March 20, 1956 A. P. SCHOLTZ 2,738,630

MACHINE FOR LOADING CANS INTO CARTONS

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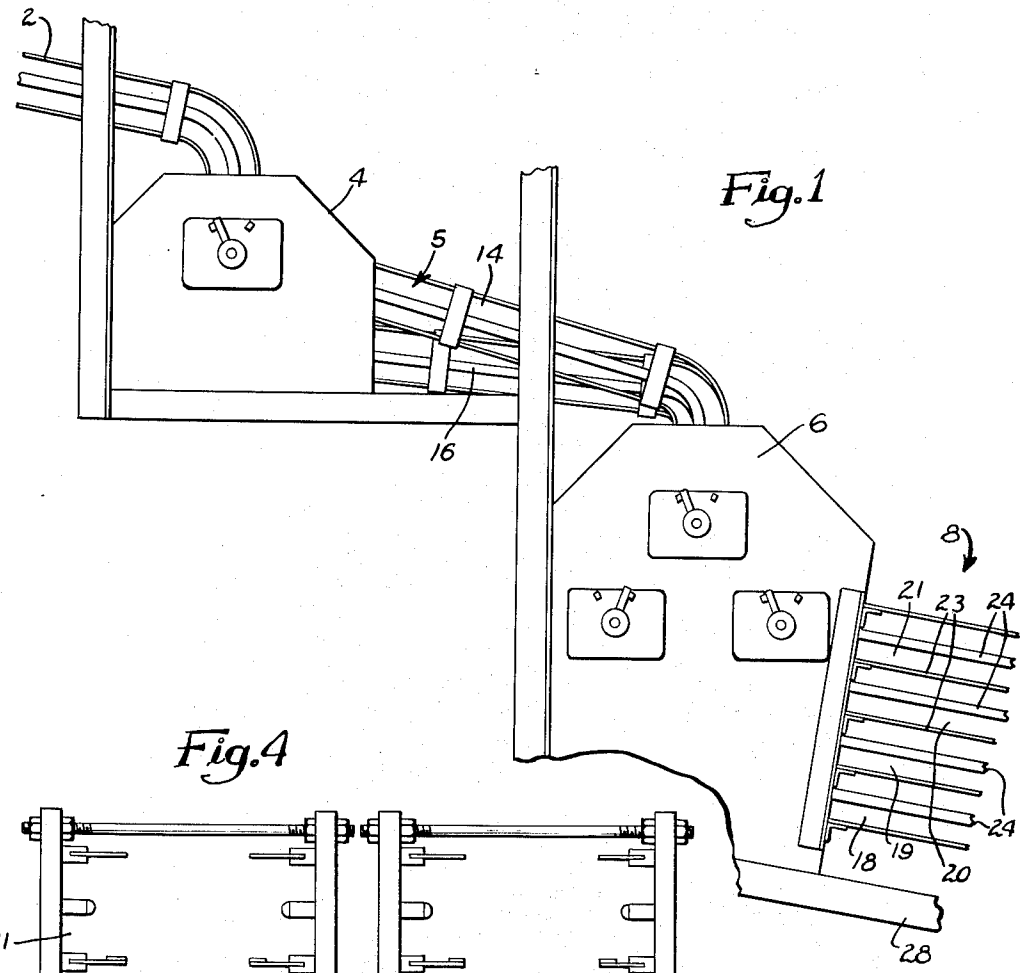
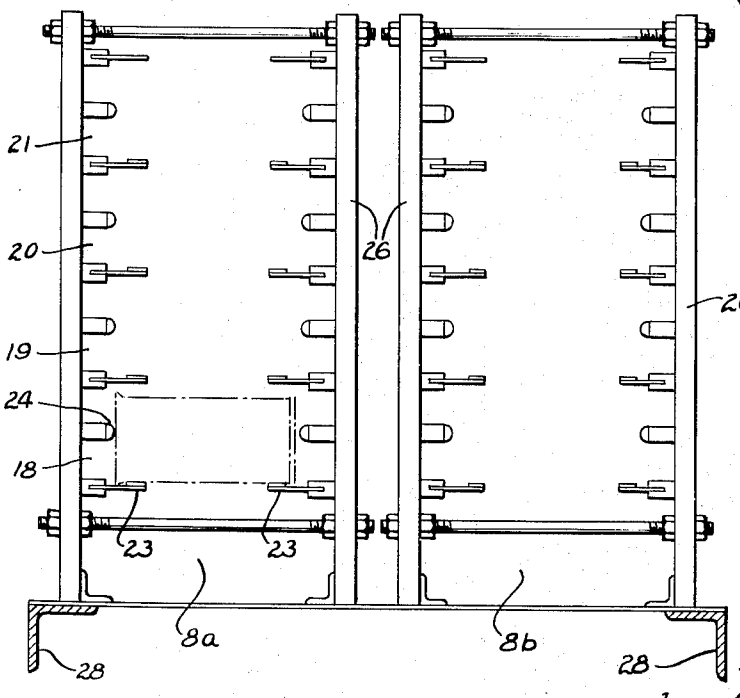


Fig.1

Fig.4



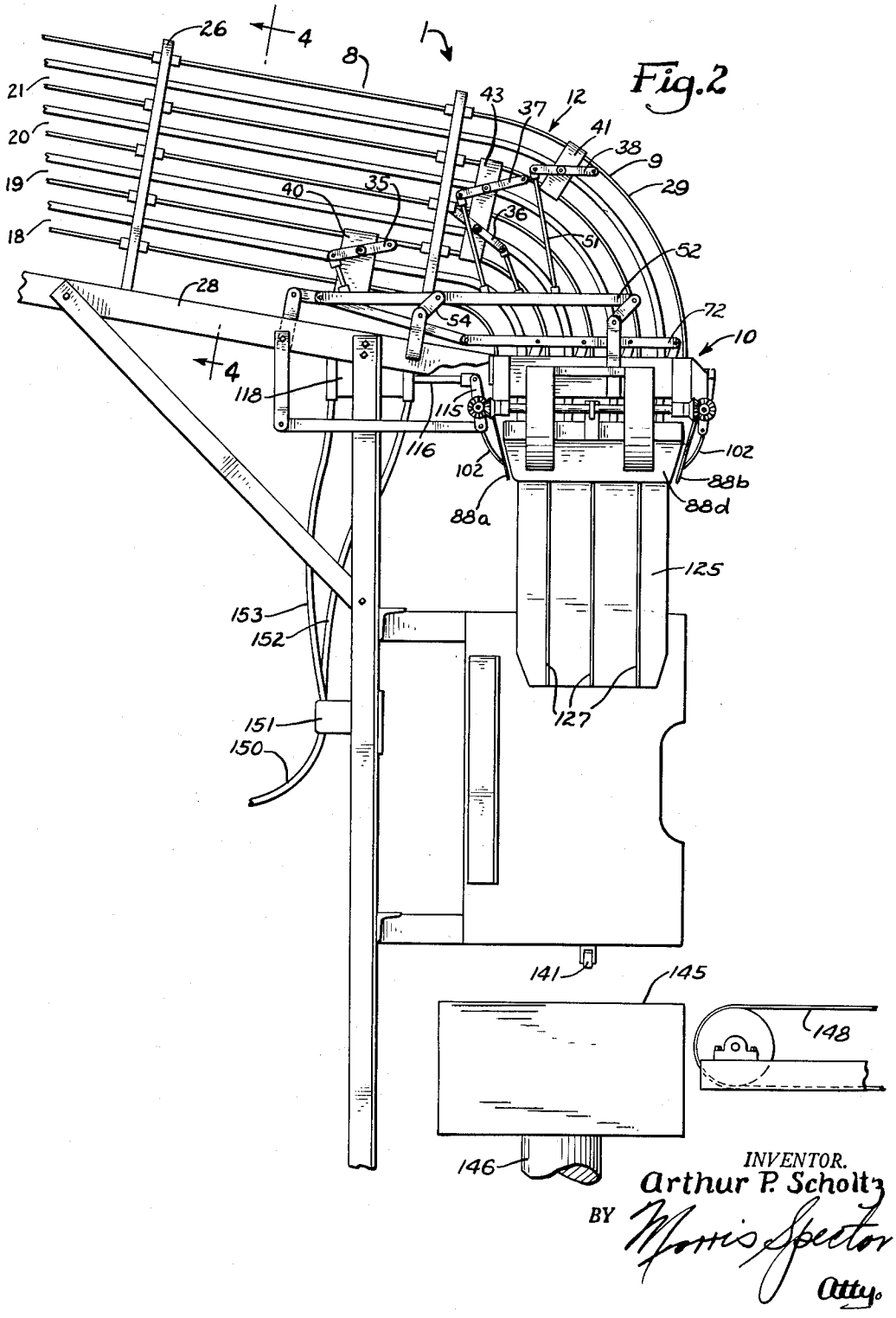
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Fig. 2



