Jan. 1, 1963 W. DU BROFF 3,070,934

CARTON INVERTING APPARATUS

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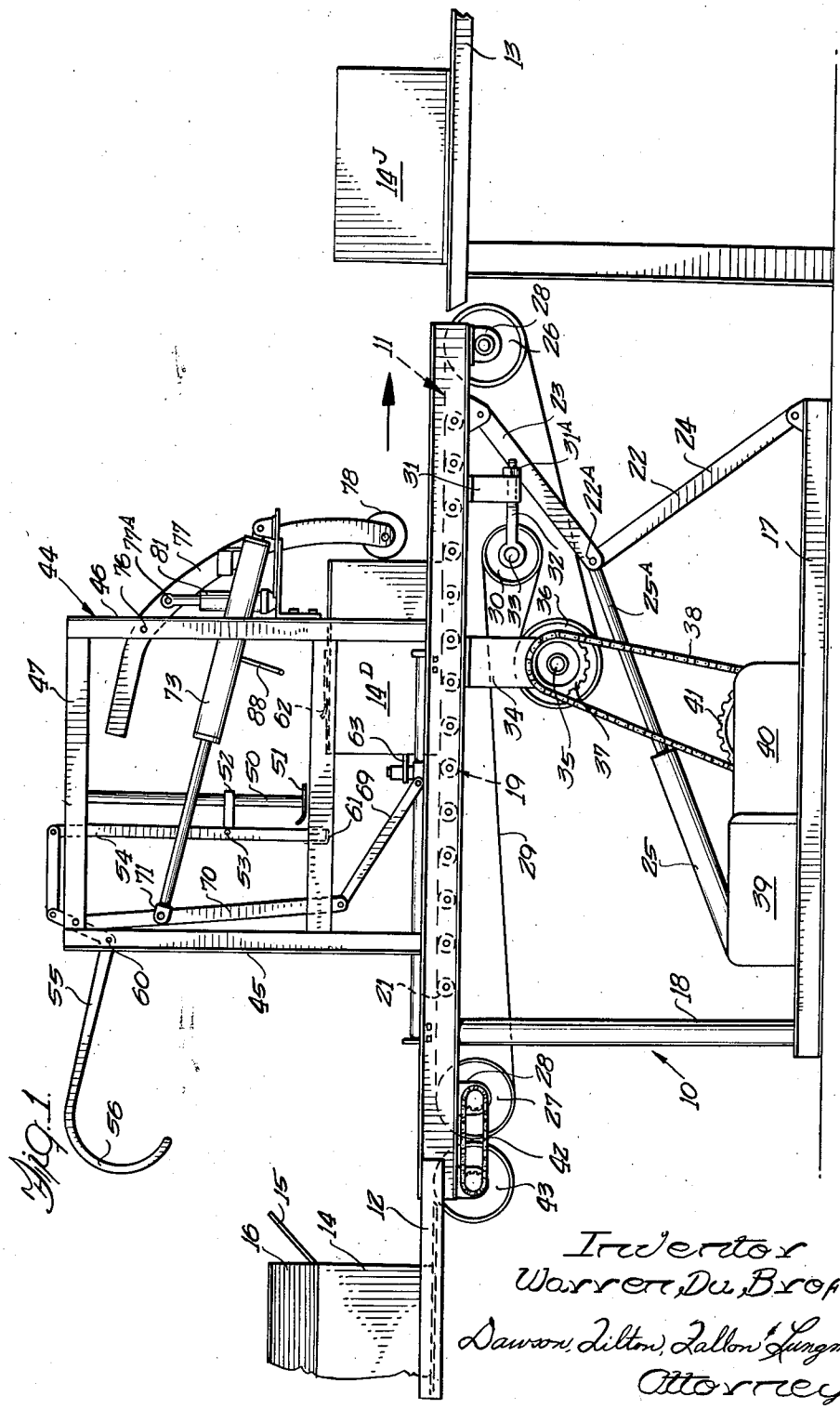

Fig. 1.

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CARTON INVERTING APPARATUS

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Fig. 2.

