March 21, 1967 T. L. BARKER ETAL 3,310,187

UNCASER

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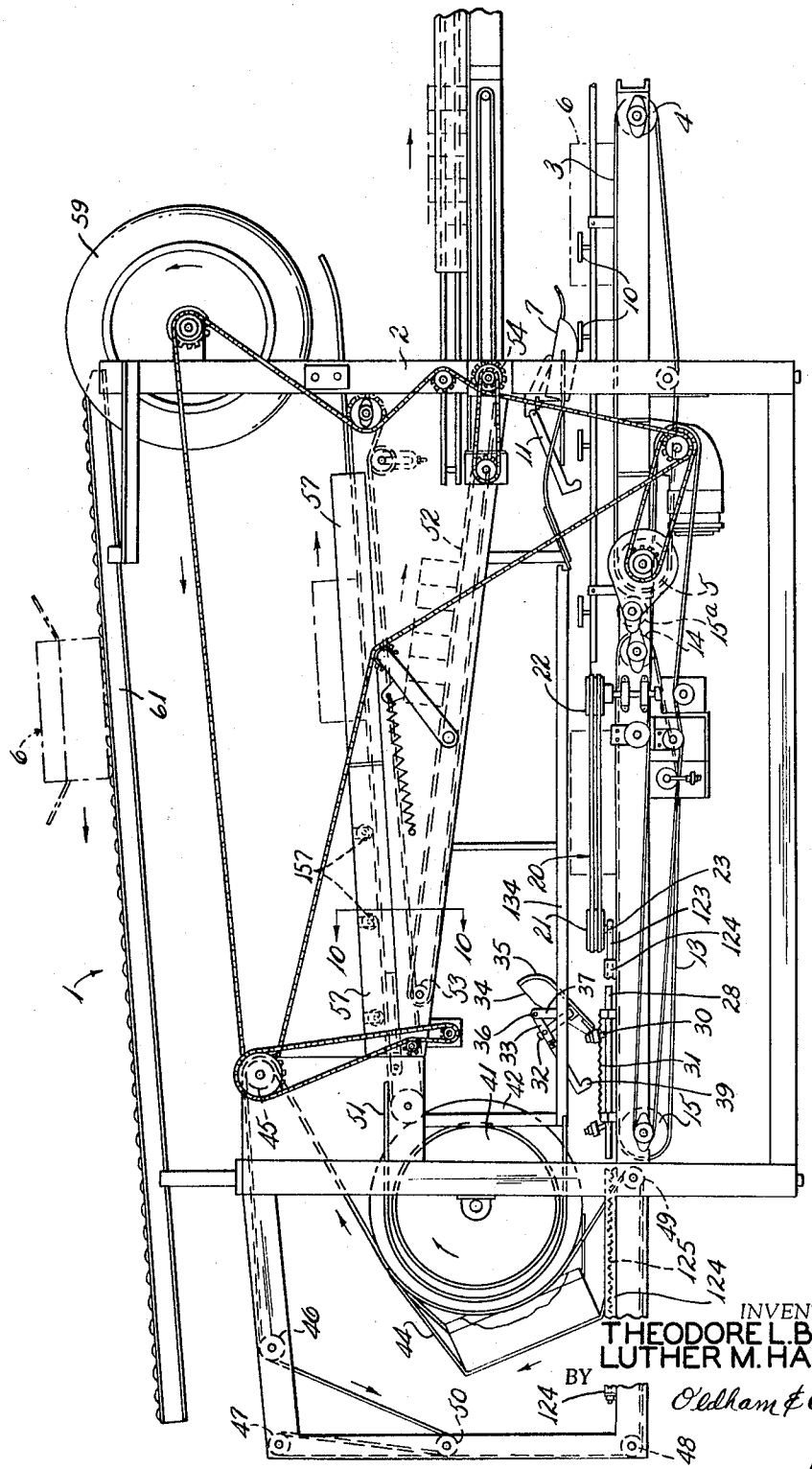


