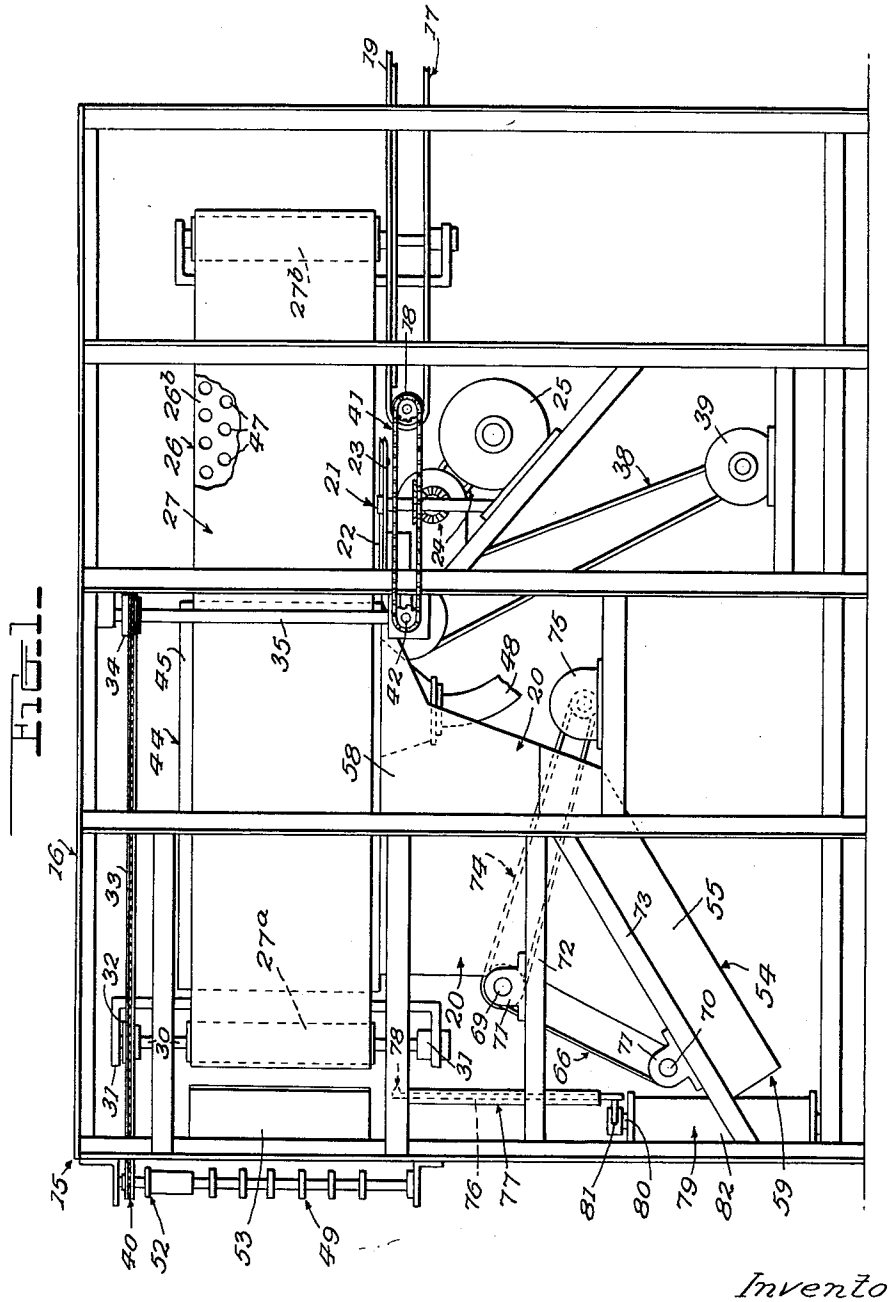
Feb. 27, 1962 J. N. VINCENT ETAL 3,022,913