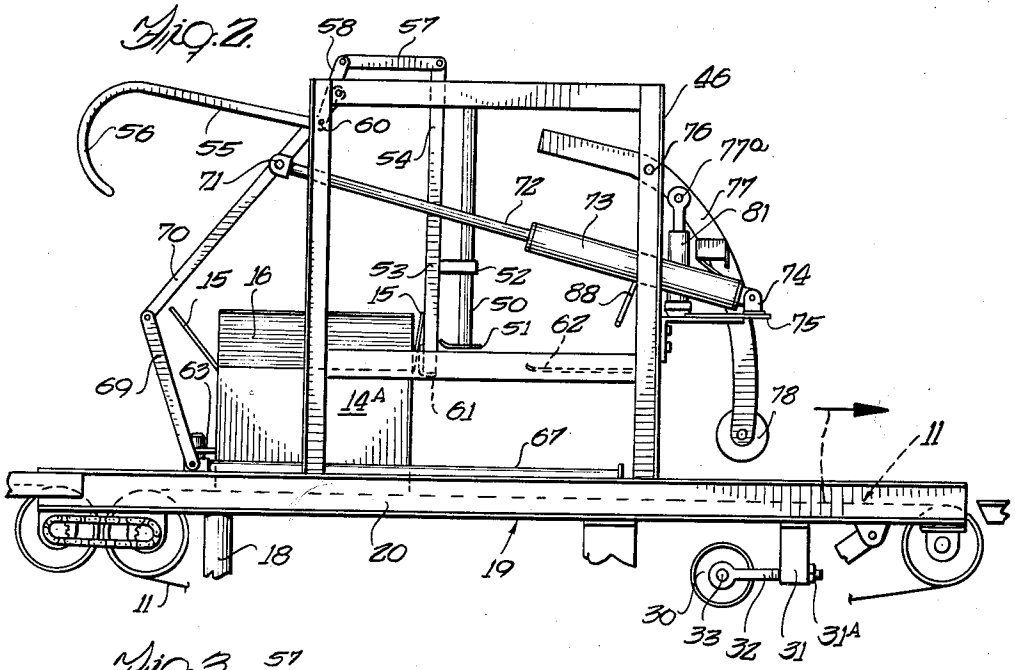
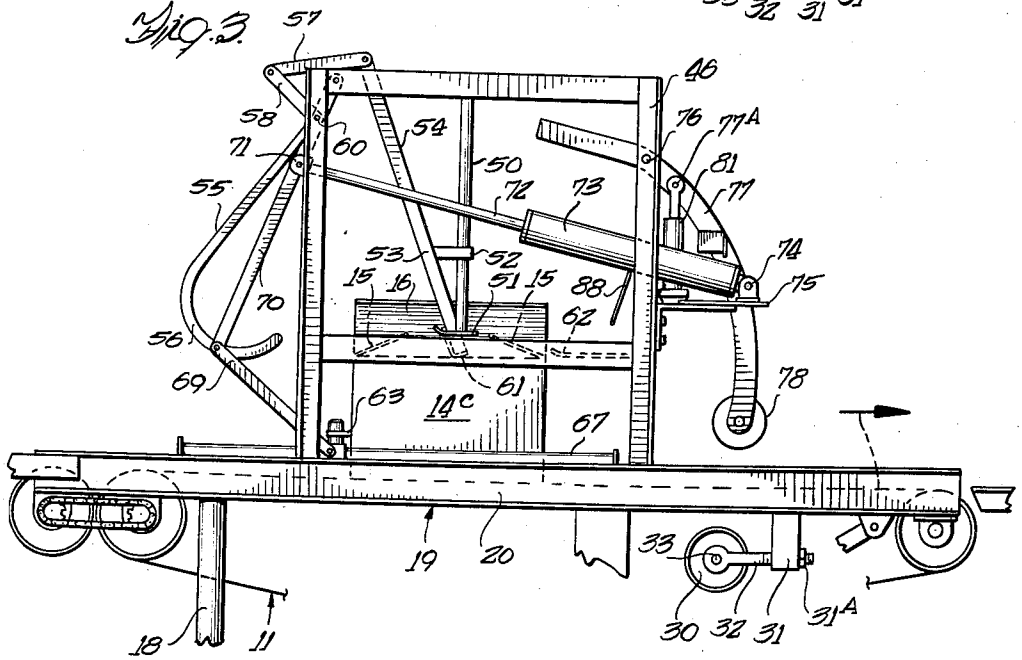


Fig. 3.



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CARTON INVERTING APPARATUS

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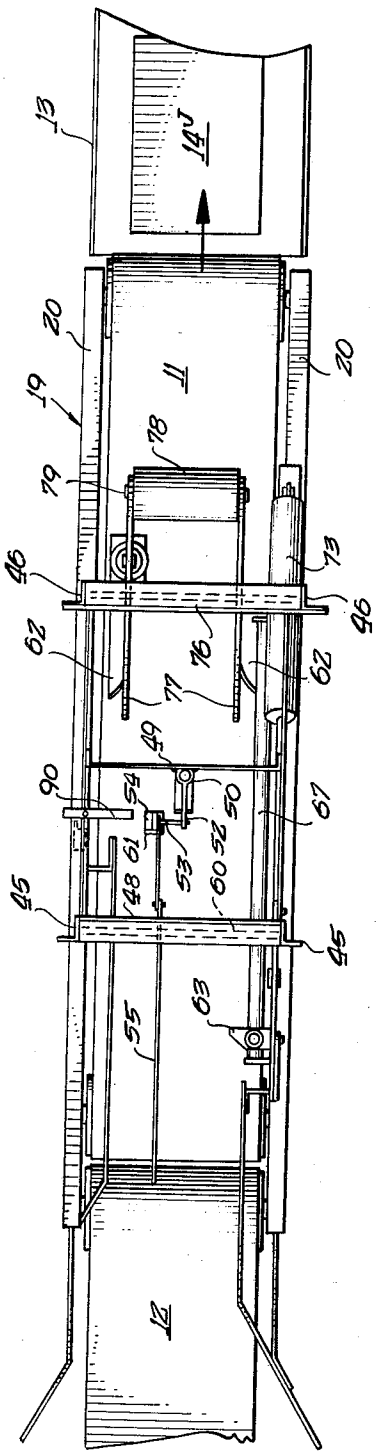

Fig. 4.

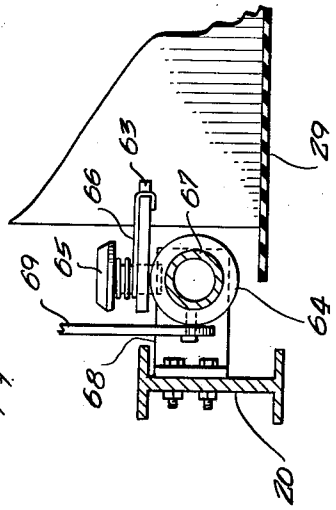

Fig. 6.

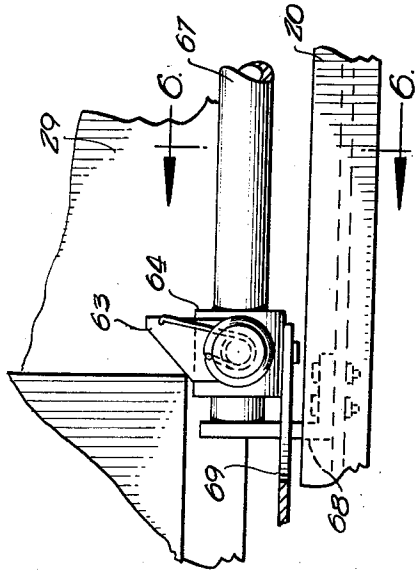

Fig. 5.

