surfaces of the lobe portion of guide member 12d. Bracket 12u is provided with a hole horizontally therethrough adjacent each end thereof, one hole being in horizontal alinement with the annular groove in bushing 12q and the other hole being in horizontal alinement with the annular groove in bushing 12r. A pair of hooks 12w, eye screws or the like are mounted in the holes in bracket 12u for retaining the other end hooks of springs 12s and 12t. These hooks 12w are preferably provided with threaded shank portions to receive respective nuts on the other side of bracket 12u whereby the tensions in springs 12s and 12t may be individually adjusted.

As shown in dotted lines in FIG. 3 a stop bracket 12x is provided to limit the rotary movement of guide member 12d on shaft 12a. This stop bracket has a flat upper portion provided with a hole larger than shaft 12a through which such shaft extends as shown in FIG. 4. The forward sides of this flat upper portion are chamfered or slanted rearwardly as shown in FIG. 3 to provide clearance for bushing 12q when the guide member is pivoted. Stop bracket 12x is also provided with a pair of depending leg portions 12y, shown in FIGS. 4 and 5. These depending leg portions are secured by a pair of bolts or the like to the internal surfaces of the parallel rear portions of the guide member 12d. The holes in the leg portions of bracket 12x through which these securing bolts extend are horizontally elongated to afford adjustment of the stops. Stop bracket 12x is further provided with stops comprising a pair of wings 12z integral with the forward edges of depending leg portions 12y. These wings extend inwardly toward one another and then rearwardly parallel to one another as shown in FIG. 3 to form stops to limit the rotary movement of the guide member. As will be apparent, the guide member may be rotated until one of these wings 12z engages projecting portion 12o of stop block 12m to limit the rotary movement. It will be apparent that other stopping means such as a pair of stop blocks adjustably secured to the parallel rear portions of guide member 12d could be empolyed in place of bracket 12x.

The operation of the aforementioned devices will now be described. Let it be assumed that receiving conveyor 4 is operated to conveyor newspaper stacks in the right-hand direction in FIGS. 1 and 2 as they are received from supply conveyor 2. Under this condition, article controlling device 12 will be effective. The shaft is adjusted on its supporting bracket so that the guide member is substantially one-half inch from a stack arriving along the center line of the supply conveyor as shown in FIG. 5. So adjusted, the guide member overlies the receiving conveyor as shown in FIG. 1 and is turned at an angle toward the projected center line of the supply conveyor.

When a stack of newspapers is conveyed by the supply conveyor and by its own inertia onto the receiving conveyor, the latter moves the stack sideways to the right as shown in FIG. 2. The stack engages the rounded guide member of article controlling device 12 and pivots the latter against the bias of its tension spring 12*s*, FIG. 3. The resilient force opposing movement of the stack in the right-hand direction absorbs the shock imparted to the stack by rollers 4*a*. In this manner, the movement of the stack in the right-hand direction is resiliently and gradually slowed down while the rollers of conveyor 4 partially rotate under the stack relative to the latter. The resiliently increasing counteracting force of the guide member allows the receiving conveyor gradually to turn the stack around the rounded end portion of the lobe of the guide member. As a result, the receiving conveyor moves the stack around the guide member whereby the stack is turned in the right-hand direction as shown in dotted lines in FIG. 2 whereby the stack is conveyed away by belt portion 8 of the transverse conveyor.

The pivotal movement of the guide member by the stack is limited to the extent shown in dotted lines in FIG. 2. At this angle, the corresponding wing 12*z* on bracket 12*x* engages projecting portion 12*o* of stop block 12*m* to prevent further rotation of guide member 12*d*. As a result, the stack of newspapers is driven by rollers 4*a* to the middle of belt 8*a* of conveyor 8 whereby a 90 degree turn of the stack is effected and the stack is conveyed away along the middle of the transverse conveyor.

Referring to FIG. 5, it will be apparent that the stack of newspapers is comprised of at least two batches including a lower batch LB and an upper batch UB. The newspapers in the lower batch have their folded sides on the left side of the stack and the newspapers in the upper batch have their folded sides on the right side of the stack. Newspaper stacks are comprised of batches of newspapers arranged in this manner to maintain the stacks reasonably level. Also, this arrangement of newspapers and batches thereof forming a stack is the product of newspaper stackers such as that disclosed in Frederic E. Howdle and Charles W. Otto Reissue Patent No. 25,018 dated August 8, 1961. It will be apparent in FIG. 5 that the upper surface of lower batch LB slants to the right which will cause the upper batch to have a tendency to slide to the right on the lower batch particularly if the stack is subjected to a shock or jolt.

