July 18, 1944. J. D. LE FRANK 2,353,736

CAN UNLOADING MACHINE

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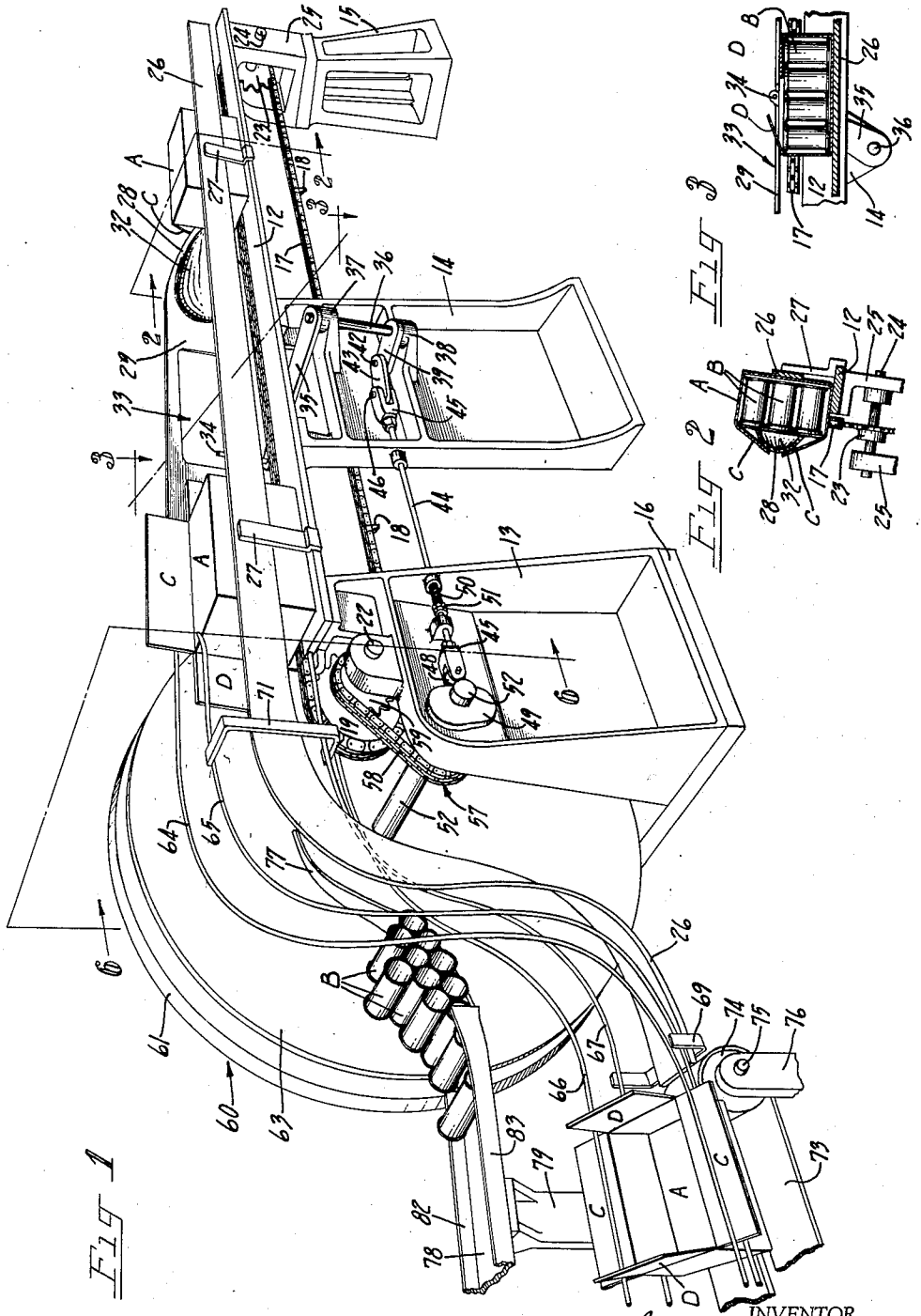


