April 24, 1956 H. R. HEDLUND ET AL 2,743,000

CONVEYOR TIMING MECHANISM

Filed Oct. 2, 1950 3 Sheets-Sheet 1

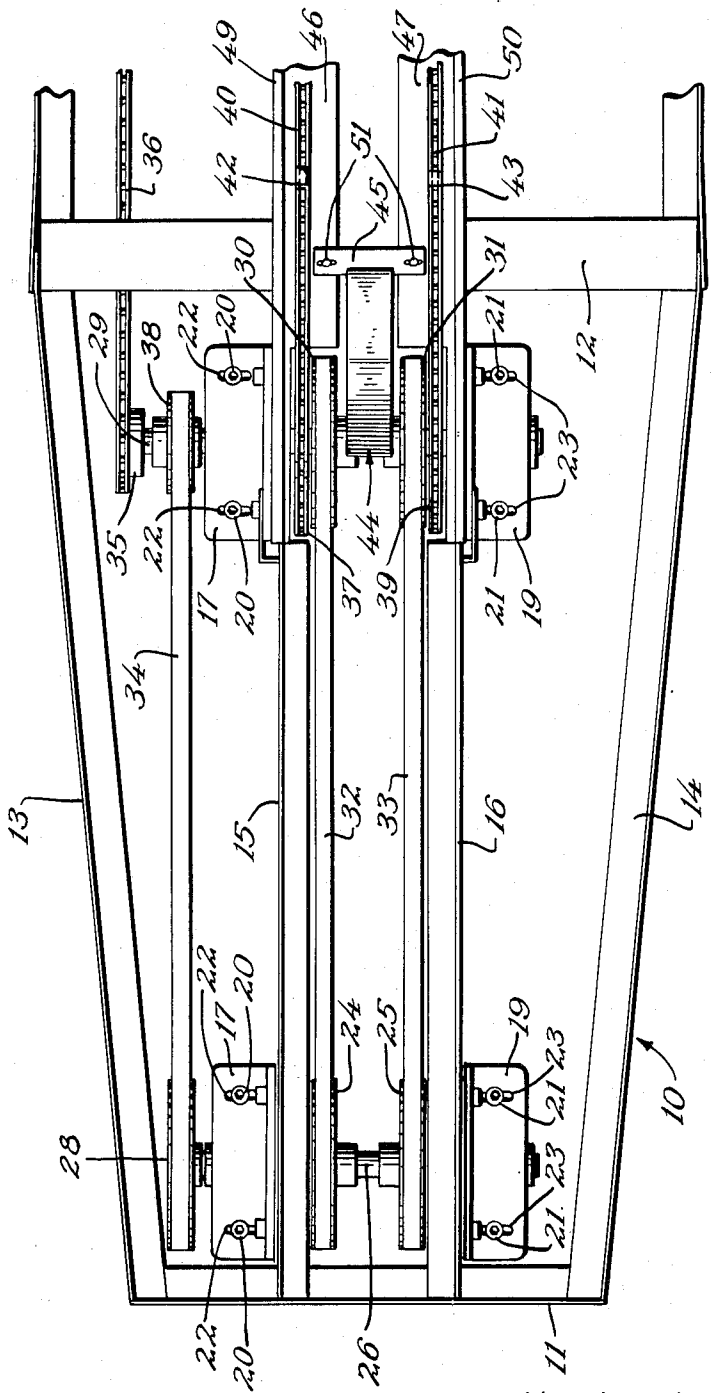

Fig. 1

