

Feb. 27, 1962

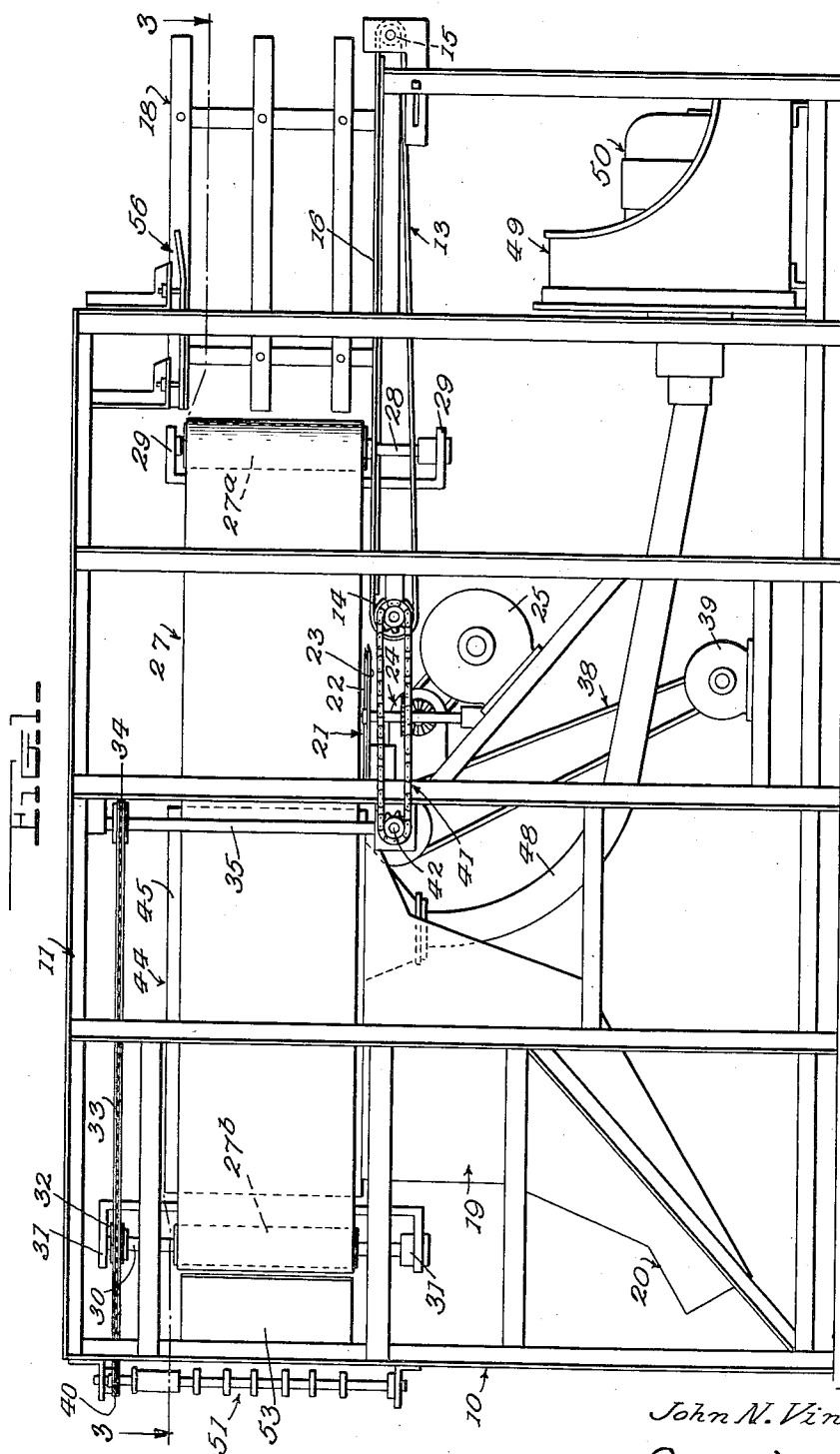
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3,022,912