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Fig. 3

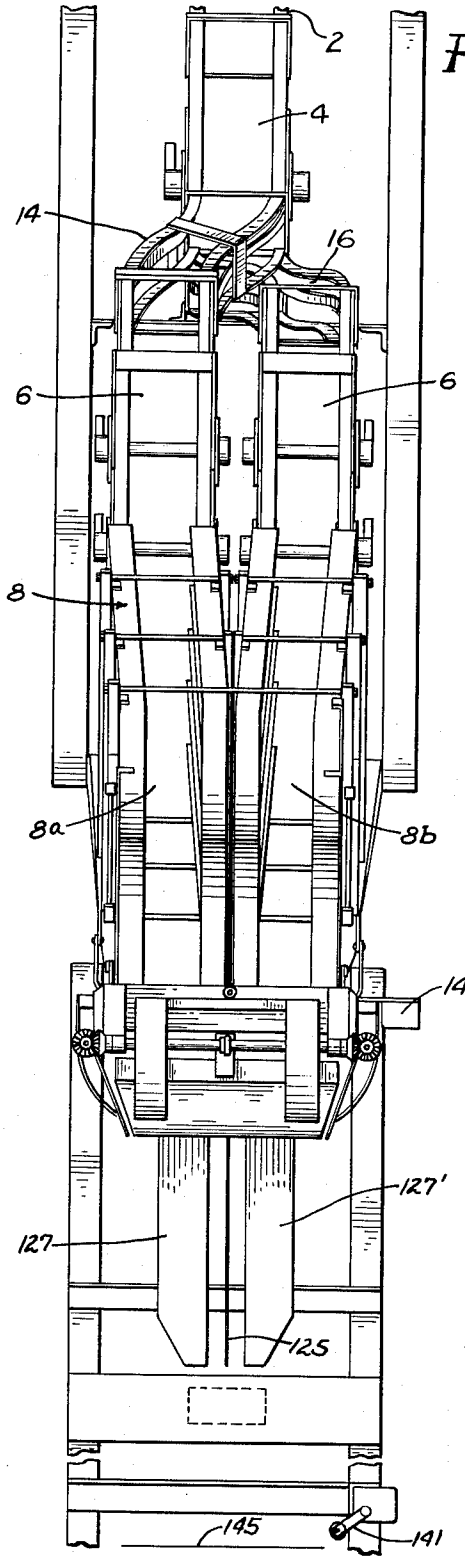


Fig. 5

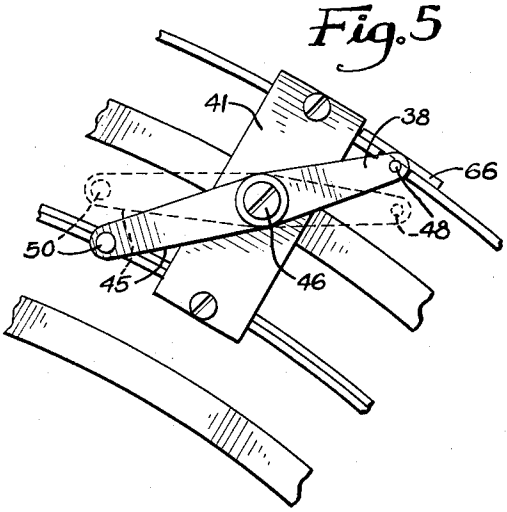
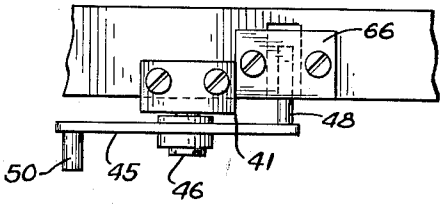


Fig. 6



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MACHINE FOR LOADING CANS INTO CARTONS

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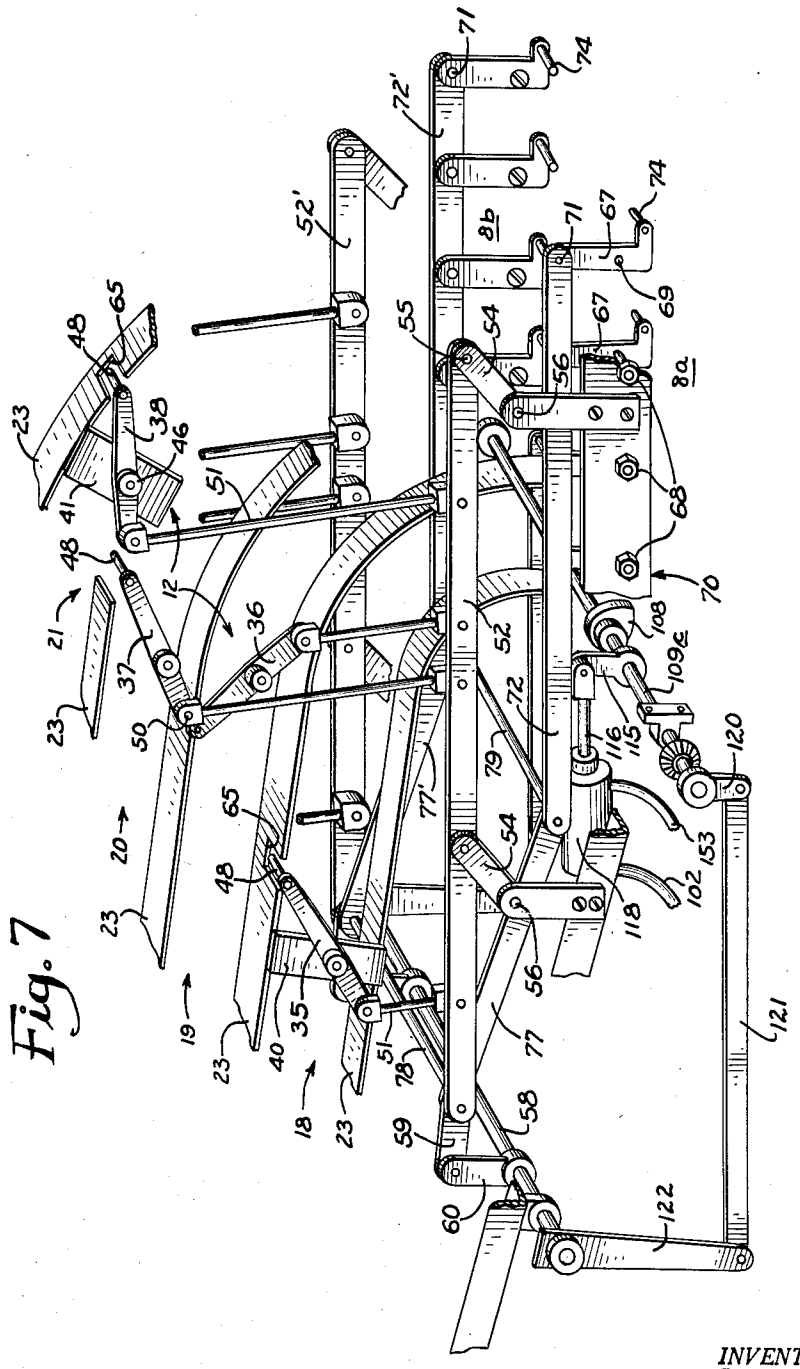