Fig 1

Fig 3

Fig 2

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Fig 5

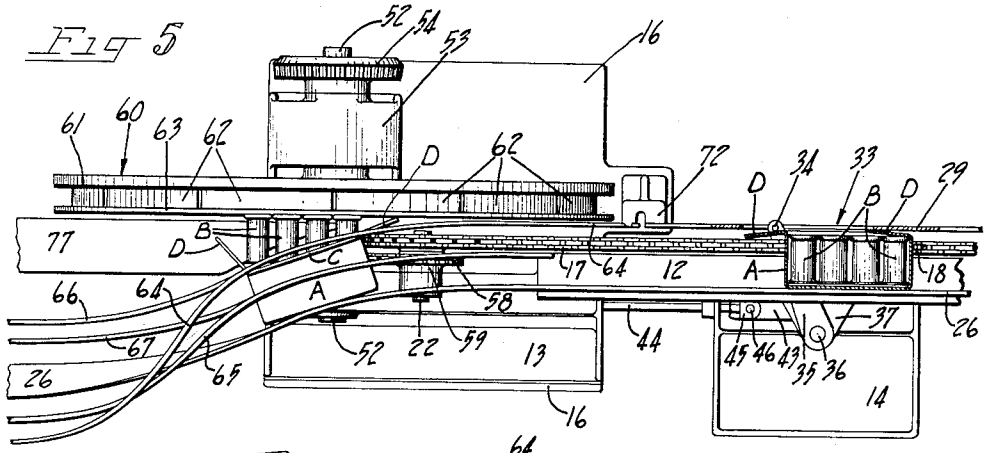


Fig 4

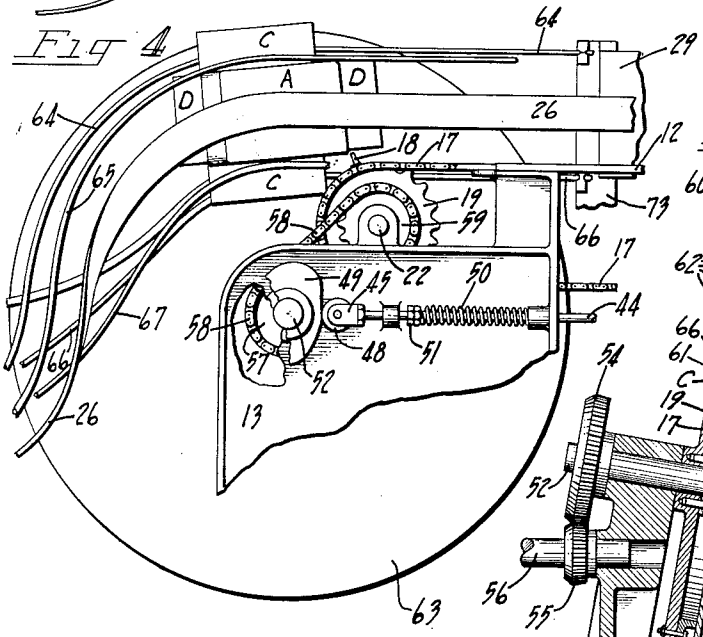


Fig 6

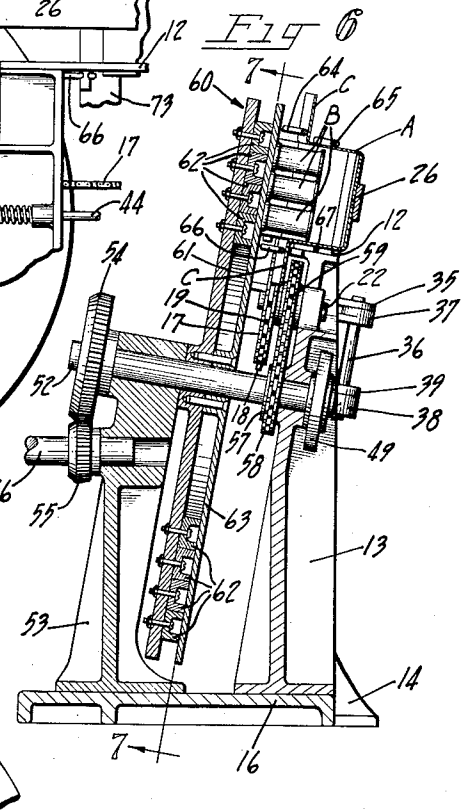
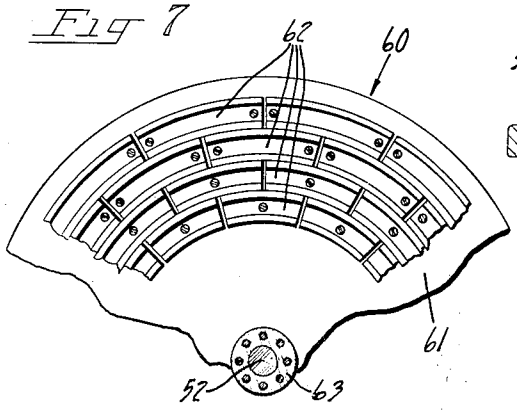


Fig 7



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CAN UNLOADING MACHINE

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7 Claims. (Cl. 214—1.1)

This invention relates to a machine for unloading cans from filled fibre boxes or cartons and has particular reference to unfolding or opening the usual overlapping closure flaps of closed cartons containing metallic cans or containers and to the removing of the cans from such cartons.

It is the practice of container manufacturers to deliver cans to their customers in a sanitary condition and therefore various types of shipping receptacles are used, including the usual fibre cartons having one wall closed by overlapping outer and inner flaps. Many liquids and beverages that are canned are packed and shipped in handy size family cartons of this character. It is desirable and economical therefore to use the same carton for delivering empty cans to the canner for filling and for delivering the filled cans to the consumer, the cans being removed from the carton for filling and sealing and then being repacked into the original carton for distribution to the consumer.

The instant invention contemplates facilitating such a double use for cartons by providing a mechanical emptying machine which is particularly adaptable for use in packing plants and canneries for opening such cartons and for removing empty cans therefrom preparatory to filling the cans.