CAN PACKAGE UNLOADING MACHINE

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Fig. 2

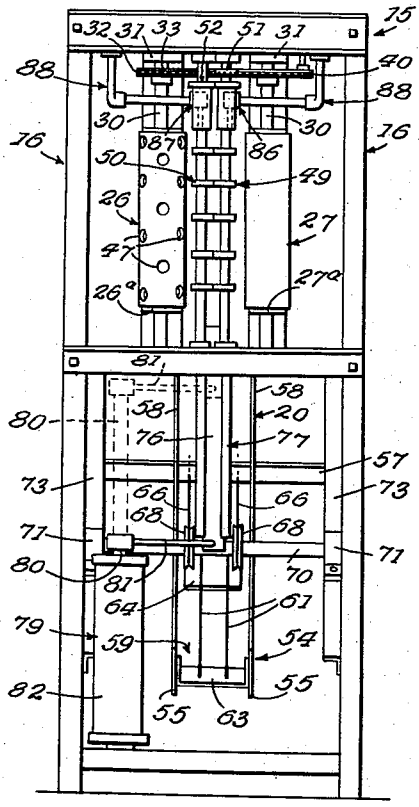
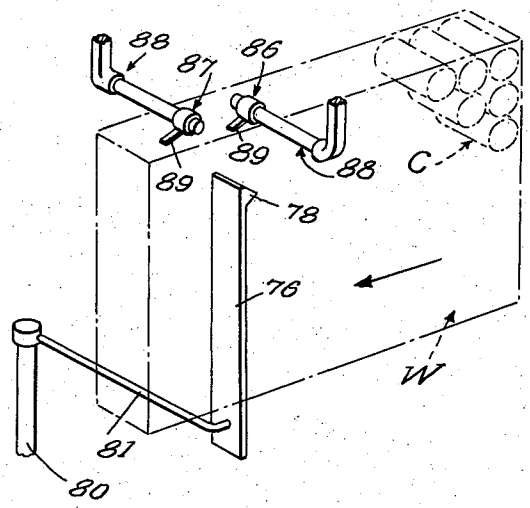


Fig. 11



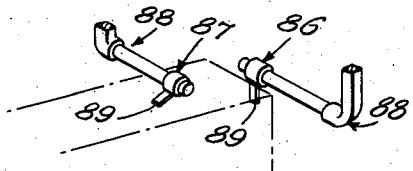
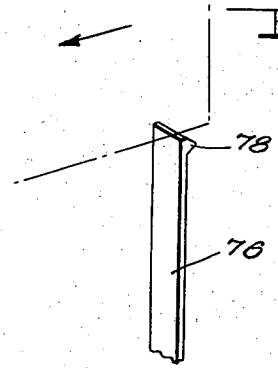


Fig. 12



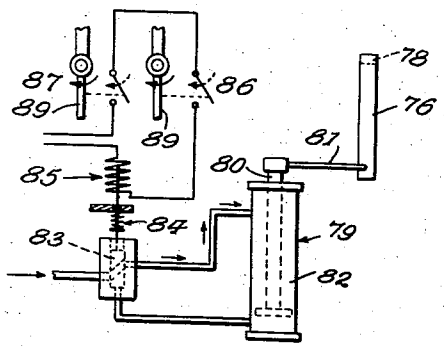


Fig. 13

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FIG. 8

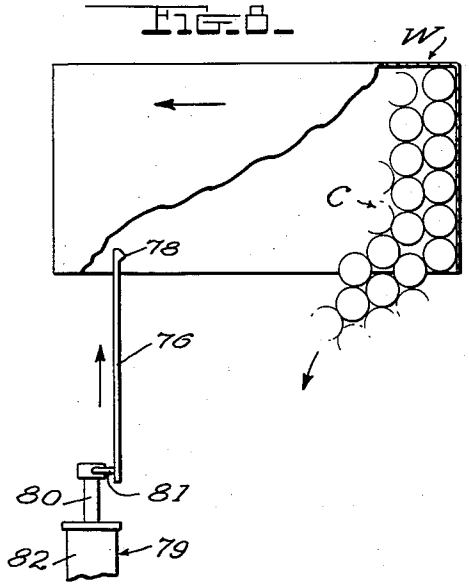


FIG. 9

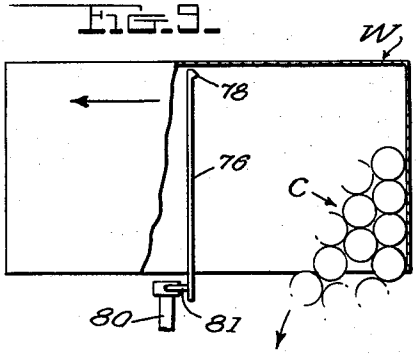
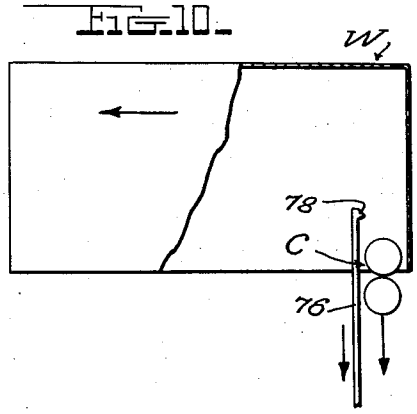