FIG. 1

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FIG. 2

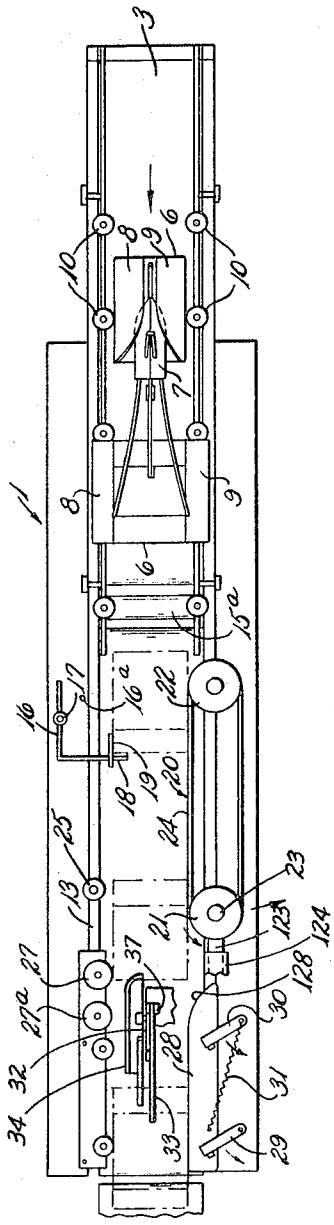


FIG. 3

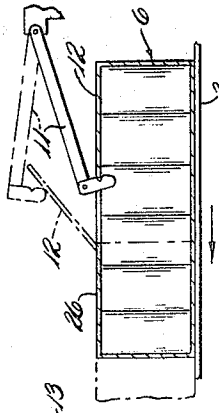


FIG. 8

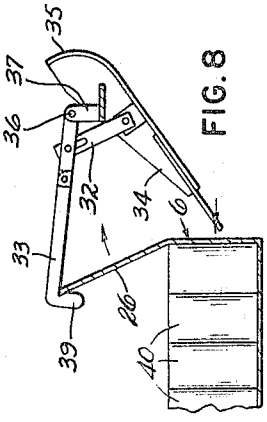


FIG. 5

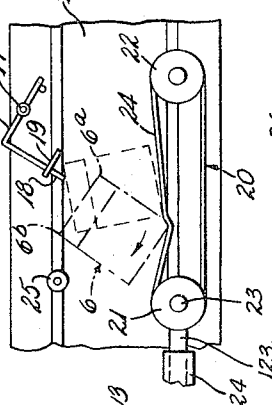


FIG. 7

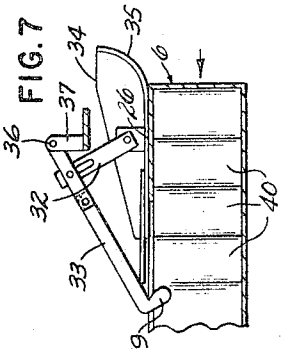


FIG. 4

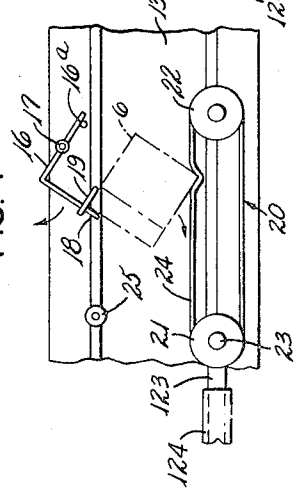
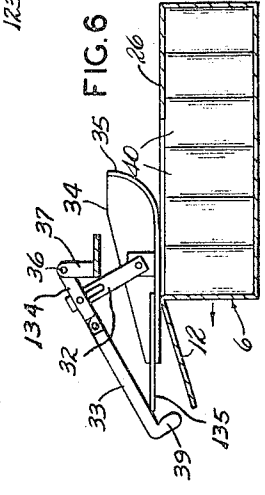


FIG. 6



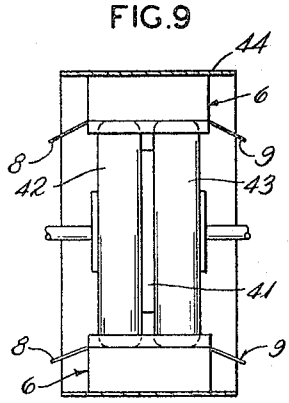
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FIG. 9