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CARTON INVERTING APPARATUS

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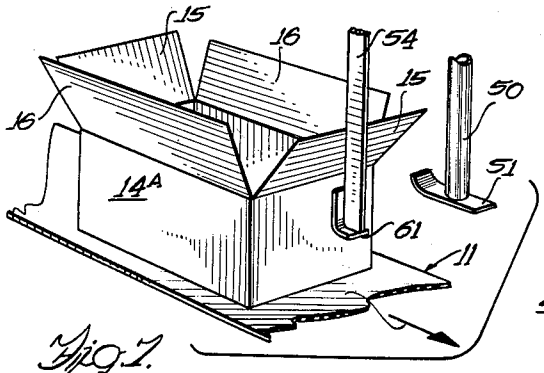

Fig. 7.

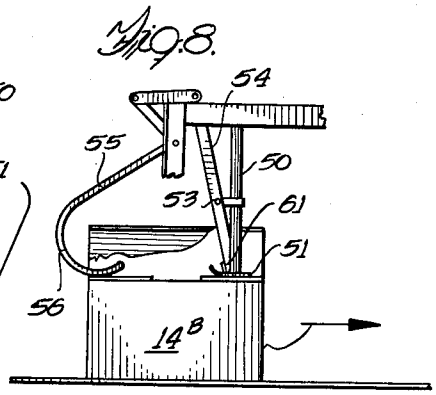

Fig. 8.

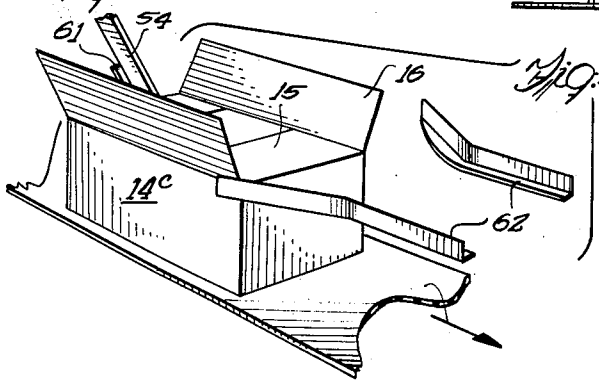

Fig. 9.

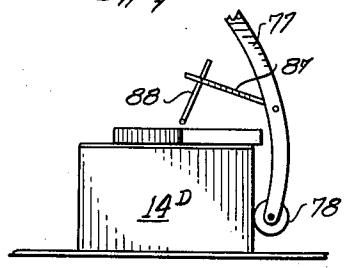

Fig. 10.

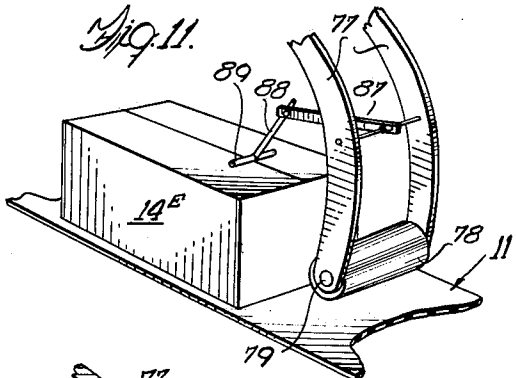

Fig. 11.

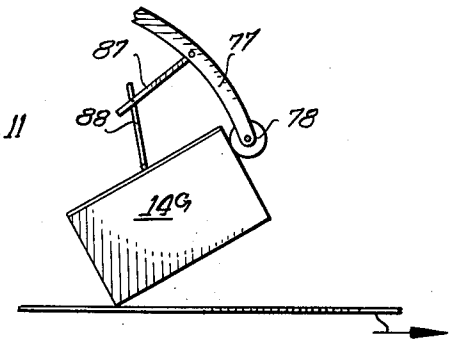

Fig. 12.

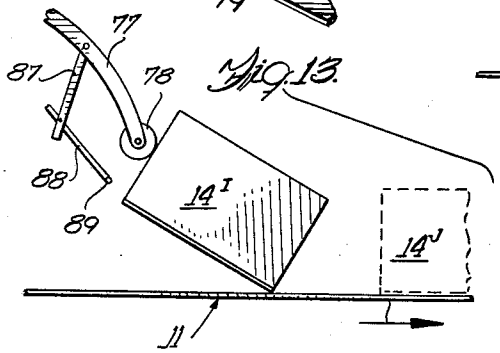

Fig. 13.

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Fig. 14.

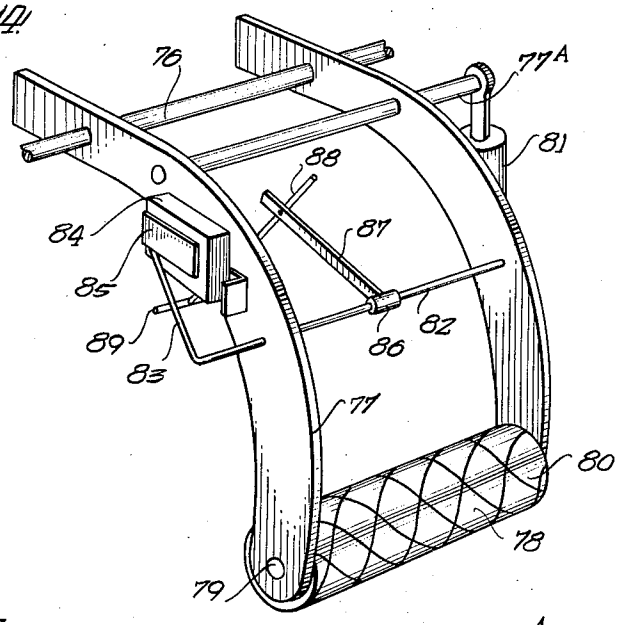


Fig. 15.