Fig. 7

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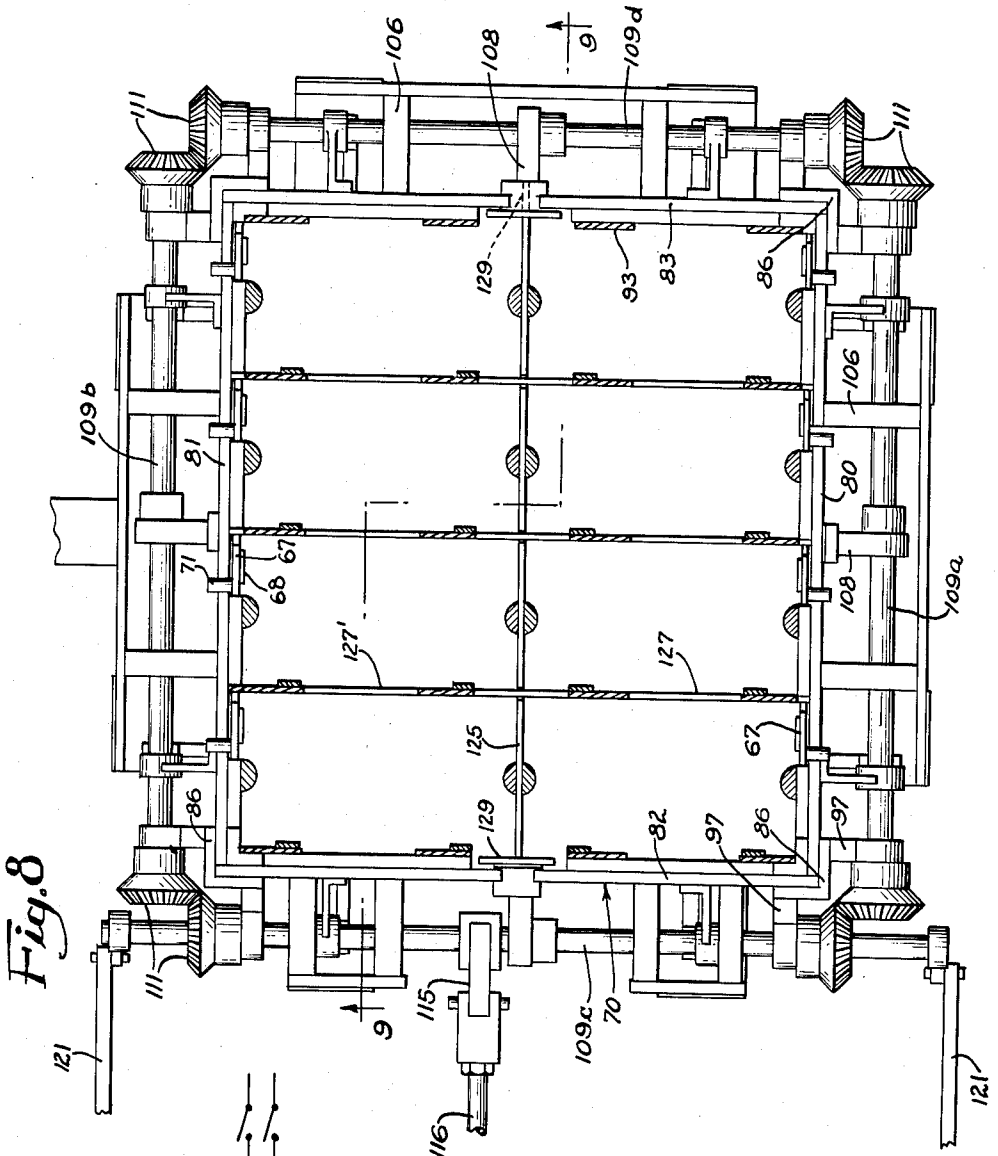


Fig. 8

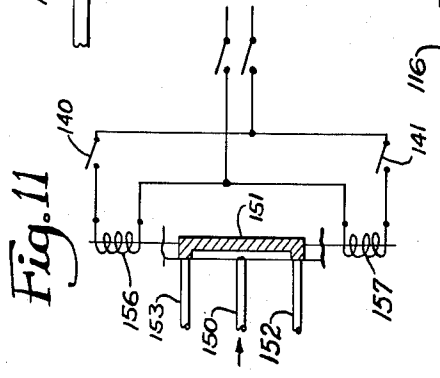


Fig. 11

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MACHINE FOR LOADING CANS INTO CARTONS