FIG. 10



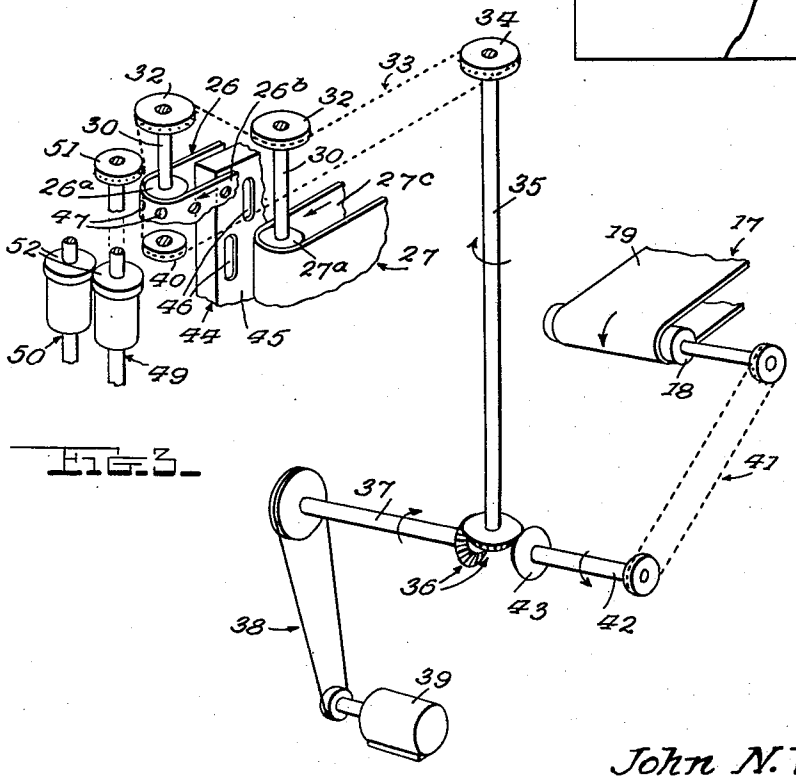


FIG. 7

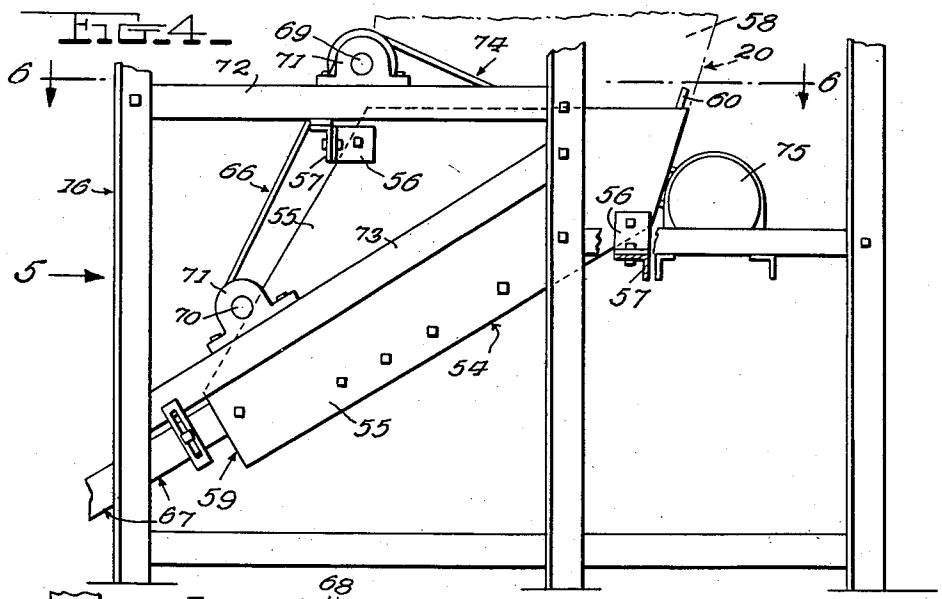
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FIG. 4