To prevent such relative sliding of the upper batch, guide member 12*d* is provided with a predetermined height. If the stack is oriented on the supply conveyor, either by the stacker or otherwise, in such a manner that the folded sides of the upper batch are on the side toward which the stack is to be turned, the guide member 12*d* for controlling turning of the stack will be provided with a height at least equal to the height of the stack. This height is required to prevent the upper papers in the upper batch from sliding over the guide member when the transverse roller conveyor moves the stack against such guide member. On the other hand, if the stack is oriented on the supply conveyor in such a manner that the unfolded sides of the upper batch are on the side toward which the stack is to be turned, as illustrated in connection with guide member 14*d* of article controlling device 14 in FIG. 5, the guide member which controls turning of the stack will be provided with a height not greater than the height of the lower batch. This lower height is required to prevent the guide member from causing the upper batch to slide down the inclined upper surface of the lower batch. As these stacks are formed by the aforementioned stacker, the upper batch is often slightly displaced sideways relative to the lower batch so that the unfolded edges of the newspapers in each batch extend beyond the folded edges of the other batch. Therefore, if a guide member higher than member 14*d* were employed, the upper portion thereof would first engage the unfolded edges of the upper batch and cause the upper batch to slide on the lower batch. To prevent this sliding effect so as to prevent the upper batch from spilling, the guide member 14*d* is given a height substantially equal to the folded edge side of the lower batch. As a result, only the folded edges of the newspapers in the lower batch engage the guide member while the stack is driven thereagainst by the receiving conveyor. If the upper batch is displaced as aforementioned, the unfolded edges of the newspapers therein will clear the top of the guide member and cannot be pushed by the latter. Although the guide member 14*d* engages only the lower batch, the upper batch will not tend to be slid in the left-hand direction because the upper surface of the lower batch slants upwardly in that direction.

Each article controlling device is provided with a pair of tension springs 12*s* and 12*t* to bias its guide member into its normal center position from both directions. As a result, each guide member can be used to control turning of stacks either in the right-hand direction or the left-hand direction when accordingly mounted on the proper side of the incoming conveyor. For this purpose, brackets 16 are readily removable and mountable in different locations on the side frame of the receiving conveyor. Also, once the brackets 16 are mounted for both directions of turning, supporting shaft 12*a* and the associated guide member assembly is readily removable by loosening nut 12*c* so that such assembly can be mounted on a bracket in another location.

While the apparatus hereinbefore described is effectively adapted to fulfill the objects stated, it is to be understood that I do not intend to confine my invention to the particular preferred embodimens of conveyed article controlling devices disclosed, inasmuch as they are susceptible of various modifications without departing from the scope of the appended claims.

I claim:

1. In a conveyor system having a first conveyor for conveying articles therealong and a second conveyor for receiving such articles from the first conveyor, the improvement comprising:

(*a*) shock absorbing and control means mounted at the junction of the first and second conveyors for absorbing the shock imparted to each article by the second conveyor as it enters the latter and for controlling movement of the article from the first conveyor to the second conveyor, said means comprising:

(*b*) a guide means having a mounting end and a free end;

(*c*) means rotatably supporting said guide means at its mounting end on a fixed point at the junction between said conveyors;

(*d*) and means resiliently biasing said guide means for limited rotary movement of its free end about said pivot in the path of turning movement of the article to apply a resilient counteracting force to the article to slow down its movement when it enters said second conveyor.

2. The invention defined in claim 1, wherein said biasing means comprises:

(*a*) means resiliently biasing said guide means for limited movement of its free end in opposite rotary directions thereby adapting it for controlling move-

ment of articles from the first conveyor either in the left or right direction.

3. The invention defined in claim 1, wherein said counteracting force applying means comprises:

(*a*) means for applying a gradually increasing force resisting movement of each article in the direction of the second conveyor until each such article has entered fully upon the second conveyor.

4. In a conveyor system having a first conveyor for conveying articles therealong and a second conveyor for receiving such articles from the first conveyor, the improvement comprising:

(*a*) article control means mounted at the junction between the first and second conveyors for assisting in turning of each article from the direction of the first conveyor to the direction of the second conveyor, said article control means comprising:

(*b*) a guide member pivotally supported at one end and having its other end extending over a portion of said second conveyor into the path of turning movement of the article;

(*c*) and means resiliently biasing said extending end to apply a counteracting force to each article to slow down movement thereof by the second conveyor causes each article to move around said extending end of said guide member and thereby to turn each article in the direction of said second conveyor.