PACKAGE OPENING MACHINE

Filed Dec. 10, 1958

4 Sheets-Sheet 1



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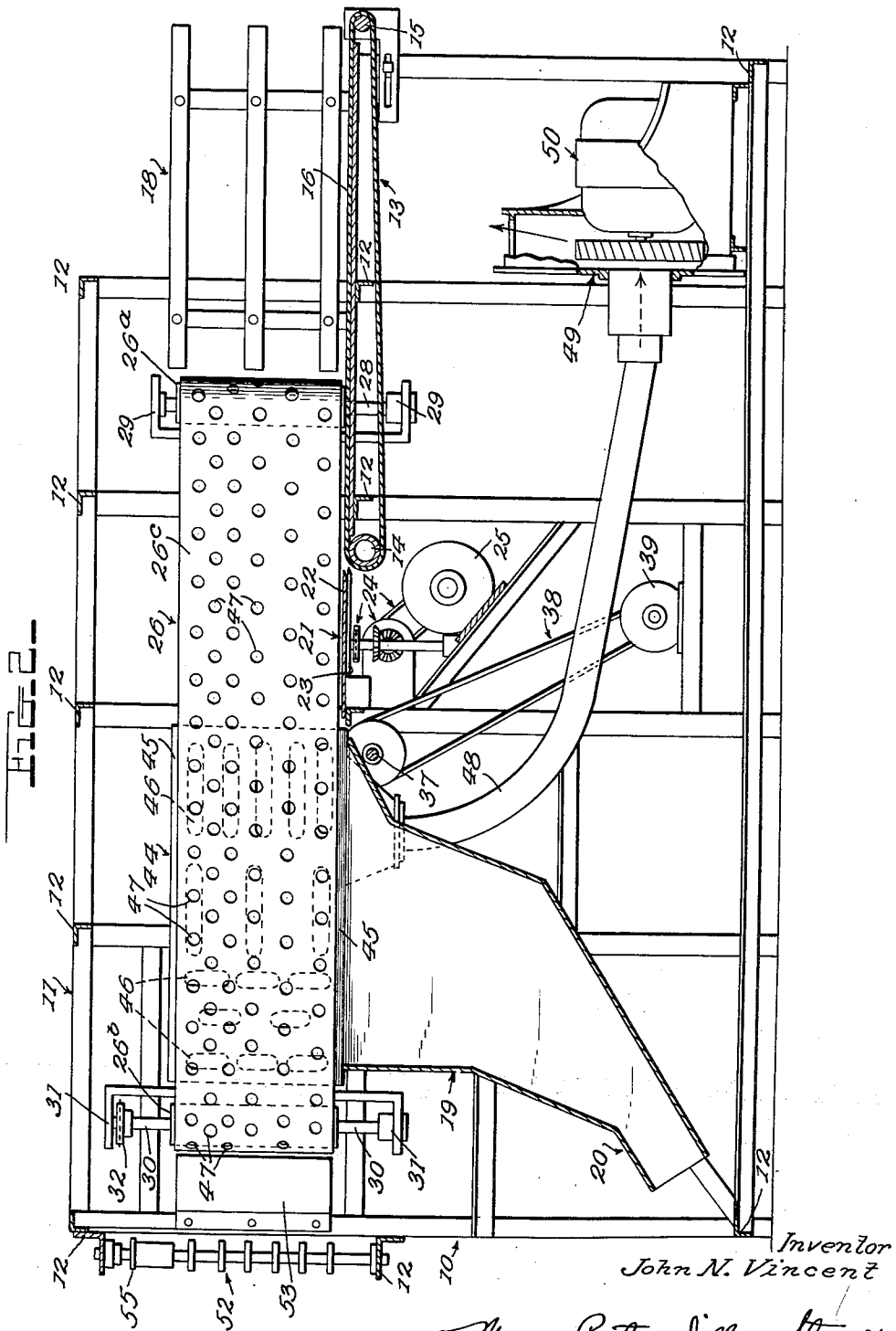
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4 Sheets-Sheet 2