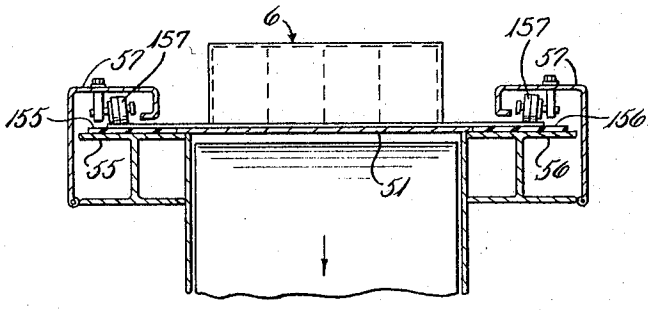


FIG. 10

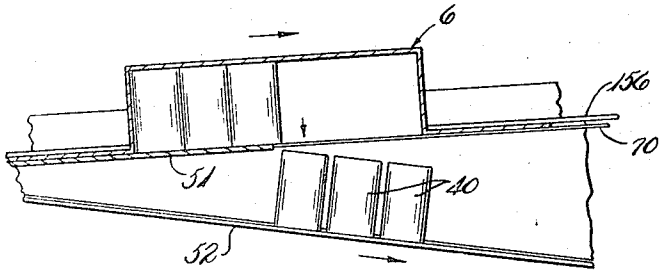


FIG. 11

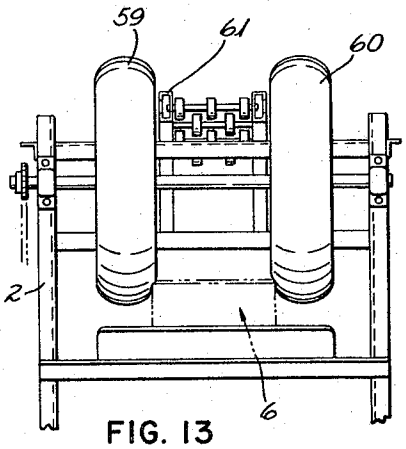


FIG. 13

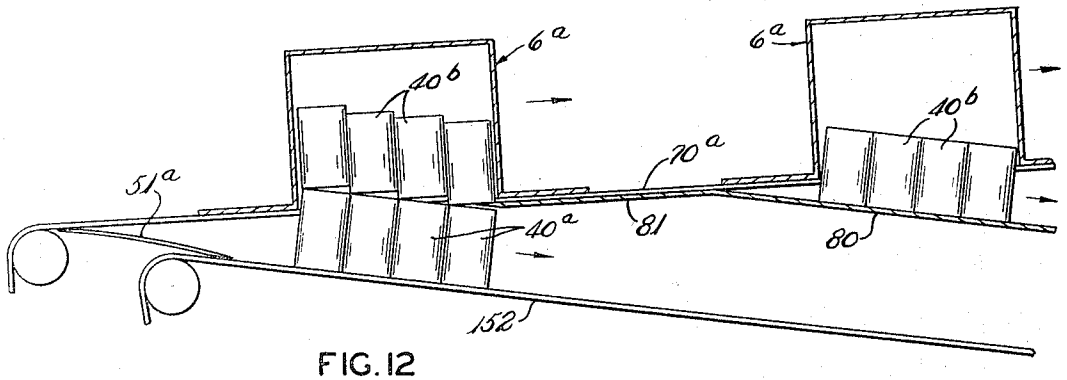


FIG. 12

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United States Patent Office 3,310,187 Patented Mar. 21, 1967

3,310,187

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Filed Sept. 14, 1965, Ser. No. 487,219
14 Claims. (Cl. 214—304)

The present invention relates, in general, to cardboard box or case opening and dumping apparatus and particularly to apparatus that is provided to facilitate opening the flaps on a cardboard case, box or the like, by reversing the position of a case being processed.

In business today, in many instances, large quantities of articles, such as cans, are shipped from the can manufacturer to a customer who has bought such containers or cans for processing them to fill them with some suitable material for ultimate resale purposes.

When these unfilled containers, or cans are shipped from the can manufacturer to the customer, normally these cans or containers are shipped in substantially rectangular, box-like shaped cases or boxes that are made from corrugated paperboard, or other equivalent materials. Such cases normally have two end flaps on the upper portions thereof, and two side flaps that are normally folded in over the top of the case after the end flaps have been brought into closed position whereby the boxes or cases are closed for shipping purposes so that when the contents of the case are to be used, the two side flaps must be folded to open positions and then the two end flaps on the case or box must be swung outwardly to open position so that the contents of the box or case can be removed.

Various efforts have been made heretofore to provide satisfactory case opening apparatus to expose the contents of the case for removal by inverting the case, by power or magnetic means engaging the contents of the case, or by other action. In all events, it is difficult to process a large number of these cases rapidly and efficiently so as to expose the contents of the case for convenient removal therefrom.

In these case opening actions, it has been conventional to open the side flaps on the case by some type of a plow means, and usually some type of a hook member is used for opening the trailing flap of the case, but the leading end flap of the case is the one that has been the most difficult to open in machinery and apparatus as made today.

The general object of the present invention is to provide a novel and improved box opening and dumping apparatus and particularly to provide a novel case reverser for use in box opening and dumping actions.

Another object of the invention is to provide a case opening apparatus characterized by the provision of means in the apparatus for reversing the case being opened after the side and original trailing end flap thereon have been opened whereby the original leading end flap of the case is now the trailing end flap of the case and it can be opened by relatively uncomplicated, positive acting means.

Another object of the invention is to provide means in case processing apparatus for engaging a corner of the leading end of the case after certain flaps thereon have been opened, and then to cause the case to start to turn about its longitudinal axis, and to engage the case with a flexible driven belt member at a corner and side portion thereof so as to positively turn the case through 180°, as it is being moved along by a driven conveyor.

Other objects of the invention include the provision of special mounting means for positioning an endless belt for engagement with a side and corner portion of a case to facilitate turning action thereof; to provide novel and

improved resilient means in association with a case inverting apparatus after the case has been opened to prevent undesired spilling of the contents of the case; to provide special means for substantially lifting a case from a driven carrier conveyor as rotation of the case about its longitudinal axis through an arc is being effected; to provide novel means for riding over an open leading end flap of a case by means used for engaging a closed trailing end flap of the case for opening action thereon as the case is being moved along by a driven conveyor; and to provide novel and improved positive acting apparatus of relatively inexpensive, uncomplicated construction for rapidly and positively reversing a case as it is being moved along a driven conveyor to move the case through a fixed path.

The foregoinng and other objects and advantages of the invention will be made more apparent as the specification proceeds.

Attention now is particularly directed to the accompanying drawings wherein:

FIG. 1 is a side elevation of apparatus embodying the principles of the invention;

FIG. 2 is a fragmentary plan view of the lower portion of the apparatus of FIG. 1 showing the initial path of movement of a case being processed by the apparatus of the invention for flap opening and reversing action;

FIG. 3 is a fragmentary vertical section, partially shown in diagrammatic form, of the means used for opening the trailing end flap on a case as it moves through the apparatus of the invention;

FIG. 4 is a fragmentary plan view, partially shown in diagrammatic form, of a case being processed in the apparatus shown in FIG. 2 as such case is started to be rotated on its longitudinal axis;

FIG. 5 is a view taken subsequent to the action shown in FIG. 4 and showing further positive rotation of the case about its longitudinal axis;

FIG. 6 is a fragmentary vertical section, partially shown in diagrammatic form, of a means and apparatus used for opening the trailing end of a case after it has been rotated on its longitudinal axis and showing the means riding over the then leading end opened end flap of the case;

FIG. 7 shows further progressive relative movement between the case of FIG. 6 and the associated trailing end flap opening member;

FIG. 8 shows the final action of the apparatus of FIGS. 6 and 7 in opening the trailing end of the case;

FIG. 9 is a fragmentary vertical section, partially shown in diagrammatic form, of the means used to engage the cases, as the cases are inverted in the apparatus;

FIG. 10 is a fragmentary vertical section taken on line 10—10 of FIG. 1;

FIG. 11 is a fragmentary vertical section showing an inverted case as it is progressively moved further through the apparatus and the contents thereof are starting to be discharged;

FIG. 12 is a fragmentary vertical section of a modified form of the apparatus of the invention as used for processing the cans having a multiplicity of vertical layers of cans or other articles therein and showing the discharge action for the contents of these cases; and

FIG. 13 is a fragmentary right side elevation of the case engaging portion of the apparatus of FIG. 1.