An object, therefore, of the invention is the provision of a machine for removing empty cans from closed and filled cartons wherein the flaps constituting a closure wall of each carton are unfolded as the carton moves along a predetermined path of travel in that the cans may be emptied from the carton and advanced to a subsequent operation machine, such as a filling and sealing machine, while the empty cartons are advanced to a position adjacent the subsequent operation machine for the repacking with the filled and sealed cans.

Another object of the invention is the provision of such an unloading machine wherein the cans are held magnetically while the carton is stripped off the cans by movement along a divergent path of travel so that the carton will be fully emptied of cans.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

Referring to the drawings:

Figure 1 is a perspective view of a can unloading machine embodying the present invention;

Fig. 2 is a sectional view taken substantially along a plane indicated by the lines 2—2 in Fig. 1, the view showing a box of containers in an advanced position in the machine and showing how the side or longitudinal flaps of the box are opened, with parts broken away;

Fig. 3 is a top plan sectional view taken substantially along a plane indicated by the lines 3—3 in Fig. 1, the view showing a carton of empty containers in section and in a position incident to opening its end or transverse flaps, with parts broken away;

Fig. 4 is a side elevation of a portion of the machine at the left in Fig. 1, with parts broken away;

Fig. 5 is a top plan view of the portion of the machine shown in Fig. 4 with additional parts and with parts broken away;

Fig. 6 is a sectional view taken substantially along a vertical plane indicated by the lines 6—6 in Fig. 1; and

Fig. 7 is a fragmentary sectional view taken along the line 7—7 in Fig. 6 and showing magnetic elements mounted on a rotary disc member.