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Fig. 9

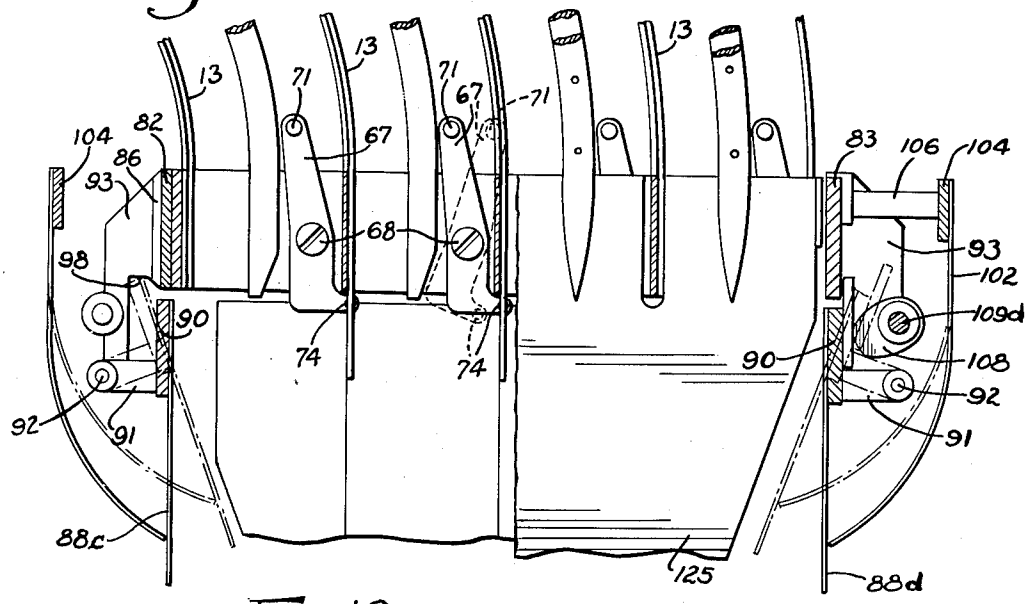
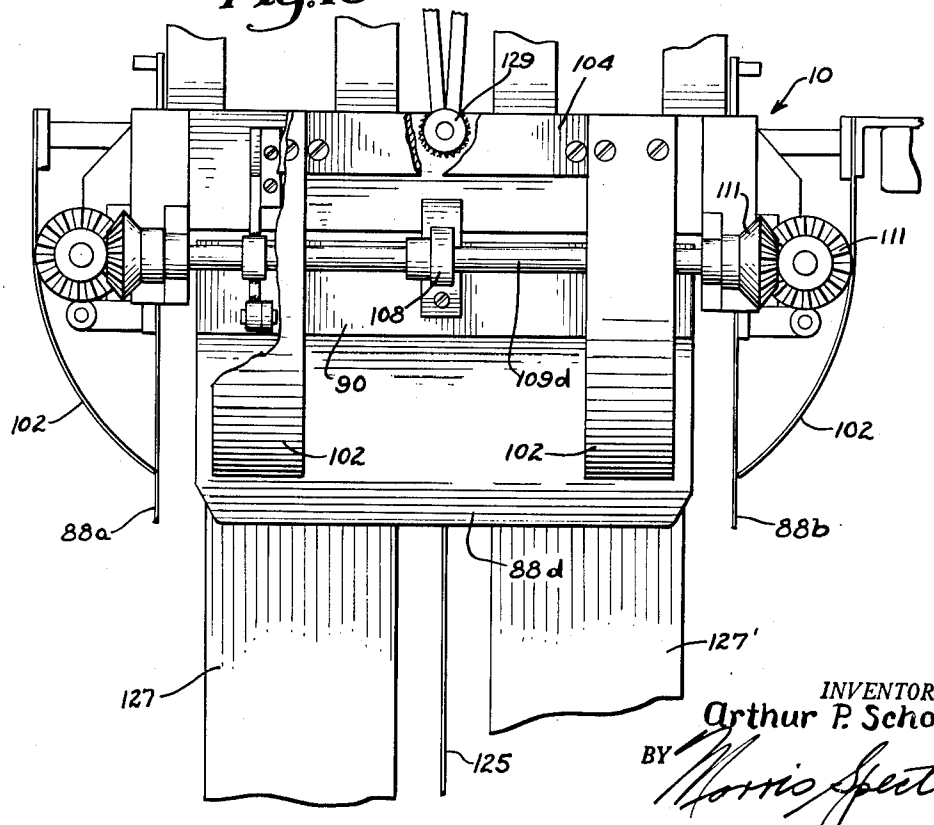


Fig. 10



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United States Patent Office 2,738,630 Patented Mar. 20, 1956

2,738,630

MACHINE FOR LOADING CANS INTO CARTONS

Arthur P. Scholtz, Chicago, Ill., assignor to National Can Corporation, Chicago, Ill., a corporation of Delaware

Application October 16, 1951, Serial No. 251,550

11 Claims. (Cl. 53—59)

This invention relates to machines for loading cans into cartons and is particularly concerned with the loading of cans into cartons of the type that open at the smallest end thereof.

It has been customary to pack cans in cartons each containing forty-eight cans placed in two tiers or layers, each layer consisting of twenty-four cans arranged six cans in one direction and four cans in the other. Obviously in such a carton two opposite sides of the carton each face the ends of twenty-four cans, two other opposite sides of the carton each face the cylindrical sides of twelve cans arranged in two rows of six cans each, and the remaining two opposite sides of the carton face the sides of eight cans arranged in two rows of four cans in each row. The last mentioned sides of the carton are the two smallest sides thereof. In the fabrication of cartons it is customary to have two opposite sides formed by overlapped flaps. Because of the overlap the total amount of paper used for those sides is greater than the areas of those sides. It is therefore economical to construct the carton in such a manner that the overlapped flaps are on the smallest sides of the carton. This means that if such a carton is held with its open end facing upwardly the carton will be of much greater depth than its length or its width. When an attempt is made to load cans into a carton which is comparatively deep care must be taken to prevent skewing of the cans as they travel in the carton to their final positions. It is an object of the present invention to provide a machine for loading cans into a carton of the above mentioned character wherein the cans drop into their position in the carton and the machine is provided with means for maintaining the cans in proper alignment as they drop to their final positions in the carton.

It is a further object of the present invention to provide a carton-loading machine of the above mentioned character with means for facilitating receiving the open end of the empty carton for the loading thereof, even though the flaps at the open end may be inwardly flexed to some extent as the carton is being positioned in the machine. It is a further object of the present invention to provide a carton-loading machine with means for spreading apart the open end of the carton, in the event that it requires such spreading, all preliminary to the depositing of the cans in the carton.

It is a still further object of the present invention to provide a carton-loading machine of the above mentioned character wherein the placing of the carton into its proper can-receiving position actuates the mechanism to discharge the required number of cans into the carton and wherein the removal of the carton from its loading position automatically refills the discharge portion of the machine with the required number of cans for loading into the next carton. It is a further object of the present invention to provide a can-loading machine wherein there is provided two side by side groups of can chutes, four chutes to each group, and wherein there is

provided an escapement mechanism for discharging six cans at a time from each of the eight chutes at once. It is a still further object of the present invention to provide an escapement mechanism for automatically reloading each of the eight chutes with the required number of cans, in this instance six cans to each chute.

The attainment of the above and further objects of the present invention will be apparent from the following specification taken in conjunction with the accompanying drawings forming a part thereof.

In the drawings:

Figures 1 and 2 are front elevations of the left hand end and right hand end, respectively, of a machine embodying the present invention;

Figure 3 is a right hand elevation of Figures 1 and 2;

Figure 4 is a sectional view taken along the line 4—4 of Figure 2 and looking in the direction of the arrows;

Figure 5 is an enlarged front elevational view of one of the escapement detents of the escapement;

Figure 6 is a top view of Figure 5;

Figure 7 is a perspective view of the detent linkage;

Figure 8 is a top plan view of the funnel assembly;

Figure 9 is a sectional view taken along the line 9—9 of Figure 8 and looking in the direction of the arrows;

Figure 10 is a right hand elevational view of the funnel assembly of Figure 8; and

Figure 11 is an electric circuit diagram of the control of the machine.

Reference may now be had more particularly to the drawings wherein like reference numerals designate like parts throughout.

The machine 1 of the present invention receives cans from a can feed line 2, from which cans flow to a can divider or distributor 4, thence through a chute 5 to a second divider or distributor assembly consisting of two similar dividers or distributors 6, and thence to a can runway assembly 8. The runway assembly leads to and through an arcuate discharge section 9 to a downwardly facing discharge funnel 10, from which cans are adapted to drop by gravity, under control of an escapement mechanism 12, into a suitably placed carton. Each operation of the escapement mechanism allows the dropping of a predetermined number of cans, sufficient to fill the carton. Cans from the can feed line 2 are delivered alternately to each of two can chutes 14 and 16, each of which leads to a can divider or distributor 6, so that there are two streams of cans of the same number of cans in each stream each flowing into a divider 6. The two separate dividers of the divider assembly are located one in back of the other, the two being incorporated into one structure. For instance, a divider operating in accordance with the principles set forth in the patent to Kimball, No. 2,127,924, is satisfactory for the purpose.