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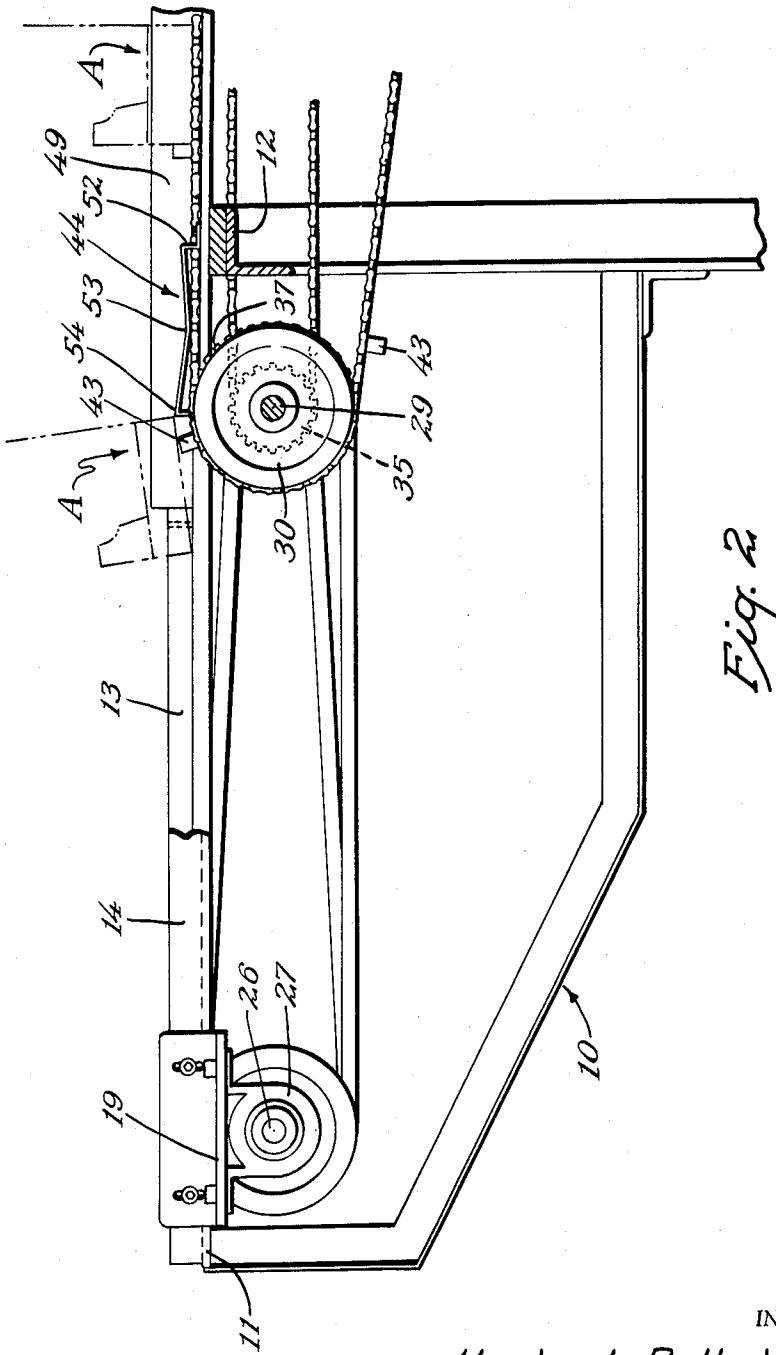

Fig. 2

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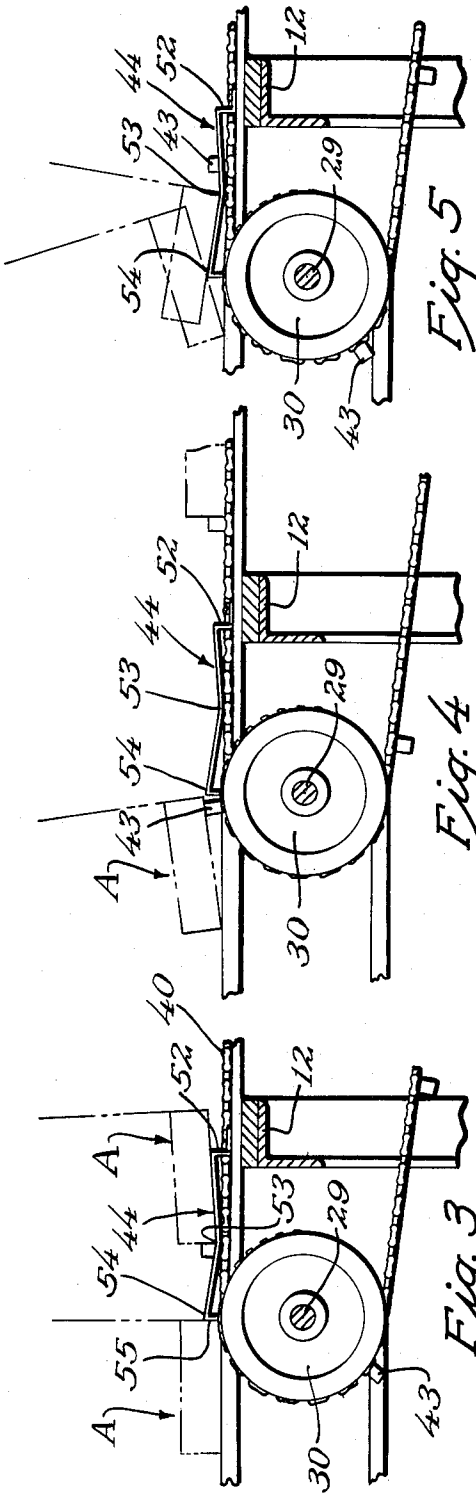

