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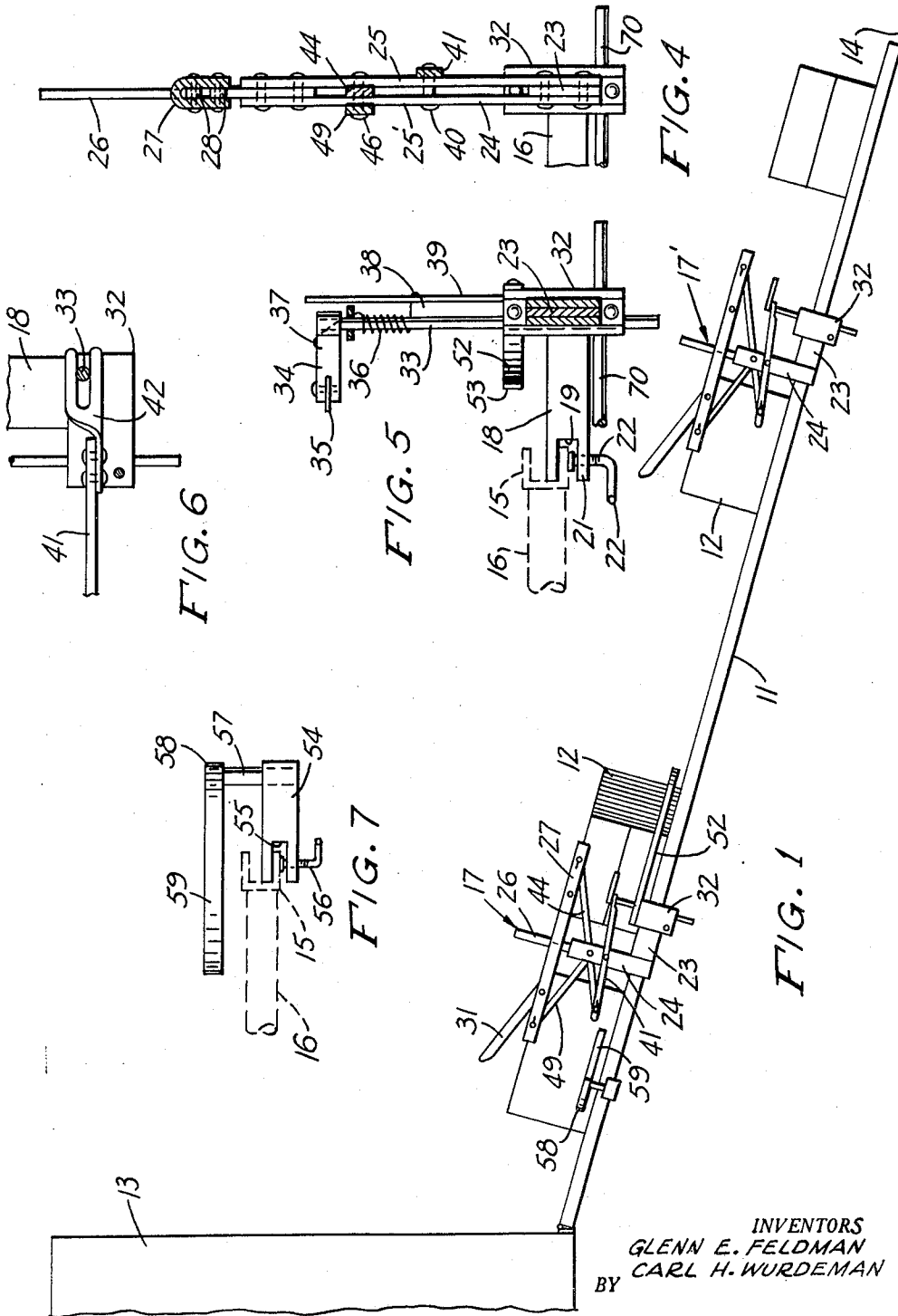
G. E. FELDMAN ET AL