When referring to corresponding members shown in the drawings and referred to in the specification, corresponding numerals are used to facilitate comparison therebetween.

Generally speaking, the present invention in its broadest aspect relates to a case reversing apparatus for arti-

cles such as rectangular boxes, cases or the like, and where the apparatus comprises a driven conveyor for moving cases along through a fixed processing path, a pivotally positioned arm having a portion thereon extending out into the path of and above the conveyor, which arm is adapted to be struck by a corner of a case as moved along by the conveyor and with the arm moving outwardly of the conveyor to start pivotal movement of the case or article about the arm due to the continued drive of the conveyor and the article thereon abutting against the arm, a driven belt is also provided, and means are present that engage the belt to secure it in a position laterally opposite to the arm adjacent the path of the conveyor, which belt is substantially parallel to the conveyor and above it and has a resiliently positioned inner course, the belt being positioned for laterally outward movement under predetermined forces being exerted thereon, and with the arm being limited in outward movement and the inner course of the belt being positioned a distance apart less than the diagonal width of a case or article on the conveyor whereby when a corner of the case is engaged by the arm, the case will start to pivot therearound by outward movement of the arm and an opposite corner of the case will be engaged by the belt to aid in positively turning the case through substantially a 180° arc after which the case continues on its movement with the conveyor.

Attention now is particularly directed to the details of the structure shown in the accompanying drawings. Such structure, which can be called an uncaser, or a case reversing apparatus, is indicated as a whole by the numeral **1** and it includes a suitable frame **2**. This frame positions a substantially conventional conveyor belt **3** or the like thereon by a plurality of means such as rolls **4** and **5** that engage the conveyor so that articles such as substantially rectangular paperboard or cardboard boxes **6** can be positioned on this conveyor **3** in any suitable manner and move therealong through a guided, controlled path. Normally these cases **6** have a pair of end flaps thereon that initially are folded inwardly of the case to enclose any contents, such as empty cans or containers that may be received in the case **6**, and a pair of side flaps, that extend the length of the case, have been folded inwardly on the top of the end flaps to close the case for convenient storage and/or shipment of the cases with the products or containers therein. As the cases are moved along the controlled path by the conveyor **3**, initially a conventional member, such as a plow **7**, engages side flaps **8** and **9** of the case **4** and moves them to a laterally outwardly extending, or open position. The cases **6** being processed in the apparatus, are suitably guided with relation to the conveyor **3**, as by a plurality of guide members, or rolls **10** or the like provided adjacent the lateral margins of the conveyor **3** so that the cases have a controlled path which accurately positions them in relation to the plow **7** and other processing means in the apparatus. After the side flaps **8** and **9** of a case **6** are open, then a member, such as a hook **11** or the like is suitably pivotally positioned on the frame **2** and is adapted to extend down into the case **6** to engage the then trailing end **12** of the case and move it to an open position by the relative movement of the case **6** along with the conveyor **3** in relation to the hook **11**. After the side and initial trailing end flaps of the case **4** have been opened, then the case is moved or discharged by the conveyor **3** onto an adjacent and continuing conveyor **13** that is positioned by suitable means, such as rolls **14** and **15** and which, as a feature of the invention, serves as a speed up or accelerating conveyor so that any cases discharged from the conveyor **3** will tend to be spaced from each other even though initially abutted against each other on the conveyor **3**. The conveyors **13** and **3** are driven in any suitable manner by conventional means, and the details of such drives are not an important element of the present invention. If necessary, an additional guide roll **15***a* may be associated with the upstream end of the conveyor **13** to aid in receiving cases **6** from the conveyor **3** and transferring them to the conveyor **13**.

In all events, as an important feature of the present invention, the frame **2** has a member, such as an arm **16** positioned on the frame **2** by means of a support **17**. The arm **16** normally is positioned as shown in FIG. 2 by suitable resilient means (not shown). Such support **17** is adapted to permit resilient laterally outward movement of the arm **16**, in the downstream portion thereof with relation to conveyor **13**, and with the arm **16** normally having a foot or section **18** thereon that extends laterally inwardly of the conveyor **13** so as to be in the path of any and all cases **6** as moved along through a fixed path by the conveyor **13**. FIGS. 4 and 5 show that the laterally inner portion of the arm section **18** will engage the leading end of a case **6** as it is moved along the conveyor **13** and will stop further movement of the case with the conveyor. Usually the arm section **18** has a stop, or plate **19** provided thereon that extends in an upstream direction from the arm section **18** so that the arm section **18** and stop **19** combine to form a corner engaging portion on the arm **16** whereby engagement with a case **6** is limited and controlled. FIGS. 2, 4 and 5 show the progressive action of the apparatus of the invention in starting one of the cases **6** to be reversed through an arc of 180° by the apparatus of the invention. A stop **16***a* is provided to limit outward pivotal movement of the arm **16** so that a fixed pivot point is, in effect, formed for the corner of a case engaging the arm **16**.