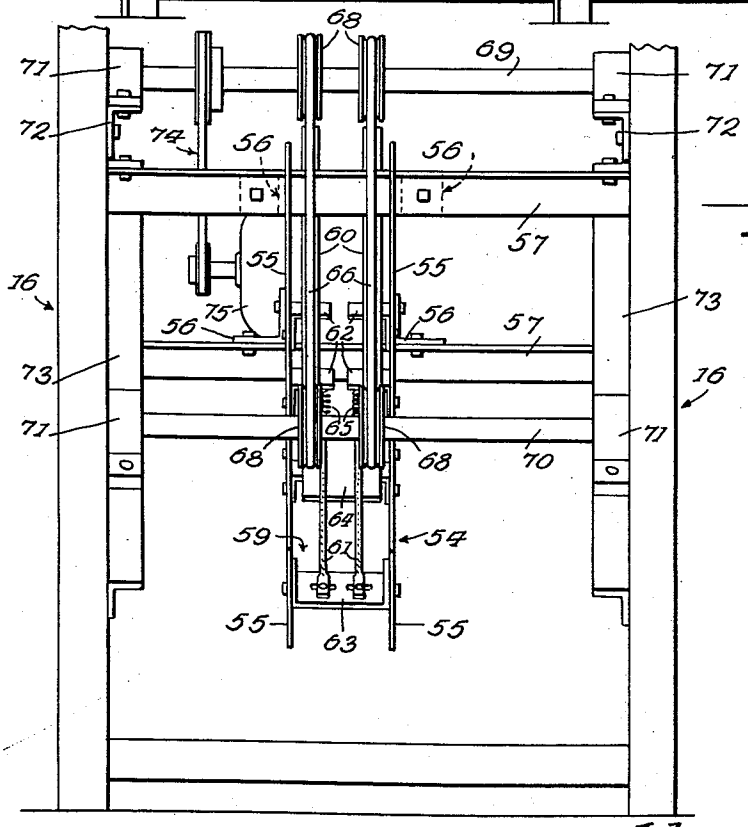


FIG. 5

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FIG. 6

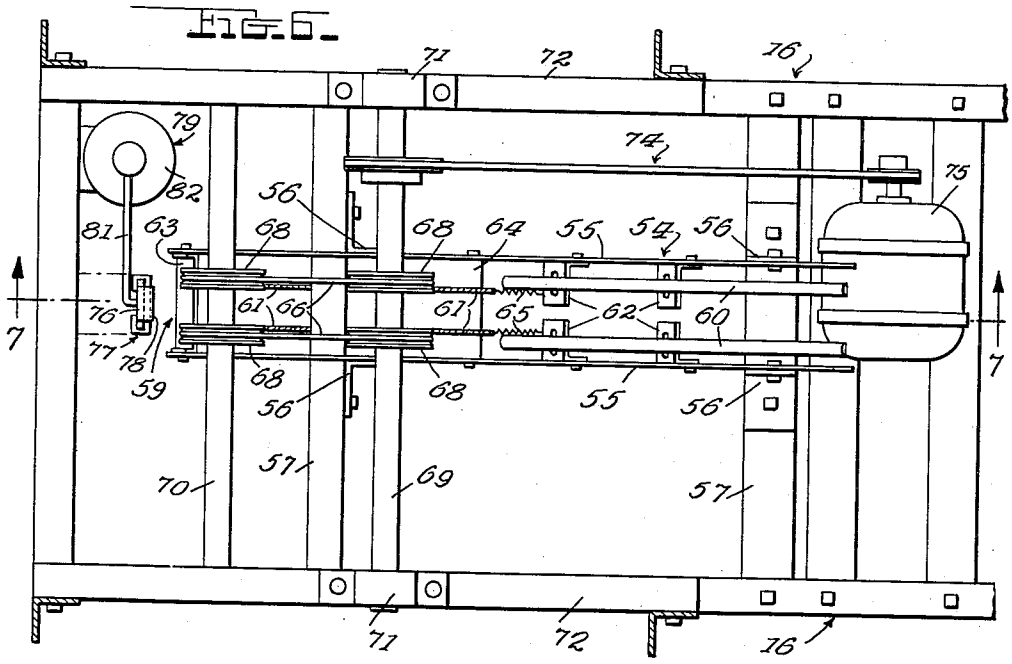
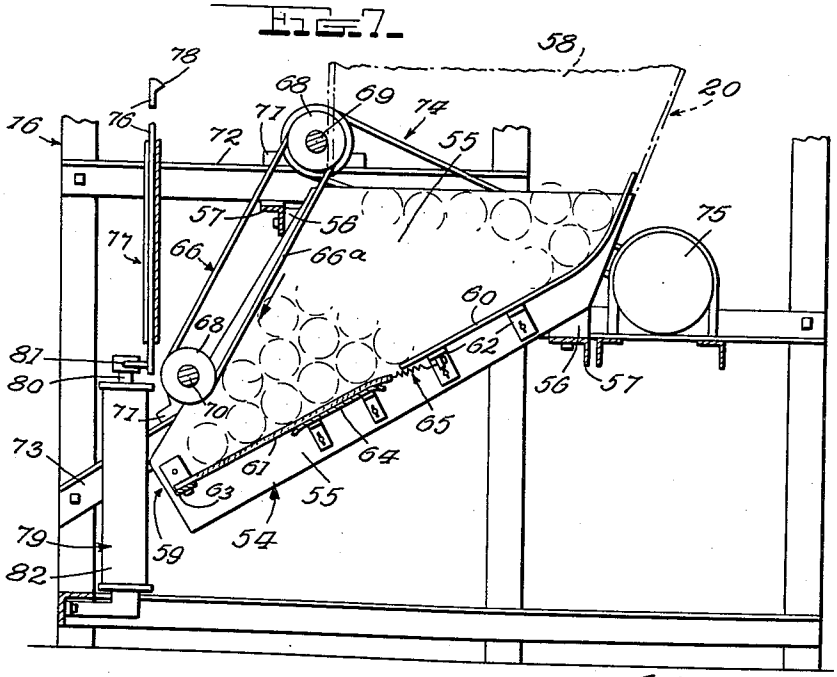