2,768,435

AUTOMATIC PACKING CASE OPENER

Filed Dec. 13, 1955

2 Sheets-Sheet 1



INVENTORS
GLENN E. FELDMAN
CARL H. WURDEMAN
BY

McMorrow, Berman & Davidson
ATTORNEYS

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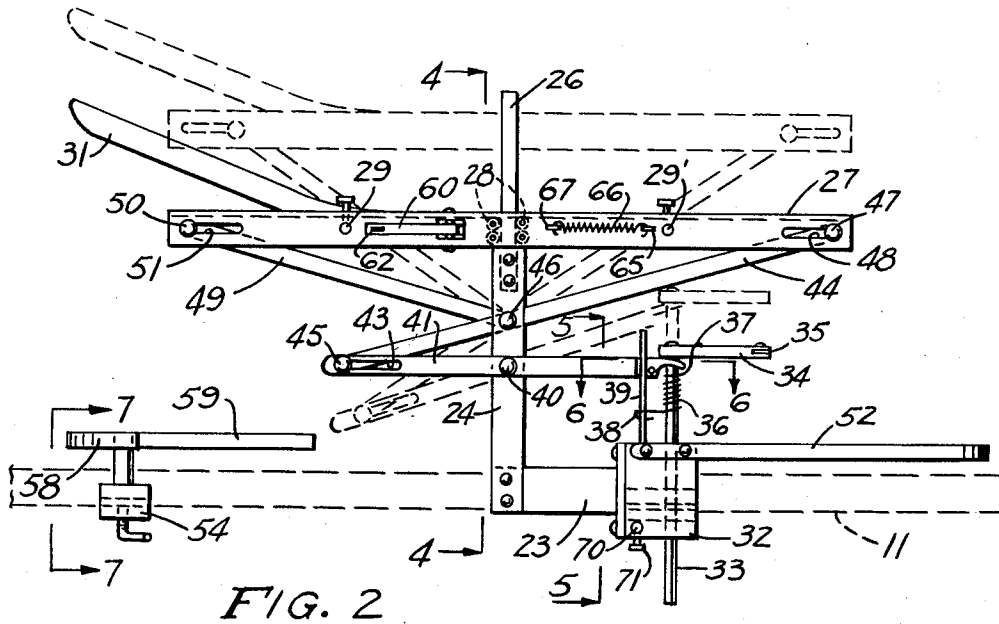


FIG. 2

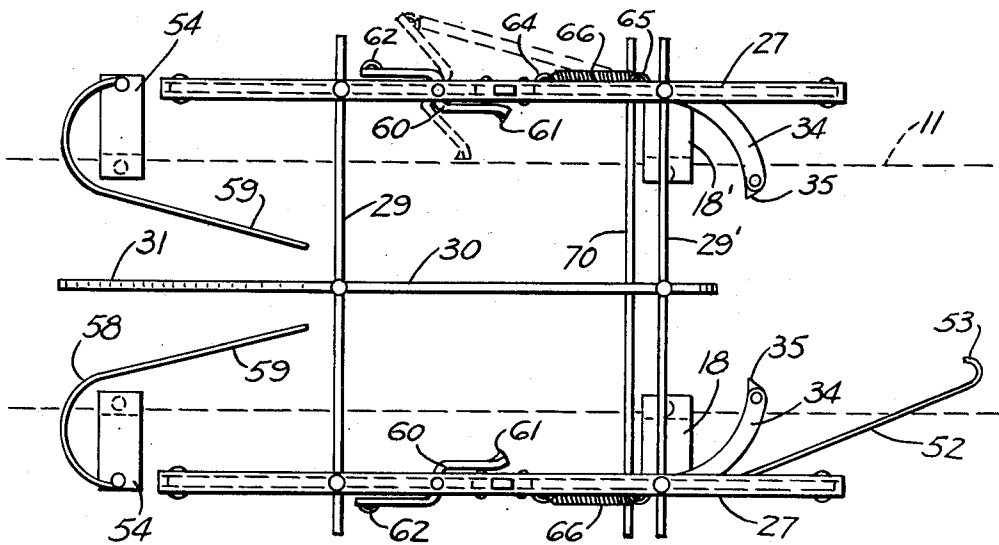


FIG. 3

INVENTORS
GLENN E. FELDMAN
CARL H. WURDEMAN
BY

McMorrow, Berman & Davidson
ATTORNEYS

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AUTOMATIC PACKING CASE OPENER

Glenn E. Feldman and Carl H. Wurdeman, Meade, Kans.