It is a further feature of the present invention that a belt **20** is positioned adjacent the conveyor **13** on the opposite lateral side of such conveyor to the arm **16**, but with such belt extending in a downstream direction past the arm section **18**. Such belt **20** is suitably positioned, as by means of a pair of pulleys **21** and **22**, the pulley **22** being rotatably supported on the frame **2**. The pulley **21** is journalled on a suitable shaft **23** secured to a bar or tube **123** telescoped into a guide **124**. The guide **124** is affixed to the frame **2** and the bar **123** is resiliently drawn into the guide by a spring **125**. The belt **20** hence is tensioned between the pulleys **21** and **22** and its inner course **24** may deflect under the forces exerted thereon by a turning box or case. The belt may be otherwise positioned so that in all events, some yieldability, or resiliency is provided in the inner course **24** of the belt **20**. The belt **20** can be made from any suitable material, but preferably the peripheral portion of this belt is of a roughened nature or the belt may be made from a plurality of links to provide for frictional engagement between the inner course **24** of the belt and a corner portion of a case **6** being turned opposite to the corner thereof being engaged by the arm **16** and associated means. Usually the belt **20** is positioned substantially parallel to the conveyor **13**, but this belt **20** may be inclined slightly upwardly in a downstream direction, with relation to the normal flat surface of the conveyor **13** and the horizontal path thereof. By such positioning of the belt **20**, the inner course **24** of the belt tends to lift the case **6** being processed slightly with relation to the conveyor **13** and this facilitates turning the cases being processed through a substantially positive or controlled 180° arc by its engagement with the belt **20**. Any suitable guide means, such as one or more guides or rolls **25** is positioned on a vertical axis for movement in a horizontal direction adjacent and downstream of the arm **16** to aid in the turning of cases as released by the arm **16** so that their longitudinal axes extend exactly parallel to the axis of the conveyor **13** and with the case again having a controlled longitudinal movement through the apparatus of the invention, as hereinafter described.

FIG. 5 of the drawings best shows that as a corner **6***a* of the case **6** being turned is released by the arm **16** and starts to move longitudinally with the conveyor **13**, the opposite side but adjacent corner **6***b* of the case will nor-

mally be abutted against the stop, roll, or guide **25** adjacent the arm **16** and the case will be pivoted thereabout by the final turning action effected on the case by the inner course **24** of the belt which is constantly urging such case laterally inwardly of the conveyor **13**. When excessive pressure is set up on the belt **20** by the turning action effected on the case, the belt can yield slightly by pulling the bar **123** out farther from the guide **124**. Then the continued turning movement of the case will cause its corner **6***a* to swing free of the arm section **18** and the belt **20** forces the case corner **6***b* over to contact the guide **25** and help turn the case into substantial longitudinal alignment with the axis of movement of the conveyor **13** by continued turning of the case about the guide. The guide **25** is spaced from the arm **16** at least the width of the case **6** and preferably a slightly greater distance. One or more belts **20** may be used. Now that the case **6** has been turned in the apparatus, the initial leading end flap of the case is now a trailing end flap of the case and it is indicated at **26** in FIGS. 6, 7 and 8. These figures of the drawings clearly show the action of the apparatus in opening the final end flap of the case.

Any other suitable guides can be associated with the conveyor to aid in centering the case on the conveyor for action in opening the now second trailing end flap **26** of the case **6**. Hence, FIGS. 2, 6, 7 and 8 show the action of the guides, which include members, such as guide rolls **27** and **27***a*, positioned adjacent one lateral margin of the conveyor **13**, and a guide plate **28** that is positioned against the opposite lateral margin of the conveyor **13** and is adapted to engage one of the cases **6** and urge it against the guide rolls **27**, **27***a* and the like. Such guide plate or member **28** is suitably positioned on the frame **2**, as by means of a pair of parallel links **29** and **30** and by a tension spring **31** so that the guide plate **28** will engage one side of the case **6** and help center it on the conveyor **13** against the guide rolls **27** and **27***a*. The plate **28** has a curved upstream end **128** to aid in completely aligning the longitudinal axis of the case with the conveyor **13**.

The actual trailing end flap opening means for the downstream portion of the apparatus forms a further feature of the invention and preferably comprises a pair of arms **32** and **33**. The arm **32** has an elongate shoe **34** pivotally positioned thereon, which shoe has an upwardly inclined lower edge **35** on its front end that is positioned to bear upon the now leading end flap **12** of the case and urge it downwardly due to the weight of the shoe **34**. The shoe **34** is arcuate in vertical section and normally is positioned with its front section being inclined upwardly to facilitate sliding engagement and hold down action on the leading end flap **12** of the case. The shoe **34** may have an extention arm **135** protruding in a downstream direction therefrom. The arm **32** adjustably engages a support arm **134** that is pivotally supported by a pivot pin **36** at the upstream end of the support arm **134**. Such support arm **134** extends in a downstream direction from a support **37** that is suitably and fixedly secured to the frame **2** above and associated with the conveyor **13**. The arm **33** is pivotally secured to the downstream end of the support arm **134** and is free for only vertical movement downwardly in relation thereto from a position aligned therewith. The arm **33** has a suitable flap engaging means, such as a hook **39** formed on, or secured to and extending downwardly from the free end of the arm. The shoe is adapted to ride along and over the tops of a plurality of articles **40** carried by the case **6** and drop into an upwardly inclined position as soon as it has passed over a case. In contrast, the arm **33** is so positioned that it will ride along the case **6** usually between a pair of longitudinally extending parallel rows of the articles **40**, as indicated in FIG. 7, whereby when the case **6** has so proceeded through the apparatus that the hook **39** is adjacent the now trailing end flap **26**, the hook will engage the trailing end flap and swing it to an open position, as indicated in FIG. 8. At the same time, the shoe **34** assumes a position for engaging the following case. The flap opening action for the case **6** now has been completed and the case can be suitably processed to dump or otherwise dispose of the contents, such as the articles **40**, received within the case **6** so that they can be further processed in any desired manner.