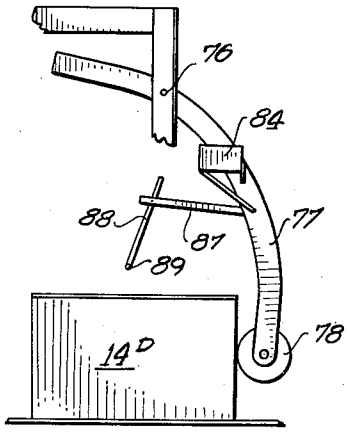


Fig. 16.

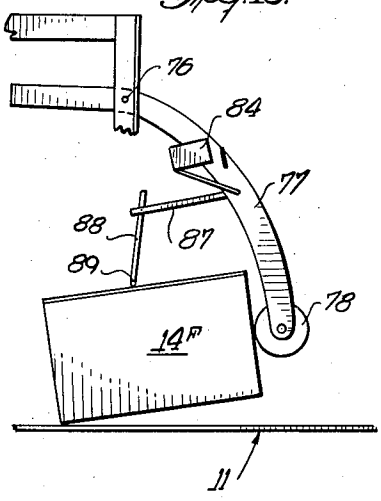
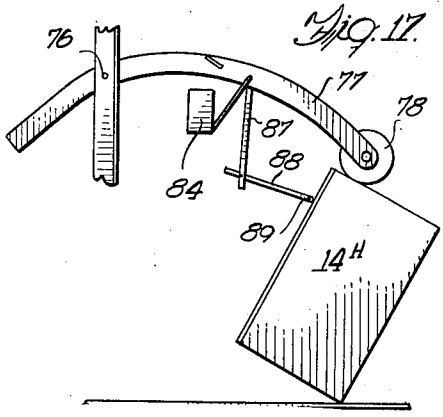


Fig. 17.



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3,070,934

CARTON INVERTING APPARATUS

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Filed May 13, 1960, Ser. No. 28,952
10 Claims. (Cl. 53—374)

This invention relates to carton inverting apparatus and, more particularly, to apparatus for inverting a carton equipped with side and end flaps wherein the apparatus is also effective to close the flaps of the carton prior to inversion.

It is an object of this invention to provide novel carton handling apparatus which is effective to invert cartons, particularly cartons filled with bottles or other containers. Another object is to provide a novel carton handling apparatus which is effective to invert flap-equipped cartons by providing means for first closing the flaps. Still another object is to provide a carton inverting mechanism for flap-equipped cartons which is equipped with means for temporarily maintaining the flaps of the carton in a closed condition during the inversion operation. Other objects and advantages of this invention may be seen in the details of construction and operation set forth herein.

The invention will be explained in conjunction with an illustrated embodiment in the accompanying drawing, in which:

FIG. 1 is a fragmentary side elevational view of apparatus showing a carton in the central portion thereof about to be turned over;

FIG. 2 is a view similar to FIG. 1 but which shows a carton in the stage of handling thereof prior to flap closing, i.e., a carton just entering the apparatus;

FIG. 3 is a view similar to FIGS. 1 and 2 but showing a carton with the flaps partially closed, i.e., partially through the apparatus and where the carton is in a condition intermediate the conditions or stages of FIGS. 1 and 2;

FIG. 4 is a fragmentary top elevational view of the apparatus seen in FIG. 1;

FIG. 5 is a fragmentary enlarged top plan view of a portion of the apparatus seen in FIG. 4;

FIG. 6 is a fragmentary sectional view as would be seen along the sight line 6—6 of FIG. 5;

FIG. 7 is a fragmentary perspective view of a carton and apparatus as the carton enters the apparatus seen in greater detail in FIGS. 1–4;

FIG. 8 is a fragmentary side elevational view of the apparatus and carton at the stage of carton handling following that seen in FIG. 7;

FIG. 9 is a fragmentary perspective view of apparatus and a carton therein at a stage following the stage seen in FIG. 8;

FIG. 10 is a fragmentary side elevational view of apparatus and a carton therein in a stage or condition following that effected in FIG. 9;

FIG. 11 is a fragmentary perspective view of apparatus and a carton therein at a stage following that of FIG. 10;

FIG. 12 is a fragmentary side elevational view of the apparatus of the invention and a carton being handled therein as would be the stage thereof following that seen in FIG. 11;

FIG. 13 is a fragmentary side elevational view of the apparatus and a carton therein in the stage following FIG. 12;

FIG. 14 is a fragmentary perspective view of the turnover arms seen in FIGS. 1–4 and 7–13 hereof;

FIGS. 15, 16 and 17 are fragmentary side elevational views of the apparatus of the invention and a carton therein featuring in different stages the flap hold-down

mechanism associated with the turnover arm, FIG. 15 corresponding to a stage in the machine operation to that seen in FIG. 10, FIG. 16 representing a stage intermediate the stages seen in FIGS. 11 and 12, while FIG. 13 represents a stage intermediate stages seen in FIGS. 12 and 13.