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5 Claims. (Cl. 30—2)

This invention relates to devices for automatically opening packing cases and cartons, and more particularly to a device adapted to be installed on a conveyor to automatically open cartons as the cartons move along the conveyor.

A main object of the invention is to provide a novel and improved carton-opening device for use on a conveyor, said device involving simple components, being easy to install, and being arranged to automatically open a carton as it moves along the conveyor.

A further object of the invention is to provide an improved carton-opening apparatus for use on a conveyor for unloading grocery cartons and similar cartons from trucks, or the like, the apparatus involving inexpensive parts, being automatically adjustable in accordance with the size of the carton to be handled by the device, and being arranged so that, if so desired, the top cover of a carton may be removed without cutting the side and end walls of the carton.

Further objects and advantages of the invention will become apparent from the following description and claims, and from the accompanying drawings, wherein:

Figure 1 is a side elevational view of a conveyor arranged between a truck and a point at which cartons are to be unloaded from the truck, said conveyor being provided with improved carton-cutting apparatus constructed in accordance with the present invention.

Figure 2 is an enlarged side elevational view of one of the forward carton-cutting unit employed in the arrangement shown in Figure 1.

Figure 3 is a top view of the carton-cutting unit of Figure 2.

Figure 4 is an enlarged transverse vertical cross sectional view taken on the line 4—4 of Figure 2.

Figure 5 is an enlarged transverse vertical cross sectional detail view taken on the line 5—5 of Figure 2.

Figure 6 is an enlarged horizontal cross sectional detail view taken on the line 6—6 of Figure 2.

Figure 7 is an enlarged transverse vertical cross sectional detail view taken on the line 7—7 of Figure 2.

Referring to the drawings, 11 generally designates a conventional conveyor, for example a conveyor of the roller type, which is employed to unload cartons, such as grocery cartons 12, from a delivery truck 13, to a location 14 spaced below the floor of the delivery truck 13, as shown in Figure 1, whereby cartons 12 on the conveyor will move downwardly along the conveyor by gravity.

The conveyor 11 comprises the outwardly facing side channels 15 between which are journaled the parallel, transversely extending rollers 16, as shown in dotted view in Figures 5 and 7.

Designated respectively at 17 and 17' are a pair of carton-cutting assemblies which are mounted on the conveyor 11 in spaced relationship, as shown in Figure 1, said assemblies being substantially identical and being arranged with the assembly 17 located forwardly of the assembly 17'. Since the assemblies 17 and 17' are identi-

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cal, a description of the assembly 17 will cover the construction of the assembly 17'.

The assembly 17 comprises a pair of bracket members 18 and 18' located on opposite sides of the conveyor 11 and formed at their ends with notches 19 arranged to receive the bottom flanges of the respective conveyor channels 15, the end portions of said bracket members having clamping members 20 threadedly engaged in the lower fingers 21 thereof defined by the notches 19, said clamping members 20 having handles 22 whereby they may be rotated to clampingly engage with the bottom surfaces of the lower flanges of the conveyor side channels 15. The arms 18 and 18' project horizontally outwardly for substantial distances, and each arm is formed with a longitudinally extending outer portion 23 extending parallel to the associated conveyor side channel element 15, and formed at its forward end with a vertical upstanding arm 24. Thus, the upstanding arm 24 may comprise vertical bars 25, 25' riveted to opposite sides of the forward end of each arm 23, as is shown in Figure 4, the arms 25, 25' extending vertically upwardly in parallel relationship. Secured between the top portions of the bars 25, 25' is a vertically projecting upstanding bar 26 on which is slidably engaged a horizontal, channel-shaped bar 27, the bar 27 being of inverted U-shaped cross section, as shown in Figure 4, and being formed with a central slot through which the vertical upstanding bar 26 extends. Journaled in the horizontal bar 27 on opposite sides of the bar 26 are respective pairs of vertically spaced rollers 28, 28 engageable with the respective forward and rear vertical edges of the bar 26, whereby the horizontal member 27 is guided for vertical movement on the upstanding vertical bar 26.