As a further aspect of the present invention, case dumping means are shown so that the processing of a case and its contents can be completed. Hence, immediately adjacent the downstream or discharge end of the conveyor **13**, a wheel or drum **41** is suitably journalled on the frame **1** and this drum **41** is shown as having a pair of inflated pneumatic inner tubes **42** and **43** secured to the periphery thereof, as indicated in FIG. 9. These tubes are immediately adjacent the upper surface of a case **6** being discharged from the conveyor **13** and a separate driven control conveyor or belt **44** is provided adjacent this discharge end of the conveyor **13** and the belt is brought into resilient engagement with the base or bottom portion of a case **6** as it is discharged from the conveyor **13** to retain the case and the opened upper end thereof against the peripheral portions of the tubes **42** and **43** with the end flaps being retained in their opened positions, as indicated in FIG. 1 of the drawing. The belt **44** is suitably supported as by a plurality of guide rolls **45**, **46**, **47**, **48** and **49** to be led through a controlled path to aid in inverting the cases being processed with the aid and assistance of the drum **41** and the tubes **42** and **43** positioned thereover. Usually some loop or festoon is provided in the belt **44**, as indicated by a roll **50**, whereby a resilient take-up force is set up on the belt **44** to permit it to engage one or more cases as they are being moved around the periphery of the drum **41**. At the upper end of the drum **41** and tubes **42** and **43**, a suitable member, such as a support plate **51**, is provided to receive the inverted cases as they are moved out of engagement with the drum **41** and associated means. A downwardly inclined article receiving conveyor **52** of any suitable construction is provided adjacent the downstream edge of the support **51**, and this conveyor can be positioned by suitable members, such as rolls **53** and **54**.

The support plate has special guide and drive means associated therewith at the lateral margins of the support, as indicated in FIG. 10. Thus guides **55** and **56** are positioned at the lateral margins of the support plate **51** and they carry suitably positioned driven belts **155** and **156** that engage the side flaps **8** and **9** of a case **6** being processed. The guides **55** and **56** have covers **57** suitably hinged thereto at **157** to bear on the side flaps of the case **6** and force them against the belts **155** and **156** to move the case along in the apparatus. The end flaps of the case will normally engage the support plate **51** and be initially retained in open position thereby so that as the case is removed from the support plate **51** along an upwardly inclined path, the contents of the case will drop down onto the downwardly inclined conveyor **52** for suitable processing in any known manner by coventional means. The covers **57** are longitudinally divided into several sections and the first of these sections on each side of the case has several rolls **157** suitably journalled thereon to bear on the case side flaps. Preferably these rolls **157** are so positioned as to be outwardly inclined at an acute angle to pull the case open and facilitate release of articles therefrom. Conventional means, such as driven knocker arms (not shown) may be provided in the apparatus at these first sections of the covers **57** to strike the case side flaps adjacent the case and aid in article release. The cases being processed in the apparatus of the invention are also supported on means, such as a plurality of longitudinally extending wires or cables **70**, that extend longitudinally of the apparatus in alignment with and between the belts **155** and **156**. Such cables **70** are suitably secured at one end to the downstream edge, for example, of the support plate **51** and are parallel to each other and are positioned intermediate the rows of the articles received in the cases **6** whereby as the inverted cases are moved beyond the leading edge or downstream edge of the support plate **51**,

then the articles can drop down onto the downwardly inclined conveyor **52** intermediate the various cables **70**. Also, the cardboard nests in the cases and the cases **6** are retained with the end flaps opened on the cables **70** for movement along an upper portion of the apparatus with the case end flaps opened. The opened cases are then positioned upright by means, such as a pair of resilient tubes **59** and **60** that engage the sides of the processed cases and move them up and around to be stripped from the tubes by a discharge conveyor **61**. The tubes **59** and **60** may be slightly inflated and in all events have sufficient strength and resiliency as to engage and lift cases readily. The tubes **59** and **60** press inwardly on the cases enough to retain the case nests therein as the cases are returned to upright position.

In FIG. 12, apparatus is shown for processing cases **6***a* that have two horizontal layers of the articles received therein so that when these cases **6***a* are processed in the apparatus, initially after moving beyond a support plate **51***a*, the lower layer **40***a* of the articles received in this inverted case would be engaged by a conveyor **152** and move out of the case. The articles may drop down between a plurality of spaced longitudinally extending wires **70***a* and then, because of the limited vertical height provided for receipt of the deposited articles and the short longitudinal extent of this area, the second or upper layer of articles **40***b* within the case **6***a* would then become the lower series of articles and would drop down onto a second suitable receiving conveyor, or chute **80** downstream of the apparatus from the initial discharge zone for the cases **6***a*. A second support plate **81** is provided at a distance only slightly greater than the length of one of the articles **40***a* from the conveyor **152**. A plurality of longitudinally extending wires or cables **70***a* extend from the second support plate **81** provided in the apparatus to support the cases **6***a* as the second layer of articles are being dropped down onto the receiving conveyor, plate or chute **80**.