In the handling of bottles or the like in bottling plants, one frequently employed procedure is for the bottle manufacturer to send the bottles to the bottler in the carton that is ultimately to be used to ship the filled bottles. This carton may be of the flap-equipped type and the bottom flaps are unsealed. Upon the arrival of the carton containing the empty bottles, the bottler separates the bottles from the carton by suitable uncasing equipment. Thereupon, the bottles and carton are sent along separate ways to be reunited just prior to shipment. The bottles, for example, may be processed through an unscrambler, filling machine, capping machine, etc. while the carton may be overprinted or the like. When the bottles and carton are reunited, the bottles are inserted into the carton mouth downward, the open flaps of the carton being the bottom flaps and disposed uppermost. The flaps may be equipped with adhesive and thereafter it is necessary to close the flaps and reinvert the carton so that the same is properly disposed for shipment. It is with the reinversion phase of this operation with which the instant invention is concerned.

Referring now to the drawing, and particularly to FIG. 1, the numeral 10 designates generally a frame while the numeral 11 generally designates a conveyor on the frame 10.

As much as possible, the numerals employed in the drawing have been applied to all of the pertinent views, however, it will be apparent that certain elements and numerals have been intentionally omitted from certain figures where they are illustrated to better advantage in other views and where the structure and operation can be more clearly appreciated through the absence of reference numerals.

Still referring to FIG. 1, the numeral 12 designates a supply conveyor while the numeral 13 designates a discharge platform or conveyor for removing inverted cartons from the conveyor equipped frame 10. The numeral 14 in FIG. 1 designates a carton on the conveyor 12 about to be transferred to the conveyor 11 on frame 10 and, relative to the carton 14, the numeral 15 applied thereto designates an end flap while the numeral 16 designates a side flap.

The overall operation of the inventive structure will now be set forth in terms of the various manipulations applied to a carton 14—it being believed that this will facilitate understanding of the structures to be described in greater detail hereinafter. The carton 14, as it is transported along the conveyor 11 reaches a stage designated 14A, as can be seen in FIGS. 2 and 7, particularly FIG. 7 where the flaps 15 and 16 are still in an open condition. Immediately thereafter, the end flaps 15 are closed, this stage or condition of a carton being illustrated in FIG. 8. Upon the closing of the end flaps and the further advancement of the carton 14, the stage at which the side flaps 16 are to be closed is reached as seen in FIG. 9 wherein the carton is designated 14C, in contrast to the designation of the carton in FIG. 8 wherein the carton is designated 14B.

Upon the closing of the flaps 15 and 16, the condition of the case is illustrated in FIG. 10, FIG. 15 and also in the central portion of FIG. 1. At this point, the carton 14D is approaching the inverting step wherein the flaps are maintained temporarily in a closed condition, this latter phase being illustrated more clearly in FIG. 11 wherein the carton is designated 14E. The initial operation for inverting the carton is seen in FIG. 16 wherein

the carton is designated 14F, a slightly later stage being seen in FIG. 12 where the carton is designated 14G while even later stages are designated in FIG. 17 (14H), and FIG. 13 by the numerals 14I and 14J.

Now turning to the details of the apparatus, the numeral 17 in FIG. 1 designates a base for the frame 10 which may be conveniently mounted on a floor or other operating surface. The base 17 is equiped with upstanding columns 18 adjacent the carton entering end of the frame 10 which, at their upper ends, are pivotally interconnected with a platform generally designated 19. The platform 19, as can be appreciated from FIG. 4, is interrupted to provide a path for the conveyor 11 and includes a pair of side rails 20 which may conveniently take the form of eye beams (see FIG. 6). The rails 20 rotatably support conveyor rolls 21 (seen only in FIG. 1 and in dotted line therein). Suitable transverse framing for the platform 19 and the frame 10 in general may be provided but which has been omitted from the showing herein in order to eliminate unnecessary detail so as to facilitate easy understanding of the invention.

Referring again to FIG. 1, the numeral 22 in the lower central portion thereof designates the linkage system which includes links 23 and 24 which are pivotally interconnected with each other and with the platform 19 and base 17. The links 23 and 24 are pivotally interconnected as at 22A, and this pivotal connection is further connected with the piston rod 25A of a fluid actuated cylinder 25. The butt end of the cylinder 25 is pivotally mounted on the base 17 so that retraction or extension of the piston rod 25A will lower or raise, respectively, the leaving or discharge end of the platform 19. Thus, the conveyor 11 may be transformed into an inclined plane if the same is desired.

Still referring to FIG. 1, the numeral 26 designates a pulley roll rotatably mounted on the leaving end of the platform 19 while the numeral 27 designates a companion pulley roll mounted on the entering end of the platform 19. The numerals 28 designate bearings in which the rolls are journaled, the bearings being rigidly coupled to the platform 19 in a conventional fashion. Entrained over the pulley roll 26 and 27 is a conveyor belt 29 which on the top run thereof is essentially flat and supported by the rolls 21 (see FIG. 1). Tension of the belt 29 is regulated by means of the tension roll 30 which is movably mounted on a bracket 31 secured to the platform 19. The platform 31 is equipped with positionable bearing members 32 which rotatably support the shaft 33 of the tensioning roll 30. It will be appreciated that the tension on the belt 29 may be conveniently regulated through positioning the member 32 within the bracket 31 by means of the lock nut 31A (see also FIGS. 2 and 3).

Still referring to FIG. 1, the numeral 34 refers to a second bracket rigidly connected to the platform 19 and depending therefrom. The bracket 34 rotatably supports a transfer shaft 35 on which is mounted a drive roll 36. As can be appreciated from FIG. 1, the belt 29 is in partial wrapping engagement with the drive roll 36 so that the roll 36 acts to advance the conveyor 11. For this purpose, the shaft 35 is equipped with a sprocket 37 over which is entrained a chain 38. The chain 38 is moved by means of a motor 39 mounted on the base 17 through a reducer 40 and a reducer sprocket 41.

In the illustration given, the supply conveyor 12 may be conveniently actuated by means of a chain and sprocket system 42 coupling the entering end pulley roll 28 with the leaving end pulley roll 43 of the supply conveyor 12.