The respective horizontal members 27 at the opposite sides of the apparatus are rigidly connected together for simultaneous vertical movement by respective transversely extending cross rods 29, 29'. Rigidly connected to the intermediate portions of the cross rods 29, 29' is a longitudinally extending feeler bar 30 which is located midway between the longitudinal side bars 27 and which is formed at its forward end with the forwardly and upwardly inclined carton-engaging arm 31.

Rigidly secured to the rear end portions of the arms 23 are respective bracket structures 32 in which are slidably and rotatably mounted respective vertical rods 33 to the top ends of which are rigidly secured respective inwardly directed arcuate horizontal arms 34, each arm having secured to its inner end a carton-cutting blade element 35, as shown in Figure 3. The arms 34 are biased inwardly by respective coil springs 36 mounted on the arms, the upper ends of the coiled springs having hook elements 37 engaging the arms to urge the arms inwardly, the lower ends of the coiled springs having hook elements 38 engaging vertical pin members 39 removably mounted in the respective bracket members 32 and projecting vertically upwardly therefrom, as shown in Figure 2.

Pivoted at 40 to the respective arms 24 are respective link bars 41 provided at their rear ends with respective fork elements 42 slidably receiving the respective rods 33 and underlying the respective arms 34. The forward ends of the link bars 41 are formed with slots 43 and are connected through said slots to the ends of link bars 44, as by pin elements 45, the link bars 44 being pivoted at 46 to the respective vertical arms 24. The rear ends of the bars 44 are connected to the rear end portions of the longitudinal bar members 27 by pin elements 47 extending through slots 48 formed in the respective side flanges of the bar members 27, the rear end portions of the link bars 44 being received in the bar members 27, as shown in Figure 2.

The forward end portions of the longitudinal bars 27

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are supported by respective pivoted struts 49 connected to the respective vertical arms 24 and connected to the forward end portions of the longitudinal bar members 27 by pins 50 extending through slots 51 formed in the side flanges of the bar members 27, the forward end portions of the struts 49 being received between said side flanges.

As will be readily apparent, the linkages above described define means to regulate the height of the arms 34 and the cutting blades 35 in accordance with the height of the feeler bar member 30, which will in turn be controlled by the height of a carton passing thereunder as it moves along the conveyor 11. The carton first engages beneath the forwardly and upwardly inclined feeler element 31, which cams the feeler bar 30 upwardly as the carton moves along the conveyor, and which lifts the cutting elements 35, 35 to a predetermined height, for example, a height midway between the top and bottom walls of the carton so that the carton will be cut along median lines on its side walls as the carton passes between the cutting arms 34, 34.

Secured to the top portion of one of the bracket assemblies 32 is a rearwardly and inwardly inclined hook member 52 having a hook element 53 at its end, said hook member 52 extending inwardly a sufficient distance to engage the corner of a carton 12 after the carton has advanced beyond the cutter arms 34.

The hook member 32 is fabricated of resilient material so that it will yield readily as its intermediate portion is engaged by the corner of the carton as the carton moves along the conveyor, the hook member 52 being of sufficient length so that the hook element 53 thereof does not engage the corner of the carton until the carton has been substantially slit by the cutting blades 35, 35 along its side walls. When the carton is engaged by the hook element 53, the carton is rotated 90° to present its end walls laterally, whereby said end walls will be then slit by the cutting blades 35, 35 associated with the rear carton-cutting assembly 17'.