The various conveyors, belts, etc. in the apparatus can be provided with connected or independent drives as desired. Any conventional adjustable guides, rollers or the like can be used in the apparatus to aid in providing a fixed path for the cases being processed.

From the foregoing, it will be seen that a novel and improved uncaser apparatus has been provided by the invention. This apparatus is particularly adapted for reversing cases being processed whereby the side flaps of the cases can be readily opened and the initial trailing end flap of the case is conveniently opened in a substantially conventional manner. However, the invention contemplates the provision of special means for opening the second trailing end flap of a case after it has been reversed in the apparatus. The apparatus is positive acting, is relatively compact and inexpensive and will be automatic in functioning. Thus, it is thought that the objects of the invention have been achieved.

While two complete embodiments of the invention have been discolsed herein, it will be appreciated that modification of these particular embodiments of the invention may be resorted to without departing from the scope of the invention as defined in the appended claims.

What is claimed is:

1. A case reversing apparatus for rectangular boxes, cases or the like and comprising

a driven conveyor for moving cases therealong,

a pivotally positioned arm having a section thereon extending out into the path of but above said conveyor, said arm being adapted to be struck by cases moved along with said conveyor,

a stop plate secured to said section of said arm and extending therefrom normal thereto to engage a side of a case engaging said arm to limit movement of a case along said section,

a driven belt, and

means engaging said belt at opposed portions thereof to secure it in a position laterally opposite to said arm adjacent the path of said conveyor but extending downstream from said arm, said belt being adjacent said conveyor and above it and having a resiliently positioned inner course,

said stop plate and said inner course of said belt normally being positioned a distance apart less than the diagonal length of said case whereby when a corner of a case is engaged by said arm section, it will start to pivot therearound by outward movement of said arm and an opposite corner of said case will be engaged by said belt to turn the case through a substantially 180° arc.

2. A case reversing apparatus for rectangular boxes, cases or the like and comprising

a driven conveyor for moving cases therealong,

a pivotally positioned arm having a section thereon extending out into the path of but above said conveyor, said arm being adapted to be struck by cases moved along with said conveyor,

a driven belt,

a pair of means engaging said belt to secure it in position laterally opposite to said arm adjacent the path of said conveyor but extending downstream from said arm, said belt being substantially parallel to said conveyor and above it, and

means resiliently positioning at least one of said belt engaging means for movement of said belt out of its normal course when deflection forces are exerted on said belt, said arm section and said inner course of said belt normally being positioned a distance apart less than the diagonal length of said case whereby when a case is engaged by said arm section, it will start to pivot therearound by outward movement of said arm and an opposite corner of said case will be engaged by said belt to turn the case through a substantially 180° arc.

3. A case reversing apparatus for rectangular boxes, cases or the like and comprising

a driven conveyor for moving cases therealong,

a pivotally positioned arm having a section thereon extending out into the path of but above said conveyor, said arm being adapted to be struck by a corner of a case moved along by said conveyor and to move outwardly of the conveyor a limited distance to start the case to pivot about said arm,

a driven belt,

means engaging said belt to secure it in position laterally opposite to said arm adjacent the path of said conveyor, said belt being substantially parallel to said conveyor and above it and having a resiliently positioned inner course,

said arm section and said inner course of said belt normally being positioned a distance apart less than the diagonal length of said case whereby when a corner of a case is engaged by said arm section, it will start to pivot therearound by outward movement of said arm and an opposite corner of said case will be engaged by said belt to turn the case through a substantially 180° arc, and

guide means positioned downstream of said arm on the same side of said conveyor as said arm and adjacent said arm to provide a means to engage a second corner of said case and prevent downstream movement of said case while still being turned by said belt.

4. Apparatus for opening the flaps of a rectangular paperboard case, box or the like filled with containers, which apparatus comprises conveyor means for receiving cases and moving them in longitudinal alignment along a fixed path, and means for opening the side flaps and end trailing flap of a case moved through said path by said conveyor means, the improvement comprising

means associated with said conveyor means for engaging a said case and turning it end for end after said trailing flap is opened,

means for engaging and opening the now trailing end flap of the turned case, and

a member to engage the opened then leading end flap of the turned case and retain it open to prevent engagement of such flap by said last-named means.

5. Apparatus for opening the flaps of a rectangular paperboard case, box or the like filled with containers which are arranged in rows within the cases, which apparatus comprises conveyor means for receiving cases and moving them in longitudinal alignment along a fixed path, means for opening the side flaps of a case moved through said path by said conveyor means, and means for engaging and opening the trailing flap of a said case, the improvement comprising

means associated with said conveyor means for engaging a said case and turning it end for end after said trailing flap is opened,

hook means for engaging and opening the trailing end flap of the turned case, and

a member operatively associated with said last-named means to engage the opened then leading end flap of the turned case and retain it open to prevent engagement of such flap by said hook means.

6. Apparatus as in claim 5 where said hook means and said member each comprise a pivotally positioned arm operatively carried by a support and extending downwardly in the apparatus, said member arm having a shoe pivotally secured thereto to bear on the leading end flap and on the containers in a case as it is moved past said member arm, and said hook means arm being positioned and constructed to drop between rows of said containers to engage the trailing flap of a case as moved downstream relative to said arms.