FIG. 7



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CAN PACKAGE UNLOADING MACHINE

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Filed Dec. 10, 1958, Ser. No. 779,481
11 Claims. (Cl. 214—310)

In the can handling art, for emptying packages of cans, in which the cans are disposed row-beside-row in a single layer, in paper bags or other wrappers, it has been proposed to (1) advance the packages over a means which removes the bottoms of the wrappers; (2) then advance the thus opened packages over a can receiving hopper or "blender" into which the cans fall by gravity and from which the cans discharge to a roll-away conveyor or the like usually extending to a can closing machine; and (3) then further advance the emptied wrappers for discharge from the machine. The present invention has aimed to improve upon such machine.

One object of the invention has been to provide an improved machine having novel means for extracting any cans which may lodge in the wrappers as the cans are being emptied from said wrappers.

A further object has been to provide means for collapsing the emptied wrappers and ejecting them from the machine to be disposed of as waste.

Another object has been to provide a novel machine in which no cans in otherwise emptied wrappers, can reach the empty wrapper ejecting means and become damaged or ruined thereby.

Yet another object has been to make novel provision whereby the can wrappers actuate control means, for upwardly moving the can extracting means into each wrapper being emptied, when the leading wall of the wrapper passes the path of said extracting means, and for moving said extracting means again downwardly before the trailing wall of the wrapper can strike it.

A further object has been to provide a novel means to rapidly and smoothly conduct the cans from the receiving hopper to the roll-away conveyor or the like.

A still further object has been to provide a chute having a declined trackway down which the cans roll to the roll-away conveyor or the like, the lower end portion of said trackway being formed by flexible spring-tightened cables which may downwardly yield under abnormal pressure from the cans and thus avoid choking of the chute outlet.

Yet another object has been to provide substantially vertical belt means spaced upwardly from the aforesaid cables to confine and guide the cans and aid in smoothly moving them to the chute outlet.

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 of a can package opening and unloading machine improved in accordance with the present invention.

FIGURE 2 s a rear end view of the machine.

FIGURE 3 is a diagrammatic perspective view showing a number of the elements of the machine and the driving means therefor.

FIGURE 4 is a side elevation of the chute and associated elements for delivering the cans to the roll-away conveyor or the like.

FIGURE 5 is an end elevation of FIGURE 4, as indicated by the arrow 5.