Fig. 5

Fig. 4

Fig. 3

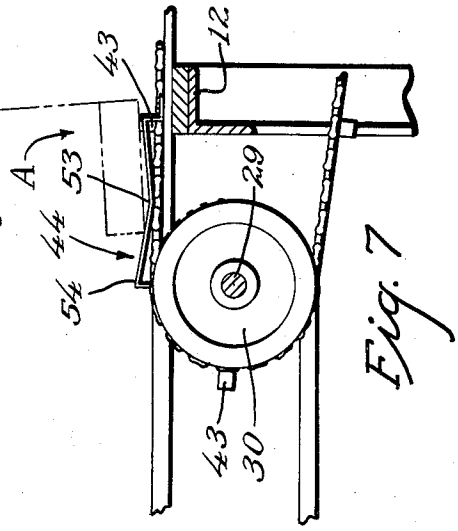

Fig. 7

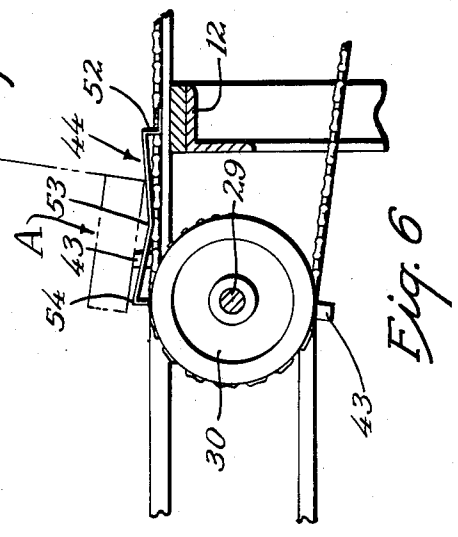

Fig. 6

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CONVEYOR TIMING MECHANISM

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Application October 2, 1950, Serial No. 187,984

12 Claims. (Cl. 198—34)

The present invention relates to an improvement in conveyor timing mechanism wherein it is desired to provide a simple and effective apparatus for timing the movement of materials along a conveyor.

In the conveying of materials through an apparatus, it is often necessary to time the articles so that they will pass through the apparatus in certain predetermined relationship. For example in the closing of filled cartons by a suitable closing mechanism, the cartons must enter the apparatus in properly spaced relationship to be operated upon by the closing mechanism. The present device provides a simple and effective means for timing the entrance of such packages into the apparatus.

In dealing with filled cartons, a vibrating or shaking mechanism is sometimes employed to move the contents of the package into a compact state. A feature of the present invention lies in the fact that the apparatus not only tends to time the entrance of packages into the apparatus, but also shakes the package and tilts the same so as to move the package contents into more compact form.

A feature of the present invention lies in a timing apparatus which is operable with a conveyor chain having a series of spaced lugs thereupon for moving the packages in properly spaced relation. These lugs serve to assist in the tilting operation of the carton, as well as to convey the carton at the proper time of operation.

These and other objects and novel features of my invention will be more clearly and fully set forth in the following specification and claims.

In the drawings forming a part of the specification:

Figure 1 is a top plan view of the entrance end of a carton closing apparatus showing the construction thereof.

Figure 2 is a side elevational view of the construction shown in Figure 1.

Figure 3 is a diagrammatic elevation view of the apparatus showing cartons in two different positions relative thereto.

Figure 4 is a view similar to Figure 3 showing the cartons in a different position.

Figure 5 is a view similar to Figures 3 and 4 showing the cartons in still a different position.

Figure 6 is a view showing the cartons in another position.

Figure 7 shows the carton in still another position on the device.

Figures 1 and 2 of the drawings disclose diagrammatically the entrance end of a machine designed to convey cartons. The apparatus discloses a frame **10** having cross members **11** and **12** which are connected by longitudinally extending frame parts **13** and **14**. Spaced guides **15** and **16** are connected to aligned attachment plates **17** and **19** which are adjustably supported to fixed portions of the frame by bolts **20** and **21**. The bolts **20** and **21** extend through slots **22** and **23** respectively so that the guides **15** and **16** may be moved toward or away from one another.