In FIG. 1, the numeral 44 found in the upper central portion, designates generally a sub-frame in the nature of a super structure which is positioned astride the conveyor 11. In the sub-frame 44, the numeral 45 designates vertical members adjacent the entering end while the numeral 46 designates vertical supporting members adjacent the leaving end of the conveyor 11. Still referring to the sub-frame 44, the numeral 47 designates a horizontal longitudinal member connecting the members 45 and 46 along each side of the conveyor 11 while the numeral 48 (designated only in FIG. 4) is applied to a transverse horizontal member connecting the vertical members 45 together to make up a rigid super structure. The numeral 49 (also seen only in FIG. 4) designates a transverse horizontal support bar which rigidly carries a depending member 50 operative to close the leadling flap 15 of a carton 14 passing through the super structure 44. For this purpose, the member 50 is equipped at the lower end thereof with a shoe 51 (the elements 50 and 51 also being seen in FIGS. 2, 3, 7 and 8).

Referring to FIGS. 1–3 in particular, the numeral 52 designates a rigid laterally extending arm on the member 50 which carries a pivot pin 53. The numeral 54 designates a link for actuating the trailing flap closing member 55, the different positions of which can be readily appreciated from a comparison of FIGS. 2 and 3. The trailing flap closing member 55 is preferably provided in a hook-shaped configuration such as is designated by the numeral 56 (see especially FIG. 8).

The numeral 57 designates a link connecting the link 54 with an extension 58 of the trailing flap closing member 55 (see FIGS. 2 and 3). The rigid extension 58 of the member 55 is pivotally mounted on a shaft 60 which extends between the upright members 45. The numeral 61 designates a shoe for the link 54 and the shoe 61 is contacted by the leading end of a carton (see FIG. 7) to pivot the member 55 from its condition in FIGS. 1 and 2 to the position seen in FIGS. 3 and 8.

Referring now particularly to FIG. 9, the numeral 62 designates plow members which are effective to close the side flaps 16 of a carton after the end flaps 15 have been closed by the mechanism just described. The plow member 62, as can be appreciated from the consideration of FIG. 4, are provided as part of the super structure 44, being rigidly connected thereto.

In order to insure that the flap closing elements just described function with maximum efficiency against the flaps of a carton passing through the super structure 44, and irrespective of the frictional engagement of a carton with the conveyor 11, a pusher member 63 (see FIG. 4) is provided for positively advancing the carton with the conveyor 11. The pusher member 63 is mounted on a bracket 64 (see FIG. 5) by means of a bolt 65 (see FIG. 6). The numeral 66 in FIG. 6 designates a spring employed to urge the pusher member 63 into immobile relation with the bracket 64. The bracket 64 in turn is slidably mounted upon a pipe guide 67 which extends longitudinally of the conveyor 11 and parallel thereto (see particularly FIG. 4). The guide pipe 67 is secured to the rail 20 provided as part of platform 19 by means of clips 68 (one of which is seen clearly in each of FIGS. 5 and 6).

The numeral 69 in FIGS. 1–3 and 5–6 designates a link which is pivotally connected to the bracket 64. The link 69 at its upper end (see FIGS. 1–3) is pivotally interconnected with a second link 70. This second link 70 in turn is pivotally interconnected with a piston rod 72 as at 71. The numeral 73 designates a cylinder associated with the piston rod 72 which conveniently may be of the fluid actuated type, i.e., compressed air. The numeral 74 (see FIGS. 2 and 3) designates a clevis for supporting in pivotal fashion the butt end of the cylinder 73 on a supporting plate 75 provided as part of the super structure sub-frame 44. Thus, extension and retraction of the piston rod 72 effects a reciprocation of the bracket 64 on the guide 67 and thus moves the pusher member 63 along the conveyor belt 29, positively advancing a carton thereon.

Referring now to FIGS. 1–3 and 14, the numeral 76 designates a transverse rod extending between the vertical members 46. The rod 76 is conveniently journaled within the members 46 for free rotation therein and non-rotatably carries a pair of arms 77 (best seen in FIG. 14). The lower ends of the arm 77 are interconnected by means of a roller 78 rotatably mounted on a shaft 79. The roller

78 is seen to be equipped with a ribbed surface 80 as seen in FIG. 14 and provides an effective gripping surface for the leading end of a carton 14, when the same is disposed in the conditions seen in FIGS. 12, 13, 16 and 17.

The numeral 81 which is seen only in FIGS. 1–3 and 14, designates a brake means operative to limit the free pivotal movement of the arms 77 about the pivot shaft 76. Also, the element 81 which may be a self-contained fluid pressure cylinder, serves to eliminate any bounce or vibration in the arms 77 and, more particularly, the gripping roll 78. In the illustration given, the element 81 is interconnected between the arms 77 and the plate 75, a transverse shaft 77A interconnecting arms 77 for this purpose. The element 81 may be a fluid-containing cylinder and piston rod unit wherein the flow of fluid from one side to the other of the piston is restrained so as to impede the free pivotal movement of the arms 77.

Referring again to FIG. 14, the numeral 82 designates a rod which is journaled in the arms 77 and which is equipped with a laterally extending arm portion 83, the arm portion 83 carrying a counterweight 84 which is adapted to be supported from time to time in the support bracket 85. The support bracket 85 is provided rigidly connected to one of the arms 77 as can be clearly seen from FIG. 14.

Still referring to FIG. 14, the numeral 86 designates a sleeve which is rigidly connected to the rod 82 and which extends generally laterally therefrom as can also be seen in FIGS. 10–13 and 15–17. Rigidly secured to the arm 87 at a point spaced from the rod 82 is a rod member 88. The pivotal relation of the member 88 relative to the arm 77 may be adjusted as desired, but once adjusted, the members operate in a fixed angular relationship to each other. The end of the rod member 88 carries a cross arm 89 (see FIG. 11) which is effective to bear against the closed flaps of a carton 14E.