The runway assembly 8 that receives cans from the divider assembly includes two similar tiers of runways 8*a* and 8*b* each receiving the cans from the respective dividers. Each tier includes four superposed inclined runways 18, 19, 20 and 21. Each runway includes a forward and rear track 23 for supporting the cans that roll thereon and a forward and rear can guide rail 24 for confining the cans axially as they roll down the runways. The tracks 23 and the rails 24 are supported intermediate their ends by uprights 26 that are supported on an angle iron frame 28 of the machine. The tracks and guide rails of the runways extend in a generally horizontal but somewhat inclined direction for a considerable distance from the divider or distributor 6 to allow an adequate space for can storage in the machine, and then curve downwardly, as indicated at 29, and terminate at the top of the funnel 10. The escapement mechanism,

to be more fully described, is arranged so that each operation of the escapement mechanism results in the discharge of six cans from each of the eight runways, or forty-eight cans at one time.

The escapement mechanism **12** consists of a set of can inlet detents, one for each runway, and a set of outlet or drop-off detents, one for each runway, and a linkage for interconnecting the two sets of detents. The inlet detents are indicated at **35**, **36**, **37** and **38** (Figs. 2, 5 and 7). The detents are mounted in any convenient manner, at the proper location. The detents **35** and **38** are mounted on plates **40** and **41** that are suitably secured in place, whereas the detents **36** and **37** are mounted on the same plate **43** which is suitably secured in place. Each detent consists of a link **45** (Fig. 5) that is pivoted intermediate its ends to its respective plate by a pivot **46**. The link carries a finger **48** at one end thereof, which finger is movable from the full line position of Figure 5 where it is above and out of the path of movement of the cans on the trackway below it, to a dotted line position illustrated in Figure 5 where it is in the path of and therefore prevents movement of cans past it. At the opposite end of the link **45** there is a pivot pin **50** for receiving a connection with a connecting rod **51** that is connected at its opposite end with an actuating bar **52**. The respective connecting rods from the links **45** of each of the four detents are connected to the actuating bar **52**.

The actuating bar **52** is pivotally supported on a pair of pivoted links **54—54** and pivots **55—55**. The links **54—54** are of equal length and are pivoted on stationary pivots **56—56** whose spacing is equal to the spacing of the pivots **55—55**. The bar **52** is adapted to be rocked by a rocker shaft **58** to which it is connected by a link **59** that is pivoted to the actuating bar at one end and at its opposite end to a crank **60** keyed to the rocker shaft **58**.

The finger **48** of each detent is movable, as stated above, from a can-holding position illustrated in dotted lines in Figure 5 to a can-release position where the finger comes to rest above the cans moving on the runways. For that purpose each track **23** above the bottom one has a slot **65** formed therein into which the finger **48** of the subjacent detent extends when the detent is in its can-releasing position. A short plate **66** (Fig. 6) covers the slot **65** that receives the finger **48** of the uppermost detent **38**, thus limiting the counter-clockwise turning of the detent **38** and thereby limiting the movement of the actuating bar **52** in one direction.

The outlet detents of the chutes in the runway assembly **8***a* consist of four similar links **67** pivoted intermediate their ends on pivot pins **68** each of which extends through a hole **69** in the associated link and pivots the link on a frame member **70** which is part of the stationary structure of the machine, being a part of the funnel **10**, as will be more fully described. Each link has at its upper end a pin **71** for pivotally connecting it with a reciprocable actuating bar **72**, and has at its lower end an inwardly extending can stop finger **74**. When the link **67** is in the position illustrated in full lines in Figure 9 its can stop finger **74** is in its discharge position, that is, in a position where it is out of the path of movement of the cans and permits the cans to drop from the associated chute. When the link **67** is pivoted to its dotted line position, illustrated in Figure 9, its can stop finger **74** is brought into the path of movement of the cans and acts as a stop to hold the row of cans of the associated chute against dropping. The reciprocable actuating bar is supported by the four associated links **67** to which it is pivoted, and is connected by a link **77** to the same pivot rod **78** that also connects the link **59** with the inlet detent actuating part **52**, as may be seen from Figure 7. This rod **78**, like a similar rod **79** at the pivot between the link **77** and the bar **72**, extends to a link **77'** and a bar **72'** similar to the link **77** and the bar **72** but located on the opposite side of the machine. The opposite side of the machine also has a bar **52'** similar to the bar **52** and pivoted to the rod **78** as is the bar **52**,

and provided for actuating a set of inlet detents similar to the detents **35—38**, as may be seen in Figure 7.

The eight chutes extend into and terminate in a rectangular frame **70** (Fig. 8) that leads to the funnel **10**. The frame **70** consists of similar front and rear straps or bars **80—81** joined by left and right straps or bars **82—83**, which may be secured together in any desired manner as, for instance, by welding or by angle brackets **86** at the four corners.

The discharge funnel **10** is a rectangular funnel having four similar sides which are separate from one another and are independently pivoted. Each side includes a funnel guide plate, there being front and rear funnel guide plates **88***a* and **88***b* and left and right funnel guide plates **88***c* and **88***d*. Each funnel guide plate is mounted on a separate horizontal bar **90**, there being four such bars in rectangular formation each located immediately below the corresponding bars **80—83** when the machine is in its delivering position as shown in Figure 9. Each funnel guide plate supporting bar **90** has a pair of lugs **91** welded or otherwise secured thereto. Each lug **91** has, at the end thereof remote from its bar **90**, a boss through which extends a mounting pin **92** that is supported in a bracket **93** that is secured to the associated strap or bar **80, 81, 82** and **83**, thereby supporting the pin in the funnel guide plate. Each bracket **93**, in addition, is provided with means for receiving a journal bearing for supporting rocker shafts, as will be more fully set forth.

Each funnel guide plate **88***a* to **88***d* is normally urged to the dotted line position of Figure 9 by a pair of leaf springs **102** that bear at their lower ends on the associated funnel guide plate and are mounted at their upper ends on a bar **104** that is supported from the associated bar **80, 81, 82** and **83** by a pair of spacer members **106**. Each funnel guide plate is adapted to be forced from its normal dotted line position of Figure 9, which is the empty box-receiving position, to its operative position illustrated in full lines in Figures 9 and 10, by a cam **108** secured to a rocker shaft, there being four such rocker shafts **109***a*, **109***b*, **109***c* and **109***d*. Each of these rocker shafts is journalled in bearings on the two associated brackets **93** and are additionally supported by bearings on end plates **97**.

The four shafts **109***a*, **109***b*, **109***c* and **109***d* are interconnected by sets of meshing bevel gears **11** so that turning or rocking of any one of the shafts results in the corresponding turning or rocking of all of the shafts. The shafts are rocked to actuate the respective cams **108** thereon to move the funnel guide plates from their carton-receiving position illustrated in dotted lines in Figure 9, to the can-discharge position illustrated in full lines in Figures 9 and 10. To bring about this rocking action the shaft **109***c* has a crank arm **115** secured thereto, which crank arm is connected to a piston rod **116** that is actuated by the piston within a double acting pneumatic cylinder **118**. The application of pneumatic pressure to one side or the other of the cylinder **118** results in the corresponding movement of the piston rod and a corresponding rocking of the shaft **109***c*. This produces corresponding rocking of the other shafts **109***a*, **109***b* and **109***d* to actuate the respective cams **108** to move the funnel guide plates to their discharge positions illustrated in Figures 9 and 10. The shaft **109***c* extends beyond its bevel gears on the front and rear of the machine. At each side thereof it has a crank **120** (Fig. 7) secured thereto which, through front and rear connecting rods **121—121**, connects with cranks **122** keyed to the front and rear of the detent actuating rocker shaft **58** so that the rocking of the shaft **109***c* results in corresponding rocking of the shaft **58** and actuation of the discharge detents **67** and the inlet detents **35—38**.