In the present invention, unsealed closed cartons A, filled with empty sheet metal cans B having one end open are moved along a predetermined path of travel on a conveyor. Such cartons preferably are resting on edge with their overlapping closure flaps in a vertical plane extending parallel with the conveyor. The cans in the cartons rest on their sides in a horizontal position with the bottoms of the cans adjacent the carton flaps. In this position the cartons move against a pointed opening blade disposed adjacent the conveyor. The pointed blade engages under the longitudinal or outer flaps of the carton and forces them outwardly with a hinging action to partially open the carton and to expose the inner or transverse flaps. Following this hinging action the inner flaps are swung back by an actuated finger to complete the full opening of the carton and to expose the bottom ends of the empty cans.

Each carton of exposed cans is moved further by the conveyor into a position adjacent the face of a rotating magnetic disc. Such a disc has a plurality of magnets mounted thereon which attract the cans and which hold them while the carton is stripped off or pulled away. The stripped off carton is delivered into a twisted runway which turns the carton right side up and which discharges it onto an auxiliary conveyor. The cans thus removed from each carton and

still clinging to the disc, are carried by the rotating disc to a discharge chute. This chute serves as a stripper for removing the cans from the disc and for guiding them to any suitable place of deposit, such as for example, the filling and sealing machine hereinbefore mentioned.

As a preferred embodiment of the invention there is shown in the drawings a carton opening and emptying machine having a table 12 which is supported by a frame 13, a bracket 14 and a pedestal 15. The frame 13 is mounted on a base 16 (Figs. 1, 5 and 6). An endless chain conveyor 17 is disposed and operated adjacent the table 12 for propelling the filled cartons along the table during the opening operation. For this purpose conveyor fingers 18 are provided at spaced intervals along the conveyor.

The chain conveyor 17 is driven by a driving sprocket 19 mounted at one end of the machine on a drive shaft 22. At the opposite end of the machine the conveyor is carried over an idler sprocket 23 mounted on a shaft 24 carried in an upper structure 25 of the pedestal 15.

Cartons moving along the table 12 are guided by a rail 26 which is carried on spaced brackets 27 secured to the table 12. The table and the guide rail are tilted transversely as best illustrated in Figs. 1, 2 and 6 so that the can will remain in place in their carton until ready for removal as will be hereinafter explained.

As a carton A is propelled along the table 12 its longitudinal flaps marked C are opened as hereinbefore mentioned by a pointed carton opening blade 28 formed on the outer end of a guide plate 29 disposed parallel with and in spaced relation to the guide rail 26. An outwardly curved bulged section 32 is formed in the guide plate and it is this bulged section that hinges the flaps C outwardly as hereinbefore mentioned.

The pointed end of the plate merges into a wide section which is slightly greater than the transverse width of the carton and this wide section of the plate further hinges the flaps until they have traveled through an angle of 180° and are standing upright in a vertical plane. The flaps thus entirely opened are held in this position by the wide section of the guide plate 29, as best shown in Fig. 1.

As the carton continues to move forward along the table 12 and between the guide rail 26 and guide plate 29 the inner or transverse flaps marked D are swung open through an angle of 180° so that they will be in the same plane as the flaps C. For this purpose an opening 33 is formed in the guide plate 29 (Figs. 1, 3 and 5) so that as the inner flaps D come into the opening, the natural spring in the material of the carton will partially open them. Full opening of these flaps is effected by an actuated finger 34 carried on an oscillated arm 35 which swings first in one direction and then in the other to engage against the flaps D alternately and to expose the empty cans B.

The arm 35 is mounted on the upper end of a vertical shaft 36 which is carried in bearing lugs 37, 38 of the bracket 14 (Figs. 1 and 6). A lever 39 is mounted on the lower end of the shaft 36 and this lever carries a pin 42 which is connected pivotally to a link 43. The link connects with a reciprocating rod 44 which carries a forked or bifurcated connection 45 at each end. This rod is carried slidably in suitable bosses in the frame 13 and the bracket 14. A pin 46 pivotally joins one of the forked connections 45 with the link 43. The connection at the opposite end of the rod carries a cam roller 48 which operates against an edge cam 49. The roller is held against the cam by a compression spring 50 which surrounds the rod and which is interposed between the rod boss in the frame 13 and a collar 51 mounted on the rod.