A pair of pulleys **24** and **25** are supported upon a common shaft **26** to extend transversely of the frame near the entrance end of the apparatus. The shaft **26** is supported by bearings **27** supported by the frame **10**. A second shaft **29** is supported by suitable bearings secured to the frame and extends parallel to the shaft **26**. Pulleys **30** and **31** are mounted upon the shaft **29**. A belt **32** connects the pulleys **24** and **30**, while a parallel belt **33** connects the pulleys **25** and **31**.

The pulleys **30** and **31** may rotate freely upon the shaft **29**. A pulley **28** is mounted upon the shaft **26** to rotate therewith. A pulley **38** is mounted in alignment with the pulley **28** upon the shaft **29**. A belt **34** connects the pulleys **28** and **38**. A sprocket **35** is mounted upon the shaft **29** and is driven from a suitable source of power supply by a drive chain **36**. The drive chain **36** thus acts to drive the shaft **29** and the pulley **33** which acts through the belt **34** to rotate the shaft **26**. Rotation of the shaft **26** acts to drive the belts **32** and **33**. As the pulley **38** is of smaller diameter than the pulley **32** and as the pulleys **24**, **25**, **30** and **31** are all of uniform size the pulleys **30** and **31** rotate at a slower rate of speed than the shaft **29** upon which they are mounted.

A pair of sprockets **37** and **39** are mounted upon the shaft **29** for rotation in unison therewith. These sprockets **37** and **39** act to drive conveyor chains **40** and **41**, respectively. These chains **40** and **41** travel at a greater lineal speed than the belts **32** and **33**.

The chains **40** and **41** are provided with spaced lugs **42** and **43** which are oppositely arranged on the two chains so as to travel in pairs. These lugs **43** are arranged to engage the wall of a carton A so as to move the carton along the chain. These lugs also serve as a timing means for spacing the cartons A in a manner which will be later described in detail.

The cartons A which travel over the present device may be of any suitable size or shape. In the construction illustrated the cartons have tray-shaped bodies having an integral back panel foldably connected to one of the carton walls and designed to fold down over the top of the carton to form a cover therefor. The cartons are usually filled by a filling apparatus, not illustrated in the drawings, and either travel automatically onto the conveyor belts **32** and **33** or are delivered manually thereto. Each carton A travels along the belts **32** and **33** until it strikes the timing and tilting mechanism over which each carton must pass before being engaged by the conveyor chains **40** and **41**.

As indicated in Figure 1 of the drawings the tilting mechanism includes a longitudinally extending strip of metal or other suitable material, indicated in general by the numeral **44**. This strip is supported by a transversely extending attaching strip **45** at one end thereof which is mounted upon longitudinally extending fixed frame members **46** and **47**. These fixed frame members are connected to the attachment plates **17** and **19** and are laterally adjustable together therewith. The frame members **46** and **47** are angular in cross section and are provided with vertical flanges **49** and **50** which form continuation of the guides **15** and **16** and act to guide the packages A as they travel along the conveyor chains **40** and **41**.

The anchoring strip **45** may be adjustably supported to the horizontal flanges of the frame members **46** and **47** by bolts or cap screws **51**, or other suitable means.

As best indicated in Figures 2 through 7 of the drawings, the tilting member extends upwardly from the anchoring strip **45** as indicated at **52**, to a point substantially above the level of the conveyor chains **40** and **41**. The strip **44** then angles downwardly toward the entrance end of the conveyor to the central low point **53**. From this low point **53** the strip angles upwardly to a second

high point 54. The end of the strip 44 is then bent downwardly to form the substantially vertical shoulder 55 against which the forward wall of the package may engage.