Secured to the side channels 15 of the conveyor forwardly of the forward carton-cutting assembly 17 are respective bracket members 54, 54, shown in Figure 7, said bracket members comprising laterally extending arms having notches 55 receiving the lower flanges of the conveyor side channels 15 and being provided with clamping screws 56 for clamping the brackets 54 to said lower flanges. The brackets 54 are formed with the vertical, upwardly extending rods 57 to the top ends of which are secured respective retarding springs 58, said springs comprising respective curved leaf springs having rearwardly and inwardly extending carton-engaging portions 59, 59, shown in Figure 3, for retarding a carton moving downwardly along the conveyor 11 as it reaches the forward carton-cutting assembly 17.

From the above, it will be readily apparent that as a carton leaves the truck 13 on the conveyor 11, it first engages the retarding springs 58, whereby it is retarded so that it moves through the forward carton-cutting assembly 17 at a controlled speed. The sides of the carton are slit by the blades 35, 35, after which the carton is rotated 90° by the hook member 52, allowing the carton to then travel downwardly along the conveyor and through the rear carton-cutting assembly 17', whose cutting blades 35 slit the respective end walls of the carton, completing the carton-cutting operation. As above explained, the carton will be cut along a median plane spaced midway between the top and bottom surfaces, since the feeler members 30 automatically regulate the height of the cutting blades 35 in accordance with the height of the carton. Thus cartons of varying heights will be cut along median planes spaced equal distances between their top and bottom surfaces by the blades 35 of the respective carton-cutting assemblies 17 and 17'.

Pivoted in the intermediate portions of the respective top bars 27 are respective arms 60, 60, the inner portions of the arms carrying cutting blade elements 61, and the

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outer portions of the arms being provided with loops 62, 62, as shown in Figure 3. As shown, the arms 60, 60 are pivoted for horizontal rotation. Secured to the outside surfaces of the respective longitudinal bar members 27 are respective spaced loops 64 and 65, and connected to the loop 65 are respective coiled springs 66. The forward ends of the coiled springs 66 are formed with hook elements 67 so that they are at times engageable with the loop 64 to support the springs in inoperative positions alongside the respective longitudinal members 27. The hook elements 67 may at times be engaged with the loop 62 of the arm 60, whereby to bias the arms to positions wherein the blade elements 61 project inwardly, as shown in dotted view in Figure 3, whereby the top wall of a carton will be cut off the carton as it moves through the assemblies 17 and 17'. When setting the apparatus up for this type of cutting operation, the detachable pin elements 39 are removed, whereby the arms 34, 34 are no longer biased inwardly. The arms 60 are then connected to their springs 66, as above described, whereby the blade elements 61 are biased inwardly. As thus arranged, as a carton moves through the assemblies 17 and 17', the upper portions of the side walls of the carton will first be slit, and the upper portions of the end walls will then be slit, thus completely removing the top wall of the carton.

To provide increased rigidity of the carton-cutting assemblies 17 and 17', the respective bracket members 32 of said assemblies may be connected below the conveyor 11 by transversely extending rods 70 engaged through the lower portions of said bracket members 32 and suitably secured thereto, as by thumb screws 71, shown in Figure 2. The transverse rods 70 are readily removable, when required, by loosening the thumb screws 71. The top transverse cross rods 29, 29' are removably secured in the longitudinal bars 27, 27 in a similar manner.

While a specific embodiment of an improved automatic case-opening apparatus has been disclosed in the foregoing description, it will be understood that various modifications within the spirit of the invention may occur to those skilled in the art. Therefore, it is intended that no limitations be placed on the invention except as defined by the scope of the appended claims.

What is claimed is:

1. In a conveyor, a carton cutting device comprising opposing upstanding supports secured to opposite sides of the conveyor, respective carton feeler members, means slidably connecting said feeler members to said support for upward and downward movement thereon, means on the feeler members formed and arranged to engage the top portions of a package moving on the conveyor, respective inwardly projecting cutting blades movably mounted on said support below the feeler members, and means mechanically coupling said cutting blades to said feeler members and being formed and arranged to regulate the height of the blades in accordance with the height of the feeler members.