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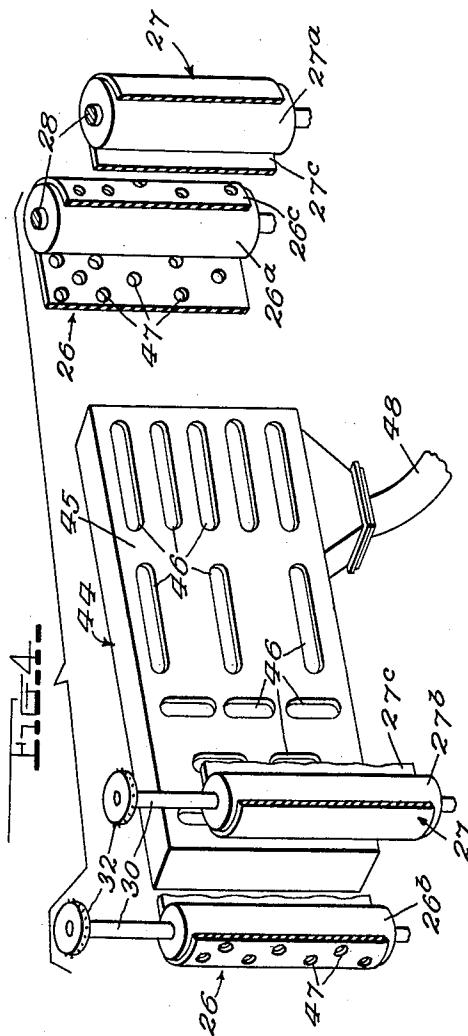
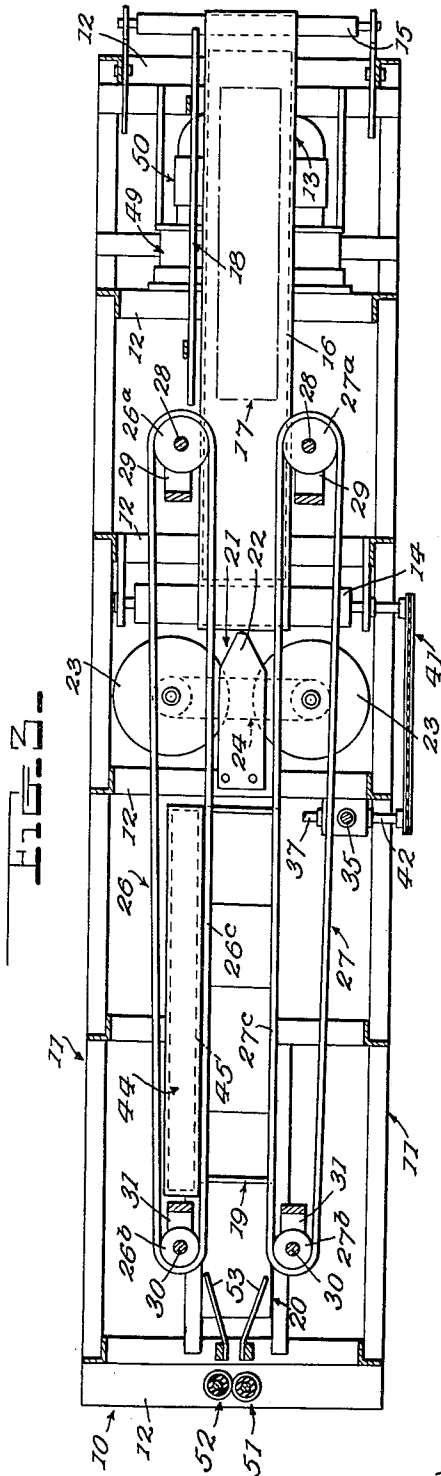
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4 Sheets-Sheet 3