The shoulder 55 of the strip 44 is located directly above the chain sprockets 37 and 39, or substantially over the axis of the shaft 29. Thus as each of the conveyor chains 40 and 41 extend over their respective sprockets 37 and 39, the chain lugs 42 and 43 of the two chains engage the bottom wall of the carton A forwardly of the center thereof and act to elevate the forward end of the carton to a point above the level of the high point 54. When the carton is thus elevated, the lugs pass from beneath the carton elevated and engage the next adjacent carton A on the tilting strip 44. Obviously the first carton engaged is merely tilted upwardly until its forward end rests upon the high point 54 of the strip 44 and the lugs 53 then slide from beneath the carton, leaving the carton upon the tilting strip 44. The cartons A are usually backed up upon the conveyor belts 32 and 33 due to the fact that these belts travel at a slightly higher speed than the conveyor chains 40 and 41 and due to the fact that the cartons are fed to the apparatus in a continuous stream and are purposely allowed to accumulate on the belts 32 and 33 so as to build up a pressure against the leading carton of the series. The belts 32 and 33 are relatively smooth and act as slip belts beneath the cartons, advancing the cartons as quickly as one of the cartons A is elevated by the lugs 42 and 43.

Figure 3 of the drawings shows the position of the cartons with one carton A elevated so that its forward edge rests upon the high point 54 of the tilting strip 44 and the lugs 42 and 43 have slipped from beneath this tilted carton to engage against the next successive carton A. The lugs 42 and 43 are slightly higher than the high points of the strip 44 so that the carton A against which the lugs engage in Figure 3 is carried off the tilting strip and onto the conveyor chains to travel through the attached apparatus.

In Figure 4 of the drawings it will be seen that pressure of the cartons on the slip belts 32 and 33 has forced the tilted carton A forwardly until the forward end of the carton is relatively high in the air and the rear end thereof is tilted downwardly. After the carton A moves past more than half way onto the strip 44, the weight of the carton and its contents tilts the carton in the opposite direction so that its forward end drops downwardly toward the low point 53 of the strip. In other words, the carton A entering the tilting apparatus tilts from the position shown in Figure 4 to the position shown in Figure 5. The forward pressure upon the rear end of the carton provided by the series of cartons A upon the slip belts 32 and 33 continues until the carton A on the tilting member is entirely supported thereby, and the next succeeding carton is in place against the shoulder 55.

After the carton is entirely supported by the tilting strip 44 the next succeeding pair of lugs 42 and 43 engage the bottom surface of the foremost carton A on the slip belts 32 and 33, which is engaged with the shoulder 55. This foremost carton is then elevated at its forward end and the lugs slip from beneath this foremost carton to engage the rear edge of the carton A previously forced onto the tilting strip 44.

From the position shown in Figure 7 of the drawings in which the carton is entirely supported by the tilting strip 44, the lugs 42 and 43 slide the carton A forwardly, the rear edge of the carton tilting downwardly and the forward edge of the carton tilting upwardly until the rear edge of the carton reaches the low point 53 of the strip 44. From this point the carton is urged forwardly up the inclined surface until the weight of the carton and its contents becomes over-balanced. At this time the forward edge of the carton drops downwardly onto the conveyor chains 40 and 41 and the rear edge of the carton tilts upwardly. The lugs 42 and 43 remain in contact with the rear surface of the carton and force the carton off the strip 44 from the position shown in Figure 4 to the position shown in Figure 5. The lugs then carry the carton through the attached apparatus.

From the foregoing description, it will be obvious that as the cartons pass over the timing and tilting apparatus, they are first tilted in one direction until the forward edge is elevated onto the tilting strip and then pushed forwardly until the carton tilts into an opposite inclined position. The carton is then urged over the remainder of the tilting strip which again first elevates the forward end of the carton and then allows the forward end to drop downwardly. Thus each carton is tilted in two opposite directions twice while passing over the apparatus and the contents of the carton are shaken down into the carton.

It will also be noted that the successive cartons first engage a shoulder and remain in this position until the forward edge of the carton is elevated by the lugs 42 and 43. This pair of lugs then slips from beneath the carton being tilted and engages the carton previously pushed onto the tilting strip. The lugs urge this forward carton through the apparatus while the cartons on the slip belt push the tilted carton completely onto the tilting strip. Thus the cartons are forced through the apparatus by the lugs in predetermined timed relation and the cartons are maintained in equally spaced relation for any succeeding operation. The timing mechanism is quite independent of the feeding operation. As a result the cartons may be fed to the apparatus in spaced relation or in bunches, it only being necessary to maintain enough cartons on the slip belts to force the foremost carton onto the tilting strip.

In the event single cartons are allowed to pass through the apparatus, the cartons will still pass through the apparatus in proper timed sequence, even though the cartons will not be equally spaced on the timed chains. If there is insufficient back pressure to push a carton onto the tilting strip, the next succeeding pair of lugs 42 and 43 may engage the undersurface of the carton and tend to move the carton forwardly. Thus a single carton may be engaged by two or more pairs of lugs before reaching position to be moved from the tilting strip by the next succeeding pair of lugs. However, in any event the carton is moved by one pair of the lugs on the conveyor chains and thus passes through the succeeding apparatus in proper timed relation.