A series of spacer or guide plates are provided for guiding the cans as they fall from the respective chutes into the carton during the loading operation. These spacer or guide plates consist of a top pivotally mounted guide plate **125** that separates the outlets from the four front runways

18, 19, 20 and 21 from the outlets of the similar rear runways. Three front transverse guide plates 127—127—127 separate the cans from the respective front runways 18, 19, 20 and 21 as they drop from the machine, and three rear transverse plates 127', similar to the plates 127, guide the cans from the similar rear runways. The guide plate 125 is suspended from a pair of aligned pins 129—129 in the bars 82—83 and has a limited free rocking movement about the longitudinal axis of the two pins.

Adjacent to the top of the funnel 10, and at the rear of the machine, there is placed an electric limit switch 140 for initiating the operation of the machine, and at the bottom of the machine and substantially in line with the limit switch 140 there is provided a limit switch 141 for restoring the machine after operation.

The carton into which cans are to be loaded by the present machine may be manually lifted to its loading position and manually held in that position during loading and then lowered, or mechanical means may be provided for lifting and lowering the carton. In this instance the mechanical means consists of a platform 145 on which the empty carton may be placed and which platform is adapted to be actuated vertically between a lower carton-receiving or discharge position and an upper carton-loading position in any desired manner, as by means of a vertically movable plunger 146 that is connected to a piston of a pneumatic cylinder, not shown. When the carton has been loaded it may be manually pushed off of the platform 145 onto a moving belt or conveyor 148 that carries the carton onward as, for instance, to the carton-sealing mechanism.

As previously stated, the machine is operated by a double acting pneumatic cylinder 118. This cylinder receives compressed air from a compressed air line 150 under control of an electromagnetically operated valve 151. The valve supplies compressed air selectively to either of two air lines 152—153 for actuating the piston within the pneumatic cylinder in one direction or the other. The valve 151 is what is known as a two-position valve. In one position it supplies air under pressure to one of the lines 152—153 and atmospheric pressure to the other line. In its alternate position it reverses this arrangement as to the lines 152—153. The valve is moved to its discharging position by a solenoid 156 and is moved to its holding position by a solenoid 157. When the machine is in use the solenoids are controlled by the limit switches 140 and 141, respectively, which are normally open. When a carton is raised to its discharge position it momentarily closes the limit switch 140. This actuates the solenoid 156. This solenoid moves the four-way valve 151 to a position for effecting discharge of the cans. At this time the carton is above the limit switch 141, having actuated that limit switch. After the carton has been filled it is lowered. As it approaches that lowered position it momentarily closes the limit switch 141. This completes a circuit for the solenoid 157 to actuate the valve 151 to its reverse position to establish pressure connections to the opposite side of the cylinder 118 to actuate the piston therein in the reverse direction to refill the discharge end of the machine, as will be more fully set forth presently.

An explanation will now be given of the mode of operation of the machine thus far described. Cans flow in a continuous stream from the can feed line 2 to the divider 4 where they are divided into two streams, alternate cans then flowing by gravity into the chute 14 and the intervening alternate cans flowing into the chute 16, each of which leads to a separate divider or distributor 6. From each divider individual cans are delivered successively to the respective runways 18, 19, 20 and 21 where all the runways receive the same number of cans. The cans roll down the runways until they come to the discharge portion 9 thereof that leads to the funnel 10. At the bottom of the discharge portion 9 the cans are held by the stop fingers 74, one at the bottom of each can chute. At this time the fingers 65 and the inlet detents 35—38 are in a position out of interference with the cans. Cans accumulate in the runway assembly from the discharge end 9 thereof past the inlet detents 35—38 towards and even up to the divider or distributor 6. At some suitable place, either at the inlet to the runway assembly 8 or at any other place spaced therefrom in a direction which is upstream with respect to the direction of the flow of cans, there is provided the usual safety mechanism which is actuated by the accumulation of cans to stop the delivery or inflow of cans from the feed line to the divider 4.

In the present instance it is desired to deliver a total of forty-eight cans to each carton, twenty-four cans coming from the runway assembly 8*a* and twenty-four cans coming from the runway assembly 8*b*. Since each runway assembly consists of four tiers it is necessary to provide six cans from each of the tiers in order to fill the carton. This is accomplished, in the present invention, by the escapement mechanism 12 wherein the fingers 48 on the respective inlet detents 35—38 are spaced from the discharge stop fingers 74 and the links 67 a distance equal to the diameter or runway extent of six cans. There are thus forty-eight cans between the eight discharge stop fingers 74 and the corresponding inlet fingers 48.

When an open ended carton is raised to position to receive cans from the machine the carton is raised until the guide plates 127—127' and the guide plate 125 extend substantially to the bottom of the carton. The guide plates are of dimensions substantially less than the dimensions of the opening of the carton so that the closure flaps of the carton, even if slightly flexed inwardly, will receive the guide plates. As the carton is raised the closure flaps thereof engage the funnel guide plates 88*a*—88*d* and then engage the springs 102 on the outside of the flaps and are thereby spread apart. Continued elevation of the carton causes the carton to engage and actuate the limit switch 140. This closes the circuit for the solenoid 156 which actuates the valve 151 to apply air pressure to the double acting pneumatic cylinder 118 in such a direction that the piston rod 116 thereof is moved in a direction to the left as seen in Figures 2 and 7. This causes the shaft 109*c* to rock in a direction counter-clockwise as seen in Figure 7, which motion is transmitted to the shafts 109*a*, 109*b* and 109*d*. These four shafts acting through their cams 108 spread the funnel guide plates from their dotted line positions in Figure 9 to their full line positions, thereby increasing the funnel opening and spreading the carton flaps sufficiently to permit the cans from the eight tiers of cans to drop therethrough as soon as they are released. At the same time the counter-clockwise rocking of the shaft 109*c* is transmitted through the link 121 and crank 122 to the rocker shaft 58 which also rocks in a counter-clockwise direction. Rocking movement of the shaft in a counter-clockwise direction produces two results, namely, it moves the actuating bars 52 and the actuating bars 72 in a direction to the left as seen in Figure 7.

Movement of the actuating bars 52 to the left from the position illustrated in Figure 7 results in a rising of the actuating bar 52 about the link centers 56—56, causing an upward thrust of the connecting rods 59 and producing clockwise turning of the inlet detents 35, 37 and 38 and counter-clockwise turning of the detent 36. This clockwise turning of these detents brings the fingers 48 of each of these detents from the position illustrated in dotted lines in Figure 5, namely, from a position which was outside of the path of movement of the cans to a position within the path of movement of the cans. The fingers 48 now act as stops so that each holds all of the cans on the upstream side thereof against downward movement but permits downward movement of the six cans on the downstream side thereof. Leftward movement of the reciprocable discharge bar 72 causes the links 67 to turn in a counter-clockwise directions from the position illustrated in dotted lines in Figure 9 to the position illustrated in full lines. This moves the stop finger 74 at the bottom of

each link 67 from the can-stopping position to the position illustrated in full lines in Figure 9, which is the position permitting dropping of the cans. The six cans in each tier between the stop fingers 74 and the fingers 48 thus drop into the carton and are guided by the guide plates 125, 127 and 127'. This fills the carton and nothing further occurs until the carton is lowered.