2. In a conveyor, carton cutting means comprising a pair of carton-cutting devices spaced along the conveyor, each carton-cutting device comprising opposing upstanding supports secured to opposite sides of the conveyor, respective carton feeler members, and means slidably connecting said feeler members to said supports for upward and downward movement thereon, means on the feeler members formed and arranged to engage the top portions of a package moving on the conveyor, respective inwardly projecting cutting blades movably mounted on said supports below the feeler members, means mechanically coupling said cutting blades to said feeler members and being formed and arranged to regulate the height of the blades in accordance with the height of the feeler members, and a hook element secured to one of the upstanding supports of the first carton-cutting device and extending rearwardly and inwardly over the adjacent side portion of the conveyor toward the other carton-cutting device, said hook element being formed and arranged

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to engage the corner of a carton as it passes beyond the first carton-cutting device and to rotate said carton horizontally substantially 90° on the conveyor.

3. In a conveyor, carton cutting means comprising a pair of carton-cutting devices spaced along the conveyor, each carton-cutting device comprising opposing upstanding supports secured to opposite sides of the conveyor, respective carton feeler members, means slidably connecting said feeler members to said supports for upward and downward movement thereon, means on the feeler members formed and arranged to engage the top portion of a carton moving on the conveyor, respective inwardly projecting cutting blades movably mounted on said supports below the feeler members, respective linkages mounted on the upstanding supports and interconnecting said cutting blades with the feeler members, said linkages being formed and arranged to regulate the height of the blades in accordance with the height of the feeler members, and a hook element secured to one of the upstanding supports of the first carton-cutting device and extending diagonally over the adjacent side portion of the conveyor toward the other carton-cutting device, said hook element being formed and arranged to engage the corner of a carton as it passes beyond the first carton-cutting device and to rotate said carton horizontally substantially 90° on the conveyor.

4. In a conveyor, carton cutting means comprising a pair of carton-cutting devices spaced along the conveyor, each carton-cutting device comprising opposing upstanding supports secured to opposite sides of the conveyor, respective carton feeler members, means slidably connecting said feeler members to said supports for upward and downward movement thereon, means on the feeler members formed and arranged to engage the top portions of a carton moving on the conveyor, respective inwardly projecting cutting blades movably mounted on said supports below the feeler members, respective linkages mounted on the upstanding supports and interconnecting

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said cutting blades with the feeler members, said linkages being formed and arranged to regulate the height of the blades in accordance with the height of the feeler members, a hook element secured to one of the upstanding supports of the first carton-cutting device and extending diagonally over the adjacent side portion of the conveyor toward the other carton-cutting device, said hook element being formed and arranged to engage the corner of a carton as it passes beyond the first carton-cutting device and to rotate said carton horizontally substantially 90° on the conveyor, and opposing inwardly projecting leaf spring assemblies secured to the opposite sides of the conveyor ahead of the first carton-cutting device, said assemblies including elongated leaf spring elements extending longitudinally and inwardly in the direction of movement of a carton toward the first carton-cutting device and being formed and arranged to engage and retard a carton traveling therebetween.

5. In a conveyor, a carton cutting device comprising opposing upstanding supports secured to opposite sides of the conveyor, respective carton feeler members, means slidably connecting said feeler members to said supports for upward and downward movement thereon, means on the feeler members formed and arranged to engage the top portions of a carton moving on the conveyor, respective inwardly projecting cutting blades movably mounted on said supports below the feeler members, means formed and arranged for at times biasing said cutting blades inwardly, means mechanically coupling said cutting blades to said feeler members and being formed and arranged to regulate the height of the blades in accordance with the height of the feeler members, auxiliary cutting blades pivoted to said feeler members for inward rotation, and means for at other times resiliently securing said last-named cutting blades in opposing inwardly projecting positions on said feeler members.

No references cited.