FIGURE 6 is a horizontal section on line 6—6 of FIGURE 4.

FIGURE 7 is a longitudinal section on line 7—7 of FIGURE 6.

FIGURES 8, 9 and 10 are diagrams showing the operation of the can extracting means.

FIGURES 11 and 12 are diagrams showing the extracting means and the wrapper controlled switches for effecting operation thereof.

FIGURE 13 is a diagram showing the operation means for the extractor and the switch controlled circuit for causing actuation thereof.

The invention is illustrated as embodied in a machine of the construction shown in the U.S. patent application Serial Number 779,482 of John N. Vincent, filed December 10, 1958. The machine is generally illustrated in FIGURES 1 to 3. It includes a frame structure **15** having parallel vertical side frames **16**. Mounted in one end portion of the frame **15** there is a longitudinal conveyor belt **17** trained around rollers one of which is shown at **18**. This belt has a horizontal upper reach **19** upon which an attendant successively places the packages to be opened.

In the other end portion of the frame **15**, there is a hopper **20** for receiving the cans discharging from the opened wrappers. It is with this hopper that some elements of the present invention are associated.

Between the belt **17** and the hopper **20**, a means **21** is mounted in the frame **15** for removing the bottom of each package advanced over said means by the belt reach **19**. The means **21** includes a fixed 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 **19**, guide said packages over the bottom removing means **21**, and then move the opened packages over the hopper **20**, allowing the cans to fall by gravity into said hopper.

The belt **26** is trained around rollers, one of which is shown at **26***a* in FIGURE 3, providing this belt with a package-engaging reach **26***b* disposed in a vertical plane. Similarly, the belt **27** is trained around rollers **27***a* and **27***b*, providing this belt with a vertical reach **27***c*. The two reaches **26***b* and **27***c* are in spaced parallel relation for contact with opposite sides of each package.

The rollers have shafts and those of the rollers **26***a* and **27***a* are shown at **30**, mounted in bearings **31**. The upper ends of the shafts **30** have sprockets **32** driven by a chain **33** from a sprocket **34** on a vertical shaft **35**. A bevel gear couple **36** connects the shaft **35** with a shaft **37** which is belt-connected at **38** with a motor **39**. The chain **33** passes around an idler **40**.

The roller **18** for the belt **17** is chain-connected at **41** with a transverse shaft **42** having a gear **43** which is driven by one of the gears of the couple **36**. The motor **25** thus drives the three belts **17**, **26** and **27**.

A suction box **44** is stationarily mounted in the frame **15** over and to one side of the hopper **20**: and said suction box includes a vertical wall **45** contacting with the outer side of the belt reach **26***b*. This wall **45** is apertured at **46** (FIGURE 3), the belt **26** is apertured at **47**, and the two sets of apertures are communicable.

The suction box **44** is connected with a suction conduit **48** (FIGURE 1) extending to a fan which exhausts air from said suction box, thereby causing one vertical wall of each opened package to be suction-held against the belt reach **26***b*. This supports each opened wrapper against falling into the hopper **20** during discharge of cans from said wrapper. The belt reach **27***c* acts to prevent canting or tilting of the wrapper but does not force the wrapper

wall which it engages toward the reach 26*b*, as such forcing would grip the cans and interfere with gravity discharge thereof from the wrapper.

According to the present invention, vertical pinch rolls 49 and 50 are mounted on the frame 15 to receive and collapse the emptied package wrappers and eject them from the machine. The roll 49 has a sprocket 51 driven by one reach of the chain 33 and said roll 49 drives the roll 50 by means of friction wheels 52. Converging wings, one of which is shown at 53 in FIGURE 1, guide the emptied wrappers to the rolls 49 and 50.

Novel provision is made for extracting any cans which may become lodged in the wrappers instead of dropping by gravity into the hopper 20. Also, an improved discharge chute is provided for the hopper 20, and novel provision is made to prevent choking at the chute outlet.

The delivery chute from the hopper 20 is generally designated 54. Its location is shown in FIGURES 1 and 2 and its structure is illustrated in FIGURES 4 to 7. Two parallel vertical plates 55 form side walls for the chute 54 and are secured by brackets 56 to transverse bars 57 which are secured to the side frames 16. The inner sides of the plates 55 are flush with the inner sides of the hopper side walls 58.