The cam 49 is mounted on a cross shaft 52 journaled in suitable bearings in the frame 13 and in a bracket 53 (Figs. 5 and 6) mounted on the base 16. The shaft is rotated continuously by a gear 54 which is mounted on the outer end of the shaft. The gear 54 meshes with and is driven by a pinion 55 mounted on a driving shaft 56 journaled in a bearing formed in the bracket 53. This shaft is the main driving shaft of the entire machine and may be rotated in any suitable manner. The cross shaft 52 also drives the conveyor 17 hereinbefore mentioned. For this purpose the cross shaft carries a sprocket 57, which drives an endless chain 58 that operates over a sprocket 59 mounted on the conveyor drive shaft 22. Thus with the rotation of the cross shaft 52, the conveyor 17 and the flap opening finger 34 are actuated in proper timed relation.

The opened carton, with flaps unfolded (Fig. 1), is moved up to and adjacent the face of a magnetized rotary unit 60. Such a unit includes a metallic disc 61 (Figs. 6 and 7) which is mounted on the shaft 52. A plurality of magnets 62 are secured to the disc 61. These members are preferably of the permanent magnet type and are covered by a smooth non-magnetic outer disc 63.

When a carton of cans is moved into a position as illustrated in Figs. 4, 5 and 6, the empty metallic cans B are attracted to the outer disc 63 by the magnets 62. As the cans and the carton are advanced by the rotating magnetic disc 63 and by the conveyor 17, the carton leaves the conveyor and enters a curved runway which is concentric with the disc 63 and which includes a plurality of spaced and parallel curved guide rods 64, 65, 66, 67 and a curved continuation of the guide rail 26. Guide brackets 69, 71 are secured to the guide rail 26 and support the curved guide rods 65, 67. A bracket 72 (Figs. 5 and 6) is secured to the table 12 and supports the guide rods 64 and 66.

The guide rails 64, 65, 66, 67 start at the terminal end of the guide plate 29 and extend outwardly and downwardly at an angle to the face of the disc 63 so that the carton is moved away from the disc and thereby is stripped from the cans. The empty carton falls downwardly along the runway. The rails are twisted to turn the falling carton gradually from its "on edge" position to a flat horizontal upright position while holding the flaps open. The carton in this position is delivered onto a separate discharge conveyor 73. Thus it is in readiness to receive the cans after they have been filled and sealed as hereinbefore mentioned.

The machine end of the discharge conveyor 73 is supported on a pulley 74 mounted on a shaft 75 journaled in a bracket 76 (Fig. 1). This conveyor may be operated in any suitable manner to transfer the cartons to a repacking destination as hereinbefore mentioned.

The rotating disc 63 carries the cans B clinging thereto, downwardly through a curved path of travel and into engagement with an upwardly curved stripper plate 77 (Fig. 1) which is disposed adjacent the disc. This stripper plate is

or may be an extension or continuation of the bottom of a substantially horizontal can discharge chute 78. The chute is supported on a floor stand 79 which is located adjacent the disc.

As the cans still held onto the disc 63 by the magnets 62 are advanced with the rotary unit 60 they engage against the stripper plate and thereby are stripped from the disc. The stripped or released cans roll into the chute 78 and are thus directed to any suitable place of deposit. Such a chute preferably has side walls 82, 83 which guide the cans. The cans may be fed to can filling and sealing machinery of the conventional type while at the same time, emptied cartons A are being advanced along the conveyor 73 to the discharge end of the filling and sealing machine. The filling and sealed cans may be repacked thereafter into the original cartons for shipment as hereinbefore mentioned.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. A machine for opening cartons having inner and outer flaps and for unloading metallic cans therefrom, comprising in combination a conveyor for advancing cartons of said cans along a predetermined path of travel, spaced opening devices disposed adjacent said path of travel of the cartons for successively engaging and swinging outwardly the inner and outer flaps of the carton to expose the cans contained within, and devices disposed later in the path of travel of the cartons for separating the exposed cans from the opened carton.