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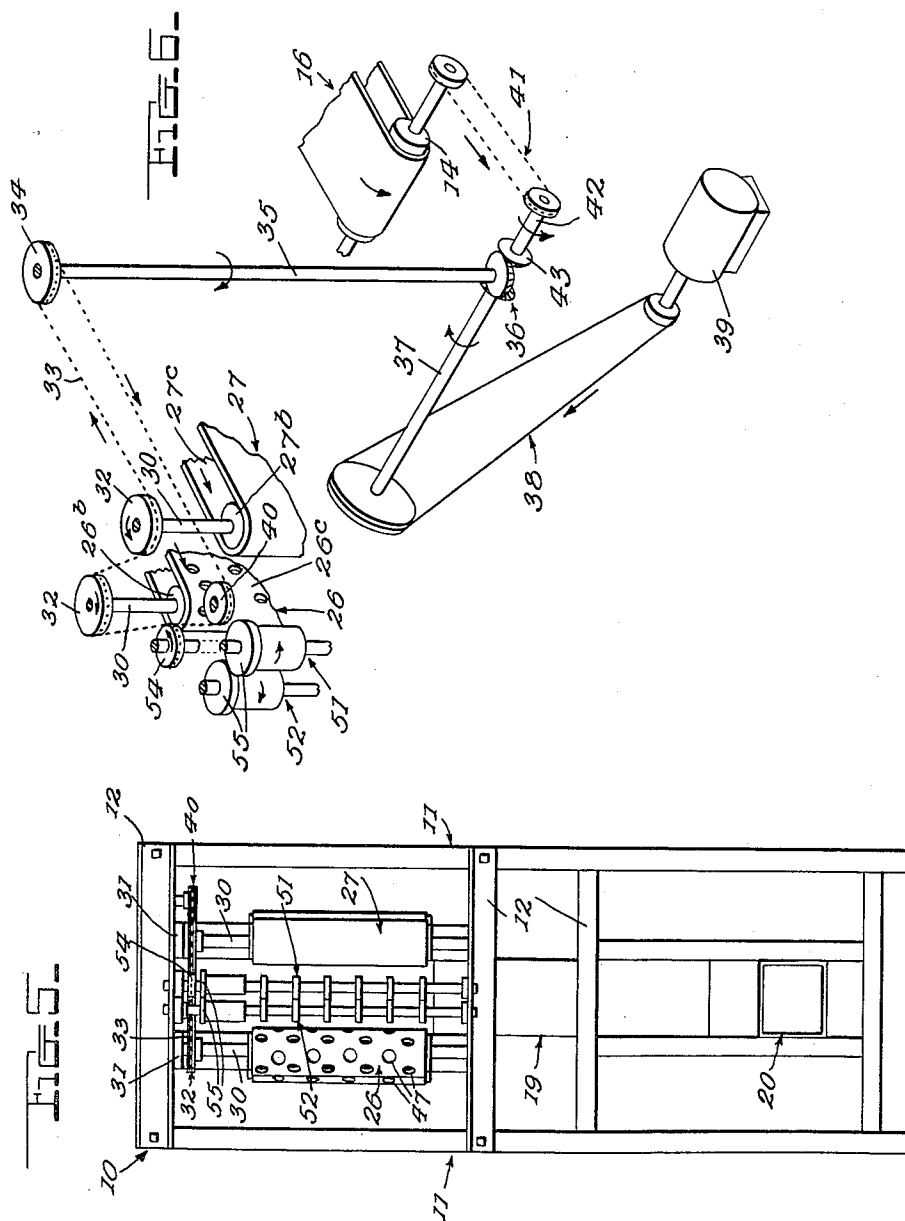
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PACKAGE OPENING MACHINE

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4 Sheets-Sheet 4



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3,022,912

PACKAGE OPENING MACHINE

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Filed Dec. 10, 1958, Ser. No. 779,482

9 Claims. (Cl. 214-305)

This invention relates generally to package opening machines and more particularly to a machine for opening packages of cans shipped by the manufacturer in paper bags or other wrappers in which the cans are arranged row-beside-row in a single layer, permitting the packages to have substantially uniform rectangular configuration.

The machine advances the packages along a path, removes the bottoms of the wrappers, and allows the cans to discharge by gravity into a receiving means; and the invention has aimed to provide such a machine which would be smoothly and rapidly operable without liability of any of the opened wrappers falling into the receiving means and interfering with the delivery of cans from said receiving means to a roll-away conveyor or the like conventionally used to conduct the cans to a filling and closing machine.

In carrying out the above end, a further object has been to provide a package opening machine having novel conveyor means for advancing the opened packages from the receiving means and including a travelling belt having a vertical reach against which one wall of each opened wrapper is suction-held while the cans are discharging into said receiving means, thereby preventing any package wrapper from falling into said receiving means.

Another object has been to provide the aforesaid vertical belt reach with apertures communicable with apertures in a vertical wall of a suction box to apply suction to the wrapper wall engaged by said belt reach.

Another object has been to provide vertical longitudinal means to contact with the wall of the package wrapper opposite that engaged by the aforesaid vertical belt reach, for holding each package against any tendency to cant or tilt away from said vertical belt reach.

Still another object has been to provide the aforesaid vertical longitudinal means in the form of a second vertical belt reach parallel with and travelling unidirectionally with the aforesaid vertical belt reach.

A further object has been to provide a package advancing belt upon which an attendant successively places the packages to be opened, said package advancing belt having a horizontal reach travelling toward the bottom removing means and underlapping the receiving ends of the aforesaid vertical belt reaches to allow these vertical reaches to guide the package as said horizontal reach pushes it over the bottom removing means.

With the above and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by reference to the following detailed description, the appended claims and the several views illustrated in the accompanying drawings.

In the drawings:

FIGURE 1 is a side elevation.

FIGURE 2 is a vertical longitudinal sectional view.

FIGURE 3 is a horizontal sectional view on line 3-3 of FIGURE 1.

FIGURE 4 is a perspective view, partly broken away, showing the suction box, and the belts associated therewith.

FIGURE 5 is an end view of the delivery end of the machine.