When the carton is lowered it finally passes and momentarily closes the limit switch 141. This establishes a circuit for the solenoid 157 which then actuates the air valve 151 to apply air under pressure to the opposite side of the double acting pneumatic cylinder 118, causing movement of the piston rod 116 thereof to the right as seen in Figure 4, thereby producing movement of the shaft 109 in a clockwise direction, which is the reverse of the direction previously described, and a corresponding reverse movement of the other parts of the mechanism to restore the stop fingers to the position shown in the drawing and to restore the cams 108 that control the funnel guide plates so that the funnel guide plates 88*a*—88*d* are restored to the position shown in the drawing.

It is to be noted that upon actuation of the rocker shaft 109*c* in the discharge direction the holding fingers 48 at the inlet side of the discharge portion 9 are moved to holding position before the discharge stop fingers 74 are released from their stop position, and upon reverse movement of the rocker shaft 109*c* the discharge stop fingers 74 are moved into their stop position before the inlet stop fingers 48 are moved out of their stop position. It is thus apparent that with each cycle of operation of the mechanism six consecutive cans from each of the eight rows are discharged, all forty-eight cans dropping as a group. During this operation all of the cans above the discharge portion 9 of the mechanism are held against downward movement. After the carton is removed from the machine sufficiently to actuate the limit switch 141 the mechanism is restored to a position where the discharge stop fingers 74 are in can-holding position and the inlet stop fingers 48 on the detents 35—38 are in their by-passed condition, and cans then roll by gravity past the fingers 48 until they are stopped by the fingers 74.

In compliance with the requirements of the patent statutes I have here shown and described a preferred embodiment of my invention. It is, however, to be understood that the invention is not limited to the precise construction here shown, the same being merely illustrative to the principles of the invention. What I consider new and desire to secure by Letters Patent is:

1. In a machine for repeatedly introducing a load of cans into a carton, means providing a series of inclined, parallel runways terminating in a discharge region, a carton-loading funnel in register with the discharge region of the runways and adapted to receive cans discharged from the runways simultaneously, means for continuously supplying cans to the upper ends of each of said runways for movement by gravity therealong to said discharge region, an escapement mechanism for delivering a measured load of cans to said funnel from the runways, means for maintaining the cans from the respective runways in rows in the funnel, said escapement mechanism including a group of inlet detents, one for each runway, means connecting said detents for movement in unison from advanced positions wherein they are disposed in the path of movement of the oncoming cans in said runways to retracted positions wherein they clear the runways, a group of drop-off detents, one for each runway, and similarly movable into and out of the paths of movement of the cans in the runways, the advanced position of the inlet detent of each runway being spaced along the runway from the advanced position of the drop-off detent of the runway a distance equal to the runway extent of a predetermined number of cans of which the number of cans in each load is a multiple, means operable when a carton has been moved to its can-receiving position with respect to said funnel for simultaneously moving said series of drop-off detents to their retracted positions and for simultaneously moving said inlet detents to their advanced positions, and means operable during withdrawal of said carton for simultaneously reversing the positions of said drop-off detents and inlet detents respectively.

2. In a machine for repeatedly introducing a load of cans into cartons, means providing a series of inclined, parallel runways terminating in a discharge region, a carton-loading funnel in register with the discharge region of the runways and adapted to receive cans discharged from the runways simultaneously, means for continuously supplying cans to the upper ends of each of said runways for movement by gravity therealong to said discharge region, an escapement mechanism for successively and repeatedly delivering a measured load of cans to said funnel from the runways, means for maintaining the cans from the respective runways in rows in the funnel, said escapement mechanism including inlet detents, one for each runway, and movable between advanced positions wherein they are disposed in the path of movement of the oncoming cans in said runways and retracted positions wherein they clear the runways, drop-off detents, one for each runway, and similarly movable into and out of the path of movement of the cans in the runways, the advanced position of the inlet detent of each runway being spaced along the runway from the advanced position of the drop-off detent of the runway a distance equal to the runway extent of a predetermined number of cans of which the number of cans in each load is a multiple, linkage mechanism operatively connected to said inlet and drop-off detents for moving said detents simultaneously and with the inlet detents assuming their advanced positions when the drop-off detents assume their retracted positions and vice versa, means operable upon movement of the carton to its can-receiving position with respect to said funnel for actuating said linkage mechanism in one direction and operable during withdrawal of said carton for actuating said linkage mechanism in the other direction.

3. In a machine for introducing a load of cans into cartons, means providing a series of inclined, parallel runways terminating in a discharge region, a carton-loading funnel in register with the discharge region of the runways and adapted to receive cans discharged from the runways, means for continuously supplying cans to the upper ends of each of said runways for movement by gravity therealong to said discharge region, an escapement mechanism for delivering a measured load of cans to said funnel from the runways, said escapement mechanism including inlet detents, one for each runway, and movable between advanced positions wherein they are disposed in the path of movement of the oncoming cans in said runways and retracted positions wherein they clear the runways, drop-off detents, one for each runway, and similarly movable into and out of the path of movement of the cans in the runways, the advanced position of the inlet detent of each runway being spaced along the runway from the advanced position of the drop-off detent of the runway a distance equal to the runway extent of a predetermined number of cans of which the number of cans in each load is a multiple, linkage mechanism operatively connected to said inlet and drop-off detents for moving said detents simultaneously and with the inlet detents assuming their advanced positions when the drop-off detents assume their retracted positions and vice versa, control means operably connected to said linkage mechanism for actuating the latter in opposite directions, a reversible motor for operating said control means, means operable upon movement of the carton to its can-receiving position with respect to said funnel for operating the motor in one direction, and means operable during withdrawal of said carton for causing the motor to operate said control means in the other direction.

4. In a machine for repeatedly introducing a load of cans into a carton, means providing a series of inclined, parallel runways terminating in a discharge region, a car-

ton-loading funnel in register with the discharge region of the runways and adapted to receive cans discharged from the runways, an escapement mechanism for delivering a measured load of cans to said funnel from the runways, said escapement mechanism including a series of inlet detents, one for each runway, and movable between advanced positions wherein they are disposed in the path of movement of the oncoming cans in said runways and retracted positions wherein they clear the runways, a series of drop-off detents, one for each runway, and similarly movable into and out of the path of movement of the cans in the runways, the advanced position of the inlet detent of each runway being along the runway from the advanced position of the drop-off detent of the runway a distance equal to the runway extent of a predetermined number of cans of which the number of cans in each load is a multiple, linkage mechanism operatively connected to said inlet and drop-off detents for moving said detents simultaneously, with the inlet detents assuming their advanced positions when the drop-off detents assume their retracted positions and vice versa, pneumatic operating means operatively connected to said linkake mechanism for operating the latter in opposite directions, a control valve for said pneumatic means, said control valve including a movable member operable when in one position to operate the pneumatic means in one direction and operable when in another position to effect reverse operation of the pneumatic means, an electromagnet operable upon energization thereof to move said valve member to one position, a second electromagnet operable upon energization thereof to move said member to its other position, a normally open circuit for each of said magnets, means operable upon movement of the carton to its can-receiving position with respect to said funnel for closing one of said circuits and means operable during withdrawal of said carton for closing the other circuit.