2. A machine for opening cartons and for unloading metallic cans therefrom, comprising in combination a conveyor for advancing cartons of said cans along a predetermined path of travel, opening devices disposed adjacent said path of travel for opening a side of the carton to expose the cans contained within, magnetic means operable adjacent the exposed cans in the opened carton for holding the cans in a predetermined position, and means for stripping the carton off the held cans so that the cans will be free of the carton for a subsequent operation.

3. A machine for opening unsealed cartons having overlapping outer and inner closure flaps and for unloading empty cans contained within the cartons, comprising in combination a conveyor for advancing the cartons along a predetermined path of travel, a pointed blade disposed adjacent said conveyor for prying under and for swinging open the outer flaps of the cartons, means for engaging and for swinging open the inner flaps of the cartons to expose the cans within, and devices also disposed adjacent the conveyor in the path of the opened cartons for separating the exposed cans from the opened cartons.

4. A machine for opening unsealed cartons having overlapping outer and inner closure flaps and for unloading empty cans contained within the cartons, comprising in combination, means for prying under and for swinging open the outer flaps of the cartons, means for successively engaging and for swinging open the inner flaps of the cartons to expose the cans therewithin, conveying means for advancing the cartons successively into engagement with said prying means and said engaging means, and devices disposed in the path of travel of the opened cartons advanced by said conveying means for separating the exposed cans from the opened cartons.

5. A machine for opening cartons having overlapping outer and inner closure flaps and for unloading empty metallic cans contained within the cartons, comprising in combination, a conveyor for advancing the cartons along a predetermined path of travel, guides disposed on opposite sides of said conveyor for retaining said cartons in place, a pointed blade extended from one of said guides for prying under the outer flaps of the cartons, said blade having a convex section adapted to swing the outer flaps into open position, an oscillatory finger disposed adjacent said guide in the path of the inner flaps of the moving cartons for alternately engaging and swinging open said inner flaps of the cartons to expose the cans therewithin, a rotary magnetic disc unit operable adjacent the path of travel of the opened cartons for attracting and holding the exposed cans in a predetermined position, and means for removing the cartons from the cans while they are so held to free the cans for a subsequent operation.

6. A machine for opening cartons having overlapping outer and inner closure flaps and for unloading empty metallic cans contained within the cartons, comprising in combination, a conveyor for advancing the cartons along a predetermined path of travel and in an "on-edge" position, a pointed blade disposed in the path of travel of the cartons for prying under the outer flaps of the moving carton, said blade having a bulged section adapted to swing the outer flaps into an open position, a finger also disposed in the path of the advancing cartons and movable in opposite directions into successive engagement with the inner flaps of the cartons for swinging them open to expose the cans within said carton, a rotary magnetic disc unit operable adjacent the path of travel of the opened cartons for attracting and holding the cans in a predetermined position, a curved and twisted runway disposed at an angle to said disc unit for removing the cartons from the cans while they are so held to free the cans for a subsequent operation, and for turning the empty cartons from an "on-edge" position into an upright position, a stripper member disposed adjacent said magnetic disc for releasing the freed cans from the disc, and devices adjacent said disc and adjacent said runway for receiving the separated cans and cartons and for carrying them to different places of deposit.

7. A machine for opening unsealed cartons having overlapping outer and inner closure flaps and for unloading empty cans contained within the cartons, comprising in combination, a conveyor for advancing the cartons along a predetermined path of travel, means disposed adjacent said conveyor for prying under and for swinging open the outer flaps of the cartons, means for engaging and for swinging open the inner flaps of the cartons to expose the cans therewithin, and devices also disposed adjacent the conveyor in the path of the opened cartons for separating the exposed cans from the opened cartons.

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