FIGURE 6 is a fragmentary diagrammatic perspective view showing the drive means for the various elements.

A frame structure 10 is shown having parallel vertical side frames 11 connected by various cross members 12.

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Mounted in one end portion of the frame 10, there is a longitudinal conveyor belt 13 trained around rollers 14 and 15. This belt 13 has a horizontal upper reach 16 upon which an attendant successively places the packages to be opened, and one of the packages is shown at 17 in FIGURE 3. A fence 18 is secured to the frame 10 to aid in placing the packages.

In the other end portion of the frame 10, a receiver 19 is mounted to receive the cans. This receiver is shown in the form of a hopper having a discharge chute 20 down which the cans roll to a roll-away conveyor or the like (not shown).

Between the belt 13 and the receiver 19, a suitable means 21 is mounted in the frame 10, for removing the bottom of each package advanced over said means 21 by the belt reach 16. The construction of the means 21 forms no part of the present invention but preferably includes a stationery knife 22, and two rotary cutting disks 23 connected at 24 with an electric motor 25.

Two longitudinal belts 26 and 27 are provided to engage opposite sides of the packages before they leave the belt reach 16, guide said packages over the bottom removing means 21, and then move the opened packages over the receiving means 19, allowing the cans to fall by gravity into said receiving means from the then bottomless wrappers.

The belt 26 is trained around vertical rollers 26a and 26b which provide said belt 26 with a package-engaging reach 26c disposed in a vertical longitudinal plane. Similarly, the belt 27 is trained around vertical rollers 27a and 27b which provide this belt with a package-engaging reach 27c disposed in a vertical longitudinal plane. The two belt reaches 26c and 27c are disposed in opposed parallel relation to contact with opposite walls of each package.

The rollers 26a and 27a have shafts 28 mounted in bearings 29, and the rollers 26b and 27b are provided with shafts 30 mounted in bearings 31. The upper ends of the shafts 30 have sprockets 32 (see FIGURE 6) driven by a chain 33 from a sprocket 34 on the upper end of a vertical shaft 35. A bevel gear couple connects the lower end of shaft 35 with a transverse shaft 37 which is belt-connected at 38 with an electric motor 39. At 40, an idler is shown, instrumental in guiding the chain 33.

The motor 39 not only drives the belts 26 and 27 but also the belt 13 as seen in FIGURE 6. The roller 14 for this belt is chain-connected at 41 with a short transverse shaft 42 aligned with the shaft 37. Shaft 42 has a bevel gear 43 driven by one of the gears of the gear couple 36.

A suction box 44 is stationarily mounted in the frame 10 over the receiving means 19 and includes a vertical wall 45 contacting with the outer side of the belt reach 26c. The wall 45 is apertured and the belt 26 is apertured, the apertures of the two being communicable. The wall apertures are shown in the form of slots 46 and those of the belt 26 in the form of circular openings 47, as seen in FIGURE 4, but any desired aperture configurations may be employed.

The suction box 44 is connected by a conduit 48 with an air exhausting fan 49 driven by an electric motor 50. Sub-atmospheric pressure is thus maintained in the suction box 44, with the result that one wall of each package wrapper is suction-held against the belt reach 26c during operation of the machine. This supports each opened wrapper against falling into the receiving means 19 during discharge of cans from said wrapper. In this connection, it may be explained that the belt reach 27c acts to prevent canting or tilting of the wrapper but does not force the wrapper wall which it engages toward the reach 26c, as such forcing would interfere with gravity discharge of the cans.

Any desired means may be provided to take the emptied

wrappers from the machine. Pinch rolls 51 and 52 and guide wings 53 converging thereto are preferable for this purpose. The roll 51 is provided with a drive sprocket 54 driven by a reach of the chain 33 as seen in FIGURE 6. The roll 51 drives the roll 52 by means of friction wheels 55. A cam track 56 (FIGURE 1) is preferably employed to push the packages well down on the belt reach 16 as they enter between the vertical belt reaches 26c and 27c.

Operation

An attendant places the packages 17 one at a time on the belt reach 16. This reach carries each package well into the space between the belt reaches 26c and 27c. These reaches guide the package as the reach 16 continues to advance it over the means 21 which cuts off the bottom of the package wrapper. As the thus opened package reaches the receiving means 19, one wall of the wrapper becomes suction-held against the belt reach 26c and this action continues until the cans have dropped from the wrapper into said receiving means. The wrapper is thus prevented from falling into the receiving means and causing trouble. Each emptied wrapper is guided to the pinch rolls 51 and 52 which pull it from the machine.