In the operation of the apparatus hereinbefore described, a carton 14 is advanced on the infeed or delivery conveyor 12 to the conveyor 11. When the conveyor 11 takes over the transportation of the carton 14, the carton advances a short distance along an unimpeded path until it contacts the switch arm 90 (see FIG. 4). The switch arm 90 through a suitable fluid-mechanical arrangement, actuates the cylinder 73 to retract the piston rod 72. In so doing, the pusher member 63 engages the trailing end of the carton (see the position designated 14A in FIG. 2) and positively advances the same towards the discharge end of the conveyor 11. As the carton is advanced, the leading end engages the shoe 61 on the linkage element 54 to pivot the element 54 to the positions seen in FIGS. 3 and 8. In FIG. 8, the hook-shaped portion 56 of the trailing flap closing member 55 is seen in engagement with the trailing end flap for the purpose of closing the same. In FIG. 3, the member 55 is partially returned to its inoperative position. Concurrently with this operation on the trailing end flap, the shoe 51 on the member 50 operates to plow down the leading end flap as can be appreciated also from a consideration of FIG. 8.

Thereafter, the partially closed carton 14C (see FIG. 7) engages the side flap plows 62 whereupon these side flaps are folded over the carton at which time the carton assumes the configuration or condition designated 14D in FIGS. 1 and 10.

Meanwhile the pusher element 63 is still operating to positively advance the carton 14 along the conveyor 11 and ultimately into engagement with the friction surface on the roller 78 (again see FIGS. 1 and 10). The arm structure including the arm 77 is somewhat resistive insofar as the case pivoting the roller 78 out of the case path but is able to be overcome under the urging of the pusher element 63. Shortly after engagement of the carton 14 with the roller 78, the carton configuration designated 14F in FIG. 16 is reached after which the pusher element 63 ceases its function of positively advancing the carton. This would correspond to the end of the stroke of piston rod 72 and a suitable limit switch (not shown) may be employed for returning the pusher element and piston rod to the condition for handling a subsequent carton 14.

When the condition depicted in FIG. 16 is realized, the cross arm 89 not only bears against the flaps of the carton 14 but also is effective to press the carton 14 against the conveyor 11. Thus, the carton is subject to advancement under the influence of the conveyor belt 29 and this is effective to pivot the carton about its lower rear edge as seen in FIGS. 12, 17 and 13, in that order. As can be appreciated from FIG. 13, the stabilization and hold-down function of the cross bar 89 ceases before the carton 14 is completely inverted. The flaps, once the carton has passed through a 90° arc, are maintained in closed position since they then bear against the conveyor 11. The conveyor belt is effective to provide a suitable frictional engagement with the pivot edge of the carton even when the carton is in the condition designated 14I—see FIG. 13. The gradual inversion of the carton 14 is also facilitated by the rotational movement of the roller 78 when the same is frictionally gripping an end surface of the carton 14.

While in the foregoing specification I have set forth a detail description of an embodiment of the invention for the purpose of illustrating the same, many variations of the details herein given may be utilized by those skilled in the art without departing from the spirit and scope of the invention.

I claim:

1. In inverting apparatus for a flap-equipped case, a frame, a case conveyor on said frame, an arm pivotally mounted on said frame and having an arm end normally positioned in the path of a case being advanced on said conveyor, said arm end being equipped with means for frictionally contacting a case side, and arm means mounted on said arm spaced from said end and positioned to contact a case top to urge the case against said conveyor and to maintain the case flaps from opening during case inversion, said frame being equipped with means for positively advancing a case with said conveyor, flap-closing means on said frame engageable by a case when the same is being advanced by said advancing means, said advancing means being operative to positively advance a case only until the case so advanced is urged against said conveyor by said arm means.

2. In apparatus for inverting cartons and the like, a frame, an endless conveyor mounted for movement on said frame to advance cartons generally horizontally thereon, an arm supported on said frame over said conveyor for pivotal movement by a carton moving with said conveyor, means interconnecting said arm and said frame for resisting the free pivoting of said arm, and brace means on said arm extending laterally therefrom for engaging the flaps of a carton during carton inversion, said frame being equipped with means for sequentially closing the end and side flaps of a carton moving with said conveyor, said means including a hook-shaped arm pivotally mounted on said frame equipped with an extension engageable with the leading portion of a carton pivoting said hook-shaped arm in the direction of conveyor movement.

3. In apparatus for inverting a carton equipped with side and end flaps, a frame providing a platform, said platform including an endless conveyor for advancing cartons therealong, means on said frame for advancing said conveyor, a sub-frame on said frame positioned above said platform, means on said sub-frame for sequentially closing the end and side flaps of a carton advancing with said conveyor, said flap closing means including a shoe-equipped rigid member positioned in the path of a carton traveling on said conveyor for closing the leading end flap of a carton, said flap closing means also including a movable member pivotally mounted on said sub-frame for closing the trailing end flap of a carton, an arm on

said sub-frame spaced in the direction of conveyor travel from said flap closing means, said arm having an arm end engageable with the leading end of a carton being advanced with said conveyor, means on said sub-frame for urging a carton against said arm end, and means on said arm for maintaining the flaps of a carton in closed condition during the initial inversion of a carton.