The bottom of the chute 54 is formed by a trackway which declines to the delivery outlet 59 of said chute. The upper end portion of this trackway is formed by parallel rails 60 and the lower end portion of said trackway is formed by parallel flexible cables 61. Brackets 62 mount the rails 60 on the side plates 55.

The lower ends of the cables 61 are anchored to a cross bar 63 secured to the side plates 55. The upper end portions of the cables 61 pass over a supporting plate 64 and are connected with spring devices 65. These spring devices 65 keep the cables 61 taut yet permit downward yielding of said cables under any abnormal pressure from cans which might otherwise choke the chute outlet 59. For illustrative purposes, the spring devices 65 are shown in the form of coiled tension springs secured at one end to the cables 61 and anchored at their other ends to two of the rail brackets 62.

Inclined but substantially vertical belts 66 are provided to confine and guide the cans and to aid in causing orderly rolling thereof through the outlet 59 to the customary roll-away conveyor or the like. A portion of such a conveyor is shown at 67 in FIGURE 4. The belts 66 are trained around pulleys 68 on upper and lower transverse shafts 69 and 70 which are so located that the downwardly travelling inner reaches 66*a* of said belts downwardly converge with the trackway 60, 61. The shafts 69 and 70 are mounted in suitable bearings 71 on elements 72 and 73 of the side frames 16, and the shaft 69 is belt-connected at 74 to an electric motor 75.

To dislodge any cans which may have become canted and thus caught in any package wrapper being emptied, an extractor 76 is mounted in fixed guide means 77 over the outlet 59 of the chute 54, as seen in FIGURES 1, 2, 6 and 7. Operational positions of this extractor are illustrated in FIGURES 8 to 12. When the leading wall of a wrapper W being emptied slightly passes the then lowered extractor 76, this extractor is moved up into the wrapper as seen in FIGURE 9, for example. The extractor 76 remains in this position until the trailing wall of the wrapper W almost reaches said extractor as seen in FIGURE 10, at which time said extractor is again lowered. These movements assure that none of the cans C shall remain in the wrappers W and interfere with pulling of the latter from the machine by the pinch rolls 49 and 50. Also, loosening movements imparted to any cans which come into contact with the extractor 76, causes similar movements of following contacting cans and facilitates their discharge from the wrapper. If, toward the end of any wrapper emptying operation, one or more cans should be more or less in contact with the extractor 76, they will be pulled out of the wrapper during descent of the extractor. For this purpose, the upper end of the extractor has a suitable can engaging lug 78.

A cylinder and piston assembly 79 is provided for operating the extractor 76. The piston rod 80 of this assembly is provided with a lateral arm 81 secured to the lower end of the extractor.

Admission of fluid to and exhaust of fluid from the ends of the cylinder 82 of assembly 79 is controlled automatically to effect the required ascent and descent of the extractor 76. In FIGURE 13, a valve 83 has been diagrammatically shown normally biased by a spring 84 to a lowered position, in which it admits fluid to the upper end of the cylinder 82. A solenoid coil 85 is shown to lift the valve 83 to a position in which it will admit fluid to the lower end of the cylinder 82. The valve also includes any suitable provision for opening the lower end of the cylinder to exhaust when fluid is admitted to the upper end of said cylinder and vice versa, as common with numerous known valves applicable to the purpose.

For completing and breaking the circuit of the coil 85 as required, said circuit is provided with two switches 86 and 87 which are diagrammatically illustrated in FIGURES 2, 11, 12 and 13. Supporting brackets 88 have been shown for these switches.

Each switch 86 and 87 has an actuating arm 89 which is spring or gravity biased to a pendent switch open position as shown in FIGURE 13. Both of these arms 89 are in the path of the upper end of the package wrappers W and when either arm is swung to the left by the wrapper, it closes its respective switch. When both switches 86 and 87 have been thus closed, the circuit of the coil 85 is complete and this coil then functions to lift the valve 83 and cause raising of the extractor 76 into the travelling wrapper being emptied of cans as seen in FIGURE 11. As soon as the arm 89 of switch 86 is released by the wrapper, as shown in FIGURE 12, it drops and opens said switch 86, thus breaking the circuit of the coil 85 and allowing the valve 83 to descend and effect lowering of the extractor 76 to normal position. When the arm 89 of switch 87 is released by the wrapper, it drops and opens said switch 87. Both switches are then in open position in readiness for closing by the next wrapper.