5. The invention defined in claim 4, wherein said resiliently biasing means comprises:

(*a*) means limiting rotary movement of said guide member out of the path of diverting movement of the articles whereby movement of each article around said extending end by the second conveyor causes each article to be turned and positioned in the middle of the second conveyor.

6. In a conveyor system having a first conveyor for conveying articles therealong in a first direction and a second conveyor for receiving such articles from the first conveyor and for conveying the articles in a transverse direction, the improvement comprising:

(*a*) means for performing the dual function of absorbing the shock imparted to each article absorbing the shock imparted to each article by the second conveyor as it enters the latter and for turning the article into the direction of the second conveyor, said means comprising;

(*b*) a lobe-shaped member resiliently biased partially into the path of diverting movement of the article at the junction of the conveyors;

(*c*) means for causing said lobe-shaped member to apply a gradually increasing counteracting force to the article as the latter is moved thereagainst by the second conveyor whereby to absorb the shock to which the article is subjected;

(*d*) and said lobe-shaped member having a rounded end engaging the article and around which the article is moved by the second conveyor to turn the article in the direction of the second conveyor.

7. In a conveyor system having a first conveyor for conveying stacks of folded articles therealong and a second conveyor extending across the discharge end of the first conveyor for conveying the stacks of folded articles in a transverse direction, the improvement comprising:

(*a*) means mounted at the junction of the first and second conveyors for absorbing the shock imparted to the article stack by the transverse conveyor whereby to prevent the stacked articles from spilling, said means comprising;

(*b*) a lobe-shaped guide member pivotally mounted at that side of the junction of the conveyors corresponding to the direction into which the article stacks are conveyed by the second conveyor;

(*c*) resilient means rotatably biasing said guide member partially into the path of turning movement of the article stack whereby said guide member absorbs the shock imposed on the stack by the transverse conveyor when the latter moves the stack thereagainst;

(*d*) and means restricting rotation of said guide member to a predetermined amount against the force of said resilient means whereby said second conveyor moves the stack around said guide member to turn the stack in the direction of the second conveyor.

8. The invention defined in claim 7, wherein;

(*a*) said stack comprises at least two batches of folded newspapers with the folded edges of the newspapers in the upper batch being on the side of the stack corresponding to the direction into which the stack is conveyed by the transverse conveyor and the folded edges of the newspapers in the lower batch being on the opposite side;

(*b*) and said guide member having a height sufficient to engage the folded edges of the newspapers in the upper batch to prevent the upper batch from sliding off the lower batch when the stack is moved against said guide member.

9. The invention defined in claim 7, wherein:

(*a*) said stack comprises at least two batches of folded newspaper with the folded edges of the newspapers in the lower batch being on the side of the stack corresponding to the direction into which the stack is conveyed by the transverse conveyor and the folded edges of the newspapers in the upper batch being on the opposite side;

(*b*) and said guide member having a height no greater than the folded side of the lower batch to prevent the guide member from pushing on any unfolded edges of newspapers in the upper batch and thereby to prevent the guide member from causing the upper batch to slide down the inclined upper surface of the lower batch.

10. The invention defined in claim 7, wherein said lobe-shaped guide member comprises:

(*a*) a rectangular sheet of metal having its ends bent back parallel to one another;

(*b*) a supporting shaft mounted to a side frame member of one of the conveyors;

(*c*) bearing blocks connecting said parallel ends of said sheet to one another and being journaled on said supporting shaft to afford rotation of the rounded intermediate portion of said sheet forming said lobe-shaped guide member partially into and out of the path of the article stacks;

(*d*) and said resilient means comprises resilient springs mounted within said lobe-shaped guide member for biasing the latter partially into the path of the article stacks.

11. The invention defined in claim 10, wherein said means restricting rotation of said guide member comprises:

(*a*) a stop block rigidly secured to said supporting shaft and having a projecting portion;

(*b*) and stop members connected to the parallel ends of said bent back sheet forming said guide member and having portions abutting said projecting portion of said stop block when said guide member is rotated limited amounts in opposite directions.

12. The invention defined in claim 11, wherein said resilient means further comprises:

(*a*) means connecting first ends of said springs to said projecting portion of said stop block;

(*b*) bracket means mounted between inner walls of said lobe-shaped guide member;

(*c*) and means connecting the other ends of said springs in tension to said bracket means in spaced apart relation.

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