4. In carton inverting apparatus, a frame, an endless conveyor mounted on said frame for generally horizontal movement, means on said frame adjacent one end thereof for sequentially closing the end and side flaps of a carton being advanced on said conveyor, a pusher element movably mounted on said frame for positively advancing a carton through said flap closing means and toward the other end of said frame, a pivotal member mounted on said frame for engaging the leading end of a carton being advanced by said pusher element, a second arm on said frame and projecting from the first mentioned arm for maintaining the carton flaps in closed condition during carton inversion, means interconnecting the first mentioned arm and said frame for limiting the free pivotal movement of said first mentioned arm.

5. The structure of claim 4 in which said resisting means includes a fluid operated piston and cylinder unit.

6. In apparatus of the character described, a frame, a belt conveyor mounted on said frame for transporting a case thereon, an arm pivotally mounted on said frame for engaging the leading end of a carton on said conveyor, means interconnecting said arm and said frame limiting the free pivotal movement of said arm, pusher means on said frame for positively advancing a carton with said conveyor against the resistance imposed by said arm, said pusher means having a limited reciprocatory motion effective to provide positive initial engagement between said arm and the carton leading end for carton inversion, said frame being equipped with means for closing the flaps of a carton being advanced on said conveyor, said flap-closing means being positioned in the path of travel of a carton on said conveyor ahead of said arm, and switch means on said frame for actuating pusher means to initiate movement of said pusher means prior to flap closing by said flap-closing means.

7. In apparatus for inverting a carton equipped with side and end flaps, a frame having an endless conveyor mounted thereon, means for moving said conveyor, a super structure on said frame about said conveyor, said super structure at the case entering end of said conveyor being equipped with means for sequentially closing the end and side flaps of a carton being advanced on said conveyor, said super structure at the end thereof adjacent the discharge end of said frame being equipped with means for inverting a flap equipped carton being advanced on said conveyor, fluid actuated cylinder means on said super structure for positively advancing a carton with said conveyor through said super structure, said carton inverting means including an arm pivotally mounted on said super structure intermediate the arm ends, one of said arm ends being equipped with means for frictionally engaging the leading end of a carton being advanced on said conveyor, and a fluid actuated cylinder unit interconnected between said frame and said arm for limiting the free pivotal movement of said arm, the fluid actuated cylinder means being effective to overcome the resistance of said arm to pivotal movement imposed by said fluid actuated cylinder unit.

8. In apparatus of the character described, a frame, a conveyor on said frame for advancing cartons therealong, means on said frame for moving said conveyor, a first plow element on said frame for closing the leading end flap of a carton being advanced on said conveyor, a linkage mechanism on said frame actuatable by a carton being advanced on said conveyor for closing the trailing end flap of a carton on said conveyor, a second plow element on said frame for closing the side flaps of a carton being advanced on said conveyor and subsequent to the closing of the end flaps thereof, a fluid actuated cylinder and piston rod unit mounted on said frame for positively advancing a carton past said plow elements, an arm pivotally mounted on said frame for contact with the leading end of a carton on said conveyor after the flaps thereof having been closed, said cylinder and piston rod unit having a stroke sufficient to urge a carton against said arm, a second cylinder and piston rod unit on said frame, said second unit being interconnected between said frame and said arm and effective to limit the free pivotal movement of said arm, the first mentioned cylinder and piston rod unit being effective to overcome the resistance imposed by the said second unit, and arm means on said arm extending downwardly and rearwardly thereof for engagement with the closed flaps of a carton contacting said arm.

9. In apparatus of the character described, a frame, a conveyor mounted for generally horizontal movement on said frame, means on said frame for advancing said conveyor, a flap closing mechanism on said conveyor operative to sequentially close the end and side flaps of a carton being advanced on said conveyor, means on said frame adjacent said flap closing means for actuating a pusher element, said pusher element being mounted on said frame for movement parallel to said conveyor to positively urge the carton along said conveyor when the flaps of said carton are being closed, an arcuate arm mounted on said frame for pivotal movement out of the path of a carton being advanced on said conveyor, resilient means interconnecting said arm and frame for limiting the free pivotal movement of said arm, and means on said arm for contacting the flaps of a carton engaging said arm.

10. In apparatus of the character described, a frame, a conveyor on said frame for transporting flap-equipped cartons therealong, means on said frame for moving said conveyor, a super structure-like sub-frame on said frame positioned astride said conveyor, a linkage mechanism on said sub-frame having a depending element engaged by the leading end of a carton being advanced on said conveyor, said linkage mechanism including a hook-shaped arm responsive to the engagement of said depending element for engaging and closing the trailing end flap of a carton being advanced on said conveyor, a plurality of plow elements rigidly mounted on said super structure for closing the leading end flap and side flaps of a carton being advanced on said conveyor, a fluid pressure actuated cylinder and piston rod unit mounted on said sub-frame, a pusher element reciprocably mounted on said sub-frame for travel over a path parallel to the path of travel of said conveyor and effective to bear against the trailing end of a carton on said conveyor, said pusher element being interconnected with the said piston rod, an arcuate arm pivotally mounted on said super structure and having a lower end equipped with a frictional service for engaging the forward end of a carton being advanced on said conveyor, brake means interconnecting said frame and said arm effective to impose a resistance against the free rotation of said arm relative to said sub-frame, said pusher element having a path of travel effective to urge a carton against said arm end and overcome the resistance of said brake means, and a hold-down structure pivotally connected to said arcuate arm and depending therefrom, said hold-down structure being equipped with a counterweight and being effective to maintain the flaps of a carton in closed condition while urging a carton against said conveyor during inversion thereof.

References Cited in the file of this patent

UNITED STATES PATENTS

1,144,773	Morton	June 29, 1915
1,778,804	Linder	Oct. 21, 1930
1,783,814	Schroeder et al.	Dec. 2, 1930
2,677,452	Mallow et al.	May 4, 1954
2,719,392	Rowland et al.	Oct. 4, 1955
2,833,099	Rejsa	May 6, 1958