Operation

As the packages of cans are advanced by the belt reach 19, the bottoms of the package wrappers are successively removed by the means 21. The belts 26 and 27 then cause presentation of the opened packages over the hopper 20 into which the cans drop by gravity and from which they are delivered to the roll-away conveyor or the like 67. Proper passage of cans through the delivery chute 54 is facilitated by the belts 66 and choking of cans at the outlet 59 is prevented by the downward yieldability of the cables 61. Any cans which may become lodged in their wrappers will be loosened by the extractor 76 and caused to descend, and the fully emptied wrappers are then pulled from the machine and collapsed by the pinch rolls 49 and 50.

From the foregoing, it will be seen that novel and advantageous construction has been disclosed for attaining the desired ends. However, attention is invited to the possibility of making variations within the scope of the invention as claimed.

We claim:

1. In a machine in which packages of cans are uninterruptedly advanced over a package bottom removing means and then over a can receiver into which the cans drop by gravity and wherein each package includes a flexible wrapper; empty wrapper ejecting means to which the emptied package wrappers are advanced, can extracting means mounted to move upwardly into and downwardly from each moving emptied wrapper as it approaches said wrapper ejecting means, thereby removing

any can which may have lodged in the flexible wrapper, and means for raising and lowering said can extracting means during the movement of the wrapper.

2. A structure as specified in claim 1, in which said raising and lowering means includes control means in the path of and actuated by the empty wrappers.

3. In a machine in which packages of cans are uninterruptedly advanced over a package bottom removing means and then over a receiver into which the cans drop by gravity and wherein each package includes a flexible wrapper; a normally lowered can extractor mounted for upward movement into each package wrapper being emptied to assure the removal of all cans from the flexible wrapper, and means for raising said extractor into the advancing package wrapper when the leading wall of the wrapper has passed the path of said extractor and for again lowering said extractor before the trailing wall of the advancing wrapper reaches the raised extractor.

4. A structure as specified in claim 3, in which said extractor is a vertically elongated bar having a can engaging lug at its upper end.

5. A structure as specified in claim 3, in which said raising and lowering means for said extractor comprises a vertical cylinder and piston assembly having a piston rod connected to said extractor, valve means for admitting fluid to and exhausting it from the cylinder of said assembly, and actuating means for said valve including switch means, said switch means having actuating means in the path of the advancing opened wrappers.

6. In a can delivery means, a declined can chute to receive cans from a hopper, said chute having parallel vertical walls to oppose the can ends, a declined trackway down which the cans roll between said side walls, said trackway including flexible can supporting cables at the lower end portion of said trackway, means anchoring one end of said cables, spring means yieldably anchoring the other ends of said cables, and substantially vertical can confining and guiding means spaced upwardly from the lower ends of said cables to provide a can outlet for the chute, said spring means being effective to normally keep said cables tight and to permit downward yielding thereof under abnormal pressure from the cans.

7. A structure as specified in claim 6, in which said substantially vertical can confining and guiding means comprises a driven belt having a downwardly travelling can engaging reach, said trackway and said can engaging

reach being in converging relation and terminating at said can outlet.

8. A structure as defined in claim 5 wherein the valve means comprises a slide valve which is one position directs fluid into one end of the cylinder and in another position directs fluid into the opposite end of the cylinder, and wherein said actuating means includes a solenoid operable to shift the valve slide to one said position and controlled by said switch means.

9. A structure as defined in claim 5 wherein the valve means comprises a slide valve which in one position directs fluid into one end of the cylinder and in another position directs fluid into the opposite end of the cylinder, and wherein said actuating means includes a solenoid operable to shift the valve slide to one said position and controlled by said switch means, and said switch means comprises a pair of control switch units placed to be sequentially actuated by an advancing wrapper and connected in series with said solenoid.

10. In a machine in which packages of cans are emptied by moving a bottomless flexible wrapper filled with cans over an open area, can extracting means for engagement with cans while the cans and wrapper are moving to assure the emptying of the flexible wrapper, said can extracting means including a vertically disposed flat blade like extractor, and mounting means mounting said extractor for movement upwardly into a moving wrapper after the wrapper has reached a can discharging position and movement downwardly out of a moving wrapper as a trailing portion of the moving wrapper approaches said extractor.

11. A structure as specified in claim 10 wherein said extractor has a downwardly facing can engaging lug at its upper end.

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