The present device has been described in conjunction with its use on cartons as it is particularly desirable in many instances to shake the contents of the cartons as they are moved along a conveyor. Obviously, however, my apparatus could similarly be used for timing other objects of somewhat different types. Boards or panels of various types moved along a conveyor may be timed by the apparatus. Similarly cans or bottles of various materials may be timed from a continuous succession to an evenly spaced relationship.

In accordance with the patent statutes, we have described the principles of construction and operation of our conveyor timing mechanism, and while we have endeavored to set forth the best embodiment thereof, I desire to have it understood that obvious changes may be made within the scope of the following claims without departing from the spirit of our invention.

We claim:

1. A conveyor apparatus for conveying articles in timed relationship, the apparatus including a first article conveyor, a shoulder located in the path of movement of articles conveyed by said first conveyor and causing stoppage of articles moved by said conveyor by slippage thereof relative to the articles conveyed, a second article moving apparatus comprising conveyor strips traveling in alignment with said first article moving conveyor, raised lug elements in spaced relationship on said endless conveyor strips for elevating articles from said first

moving conveyor above said shoulder and moving said articles from said shoulder over said endless conveyor strips in timed spaced relationship.

2. A conveyor apparatus for conveying articles in timed relationship, the apparatus including a first article conveyor, a shoulder located in the path of movement of articles conveyed by said first conveyor and causing stoppage of articles moved by said conveyor by slippage thereof relative to the articles conveyed, a second article moving apparatus comprising an endless conveyor traveling in alignment with said first moving conveyor, an article lifting element on said endless conveyor for lifting articles from said first moving conveyor above said shoulder and thereafter moving said articles from said shoulder over said endless conveyor in timed spaced relationship.

3. A conveying apparatus for conveying articles including a stop shoulder, means for guiding articles against said stop shoulder, a series of spaced elements movable past said stop shoulder, said elements being engageable with an article positioned against said shoulder to tilt upwardly the forward end of said article, the next successive of said spaced elements engaging the article and moving the same away from said stop shoulder.

4. The structure described in claim 3 in which said spaced elements engage the undersurface of the articles to elevate the edge of the article engaged with said stop shoulder.

5. The structure described in claim 3 and in which the spaced elements engage the undersurface of the article located against said shoulder to elevate the edge of the article engaged with said stop shoulder, this element sliding from beneath the article, the next successive of said elements engaging the article to move the same.

6. An apparatus for conveying articles including a first conveyor, a stop shoulder in the path of movement of articles on the first conveyor, continued movement of said first conveyor causing slippage between the first conveyor and the articles conveyed, a second conveyor overlapping the first conveyor, means on said second conveyor successively engageable with the articles engaging said shoulder to elevate the articles over said shoulder, and means on said second conveyor engaging the articles passing over the shoulder to move the same in timed relation along said second conveyor.

7. The structure described in claim 6 in which the means elevating the articles and the means moving the articles in timed relation comprise spaced means on the second conveyor.

8. An article conveying apparatus including a first conveyor, a stop shoulder located in the path of movement of articles carried by said first conveyor and capable of arresting movement of articles conveyed while resting on said first conveyor, a platform adjacent said stop shoulder, a second conveyor overlapping said first conveyor, means on said second conveyor engaging the undersurface of an article engaged with said shoulder for elevating said article over said shoulder and onto said platform, and means on said second conveyor for engaging articles on said platform to slide the articles from said platform and carry the same along said second conveyor.

9. The structure described in claim 8 in which said platform acts to tilt said articles.

10. An article conveying apparatus including a first conveyor, a platform located in the path of movement of articles carried by said conveyor and capable of arresting movement of the articles while resting on said first conveyor, a second conveyor overlapping said first conveyor, means on said second conveyor engageable with the undersurface of an article lying against said platform for elevating the article for movement onto said platform, said means on said second conveyor being engageable with any article already on said platform for moving the same along said second conveyor.

11. The structure described in claim 10 in which the means on the second conveyor slides beneath the elevated article to engage any article previously deposited upon said platform.

12. The structure described in claim 10 in which the platform includes means for tilting articles passing thereover.

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