While preferences have been disclosed, attention is invited to the possibility of making variations within the scope of the invention.

I claim:

1. In a machine for opening sealed packages and allowing the contents thereof to discharge by gravity, means for cutting and removing the sealed bottoms of the package wrappers as the packages are advanced along a path, means spaced along said path from said bottom removing means and disposed under said path for receiving the contents discharging from the opened wrappers, conveying means for moving each opened package at a constant height from said bottom removing means over said receiving means, said conveying means including an apertured belt having a reach to contact with one wall of the package wrapper, a stationary suction box having an apertured wall contacting with the outer side of said belt reach, the apertures of said belt being communicable with those of said wall, and means for exhausting air from said suction box to cause said wall of the package wrapper to be suction-held against said belt reach, thereby preventing the opened wrapper from falling into said receiving means.

2. A structure as specified in claim 1: together with vertical pinch rolls positioned to receive each emptied wrapper, collapse said wrapper and eject it from the machine.

3. A structure as specified in claim 1: together with an additional conveyor belt upon which an attendant places the packages, this conveyor belt being provided with a horizontal upper reach which travels toward said bottom removing means and extends under the receiving end of the aforesaid belt reach.

4. In a machine for opening sealed packages and allowing the contents thereof to discharge by gravity, means for cutting and removing the sealed bottoms of the package wrappers as the packages are advanced along a path, means spaced along said path from said bottom removing means and disposed under said path for receiving the contents discharging from the opened wrappers, conveying means for moving the opened packages from said bottom removing means over said receiving means, said conveying means including an apertured belt having a package-engaging reach disposed in a vertical plane to contact with one vertical wall of each opened package, vertical guide means positioned for contact with the opposite vertical wall of each opened package and effective to prevent tilting or canting of each opened package relative to said package-engaging reach of said belt, a stationary suction box having an apertured vertical wall in contact with the outer side of said package-engaging reach of said apertured belt, the apertures of said belt

reach and those of said box wall being communicable, and means for exhausting air from said suction box to cause one vertical wall of each opened package wrapper to be suction-held against said belt reach, thereby preventing the opened wrapper from falling into said receiving means.

5. A structure as specified in claim 4, in which said vertical guide means is formed by a vertical reach of a second belt, this reach being parallel with the aforesaid reach.

6. A structure as specified in claim 4: together with a conveyor belt upon which an attendant places the packages, this conveyor belt being provided with a horizontal upper reach which travels toward said bottom removing means and underlaps the receiving end of the aforesaid conveying means.

7. A machine for opening sealed paper bag packages and allowing the contents thereof to discharge by gravity, said machine comprising a bag support, means at an end of said bag support for cutting and removing the sealed bottoms of the paper bags as the packages are moved off of said bag support, said machine having an open area beyond said means of a width greater than the width of a package to receive the contents discharging from the open bags, and support means for supporting the open bags at a constant height during movement through said machine beyond said first mentioned means, said support means including a stationary suction box having an apertured vertical wall extending alongside said open area, and an apertured conveyor belt having a run in engagement with said apertured vertical wall, the apertures of said belt and the apertures of said vertical wall being communicable, and means for exhausting air from said suction box to cause one vertical wall of each open bag to be suction held against said conveyor belt run and to be conveyed thereby over said open area.

8. The machine of claim 7 wherein said conveyor belt run also extends alongside said first mentioned means and said bag support, and a second conveyor belt having a run opposed to and generally parallel to said first mentioned conveyor run, said second conveyor belt run functioning as a guide to prevent tilting of a package and being spaced from said first mentioned conveyor belt run a distance at least as great as the normal widths of packages handled by said machine.

9. A machine for emptying a package of cans wherein the cans are packaged in a light-weight flexible wrapper having a top, bottom, sides and ends, said machine comprising a generally horizontal package delivery conveyor having a discharge end, a pair of transversely spaced and horizontally extending upright conveyors overlapping the discharged end of said package delivery conveyor for engaging the sides of the wrapper and supporting the wrapper, cutter means aligned with said package delivery conveyor at the discharge end thereof for removing the bottom of the wrapper to permit the cans within the wrapper to fall out by action of gravity, a pair of upright pinch rolls disposed generally along the straight line path of a wrapper conveyed by said upright conveyor remote from said package delivery conveyor for grasping and flattening the wrapper, and fixed guide means disposed intermediate said upright conveyors and said pinch rolls for guiding the wrapper being conveyed by upright conveyors to said pinch rolls.

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