7. Apparatus as in claim 5 where said hook means and said member each comprise a pivotally positioned arm operatively carried by a support, said member arm having means thereon bearing on the opened leading end flap of a case as it is moved by said member arm, said hook means arm being positioned and constructed to engage and open the trailing flap of a case as moved relative to said arms.

8. Apparatus for opening the flaps of a rectangular paperboard case, box or the like comprising

a conveyor for receiving cases and moving them in longitudinal alignment along a fixed path,

plow means for opening the side flaps of a case moved through said path by said conveyor,

means for engaging and opening the trailing flap of a said case,

means associated with said conveyor for engaging a said case and turning it end for end after said trailing flap is opened,

means for engaging and opening the trailing end flap of the turned case, and

a member operatively associated with said last-named means to engage the opened then leading end flap of the turned case and retain it open to prevent engagement of such flap by said last-named means.

9. An opening and dumping apparatus for rectangular paperboard cases, boxes and the like comprising

conveyor means for receiving cases and moving them in longitudinal alignment along a fixed path,

plow means for opening the side flaps of a case moved through said path by said conveyor means,

means for engaging and opening the trailing flap of a said case,

means associated with said conveyor means for engaging a said case and turning it end for end after said trailing flap is opened,

means for engaging and opening the trailing end flap of the turned case,

a member operatively associated with said last-named means to engage the opened leading end flap of the turned case and retain it open to prevent engagement of such flap by said last-named means,

a rotating wheel positioned at and above a discharge end of said conveyor means,

a driven belt means engaging said case after the flaps thereon are opened and forcing the open top of said case towards said wheel for movement therearound to an inverted open position for discharge of the contents of the case, and

resilient means on said wheel and forming the periphery thereof to engage said case and the contents thereof as said case is moved around said wheel.

10. A case reversing apparatus for rectangular boxes, cases or the like and comprising

a driven conveyor for moving cases therealong,

a pivotally positioned arm having a section thereon extending out into the path of but above said conveyor, said arm being adapted to engage a corner of cases moved along by said conveyor and to move a limited distance outwardly of the conveyor to provide a fixed pivot point for a case to start it to pivot about said arm,

a driven belt for engaging and turning cases end for end,

a plurality of means engaging said belt to secure it in a position laterally opposite to said arm adjacent the path of said conveyor, said belt being substantially parallel to said conveyor and above it and having a flexible inner course,

a guide member positioned downstream of said arm to engage the opposite but adjacent side corner of a case when released by said arm, and

a member resiliently positioning one of said belt engaging means for movement to permit said belt to be deflected laterally outwardly by a case engaged therewith for turning action, said arm section and said inner course of said belt normally being positioned a distance apart less than the diagonal length of said case whereby when the corner of a case is engaged by said arm section, it will start to pivot therearound by outward movement of said arm and a diagonally opposite corner of said case will be engaged by said belt to turn the case through a substantially 180° arc, which action is aided by said guide member.

11. An opening and dumping apparatus for rectangular paperboard cases, boxes and the like comprising

conveyor means for receiving cases and moving them in longitudinal alignment along a fixed path,

plow means for opening the side flaps of a case moved through said path by said conveyor means,

means for engaging and opening the trailing flap of a said case,

means associated with said conveyor means for engaging a said case and turning it end for end after said trailing flap is opened,

means for engaging and opening the trailing end flap of the turned case,

a member operatively associated with said last-named means to engage the opened leading end flap of the turned case and retain it open to prevent engagement of such flap by said last-named means,

means for inverting an opened case,

a support plate to receive the inverted opened case and having a discharge edge,

means for receiving the contents of the inverted case positioned adjacent but below the discharge edge of said support plate, and

a plurality of parallel wires secured in position above said last-named means and extending downstream from said discharge edge to receive and support the case nest and the opened end flaps thereon, said wires permitting the contents of a case to drop therethrough.

12. An opening and dumping apparatus for rectangular paperboard cases, boxes and the like comprising

conveyor means for receiving cases and moving them in longitudinal alignment along a fixed path,

plow means for opening the side flaps of a case moved through said path by said conveyor means,

means for engaging and opening the trailing flap of a said case,

means associated with said conveyor means for engaging a said case and turning it end for end after said trailing flap is opened,

means for engaging and opening the trailing end flap of the turned case,

a member operatively associated with said last-named means to engage the opened leading end flap of the turned case and retain it open to prevent engagement of such flap by said last-named means,

means for inverting an opened case,

a support means to receive the inverted opened case and guide in the apparatus,

conveyor means for receiving the contents of the inverted cases positioned adjacent but below and inclined downwardly of said support means,

said cases having two vertically spaced horizontally extending layers of articles therein, and

a second support means for said inverted cases and case nests spaced downstream from said first support means and being above said conveyor means a distance but slightly greater than the height of an article in said case whereby as an article drops from the lower layer of said case, it is tilted downwardly

but the article previously in the upper layer has dropped down in the case but still is on a vertical axis and moves onto said second support means with downstream movement of said case.

13. Apparatus according to claim **8** wherein said means associated with said conveyor for engaging said case and turning it end for end include

a pivotally positioned arm having a section thereon extending out into the path but above said conveyor,

a stop means carried by said section of said arm forming a case corner engaging portion, and

a driven belt positioned adjacent the conveyor and laterally opposite to said arm, said belt extending in a downstream direction past said arm section.

14. Apparatus according to claim **13** and including a guide means positioned on a vertical axis adjacent to and downstream of said arm to aid in the turning of said cases when released by said arm.

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