5. In a machine for introducing a load of cans into a carton, means providing a series of inclined, parallel runways terminating in a discharge region, a carton-loading funnel in register with the discharge region of the runways and adapted to receive cans discharged from the runways, means carried by said funnel and movable from a retracted position to an advanced position for engaging the walls of said carton to spread the same during loading of the carton when the latter is in register with the funnel, an escapement mechanism for delivering a measured load of cans to said funnel from the runways, said escapement mechanism including inlet detents, one for each runway, and movable between advanced positions wherein they are disposed in the path of movement of the oncoming cans in said runways and retracted positions wherein they clear the runways, drop-off detents, one for each runway, and similarly movable into and out of the paths of movement of the cans in the runways, the advanced position of the inlet detent of each runway being spaced along the runway from the advanced position of the drop-off detent of the runway a distance equal to the runway extent of a predetermined number of cans of which the number of cans in each load is a multiple, means operable when the carton has been moved to its can-receiving position with respect to said funnel for simultaneously moving said series of drop-off detents to their retracted positions and for simultaneously moving said inlet detents to their advanced positions, means operable during withdrawal of said carton for simultaneously reversing the positions of said drop-off detents and inlet detents respectively, and means operable upon movement of said drop-off detents to their retracted position for moving said carton-spreading means to its carton-spreading position and operable upon movement of said drop-off detents to their advanced positions for retracting said carton-spreading means.

6. In a machine for repeatedly introducing a load of cans into a carton, means providing a series of inclined,

parallel runways terminating in a discharge region, a carton-loading funnel in register with the discharge region of the runways and adapted to receive cans discharged from the runways, means carried by said funnel and movable from a retracted position to an advanced position for engaging the walls of said carton to spread the same during loading of the carton when the latter is in register with the funnel, an escapement mechanism for delivering a measured load of cans to said funnel from the runways, said escapement mechanism including inlet detents, one for each runway, and movable between advanced positions wherein they are disposed in the path of movement of the oncoming cans in said runways and retracted positions wherein they clear the runways, drop-off detents, one for each runway, and similarly movable into and out of the paths of movement of the cans in the runways, the advanced position of the inlet detent of each runway being spaced along the runway from the advanced position of the drop-off detent of the runway a distance equal to the runway extent of a predetermined number of cans of which the number of cans in each load is a multiple, linkage mechanism movable in opposite directions and operatively connected to said inlet and drop-off detents for moving said detents simultaneously, with the inlet detents assuming their advanced position when the drop-off detents assume their retracted position and vice versa, means operable upon movement of the carton to its can-receiving position with respect to said funnel for actuating said linkage mechanism in one direction and operable during withdrawal of said carton for actuating said linkage mechanism in the other direction, and means operatively connecting said linkage mechanism and carton-spreading means for moving the latter to its advanced position when said linkage mechanism is in the position it assumes when the carton is in its can-receiving position.

7. In a mechanism for loading cans into open ended cartons, means providing a series of runways the lower ends of which terminate in a discharge region, a carton-loading funnel in register with said discharge region for receiving cans therefrom, means for separating the open end of the carton when in can-receiving position with respect to said funnel, an escapement mechanism for delivering measured loads of cans to said funnel from said runways and including a drop-off detent and an inlet detent for each runway movable alternately into can-arresting and can-releasing positions respectively, a rock shaft, linkage mechanisms operatively connecting said rock shaft to each detent and to said carton-spreading means, and means for actuating said rock shaft.

8. In a mechanism for loading cans into open ended cartons, means providing a series of runways the lower ends of which terminate in a discharge region, a carton-loading funnel in register with said discharge region for receiving cans, means for supplying cans to the upper end of said runways for movement therealong to said discharge region, a plurality of carton-spreading fingers pivotally secured to said funnel and movable in unison from retracted positions to advanced positions wherein they engage the sides of a carton in can-receiving position to spread the same outwardly, an escapement mechanism for delivering measured loads of cans to said funnel from the runways, said escapement mechanism including a series of drop-off and inlet detents one for each runway, movable between advanced positions wherein they are disposed in the path of movement of oncoming cans in said runways and retracted positions wherein they clear the runways, a series of drop-off detents one for each runway and similarly movable into and out of the path of movement of the cans in the runways, linkage mechanism operatively connected to said inlet and drop-off detents for moving said detents simultaneously, with the inlet detents assuming their advanced positions when the drop-off detents assume their retracted positions and vice versa, linkage mechanism operatively connected to said

carton-spreading members for moving the same in unison to and from their advanced positions, a rock shaft operatively connected to said linkage mechanisms for actuating them in opposite directions, and means for oscillating said rock shaft.

9. In a mechanism for loading cans into open ended cartons, means providing a series of runways the lower ends of which terminate in a discharge region, a carton-loading funnel in register with said discharge region for receiving successive can loads therefrom, a carton spreading member pivotally connected to said funnel and movable from a retracted to an advanced position wherein it engages a side of the carton to spread the same outwardly when the carton is in can-receiving position, an escapement mechanism for delivering measured loads of cans to said funnel from said runways and including a drop-off detent and an inlet detent for each runway movable alternately between can-arresting and can-releasing positions respectively, a cam for actuating said carton-spreading member, a rock shaft, linkage mechanisms operatively connecting each detent to said rock shaft, linkage mechanism connecting said cam to said rock shaft, and means for actuating said rock shaft.

10. In a machine for loading cans into cartons, means providing a series of inclined runways the lower ends of which are turned downwardly and terminate in a discharge region, a carton-loading funnel in register with said discharge region of the runways to receive cans discharged from the runways simultaneously, means for continuously supplying cans to the upper ends of each of said runways for movement by gravity therealong to said discharge region, an escapement mechanism for delivering measured loads of cans to said funnel from said runways, means for maintaining the cans from the respective runways in rows in the funnel, said escapement mechanism comprising a series of inlet detents, one for each runway, a series of drop-off detents, one for each runway, each detent being in the form of a lever pivoted for limited oscillation about a medial axis, a can-engaging finger on one end of each lever the detents of each series being movable in unison between advanced positions wherein the fingers thereon are disposed in the paths of oncoming cans in their respective runways and retracted positions wherein the fingers clear said paths, and means for alternately moving said series of inlet and drop-off detents from their advanced positions to their retracted positions and vice versa, said means comprising a thrust rod pivotally connected at one end to an end of each inlet detent lever, a common actuating bar pivotally connected to the other ends of said thrust rods, means mounting said bar for bodily oscillation about an axis, a second common actuating bar connected to an end of each drop-off lever, and a rock shaft common to said actuating bars and connected thereto for imparting respective oscillatory movements to said bars, said first mentioned bar having a component of motion imparting thrust to said thrust rods to oscillate said inlet detent levers, the oscillating movement of said second bar serving to directly oscillate said drop-off detents.

11. In a machine for repeatedly introducing a load of cans into a carton, means providing a series of inclined runways the lower ends of which terminate in a discharge region, a carton-loading funnel in register with the discharge region of the runways, an escapement mechanism for delivering measured loads of cans to said funnel from said runways, said escapement mechanism including a series of inlet detents, one for each runway, and movable in unison between advanced can-engaging and retracted can-releasing positions, a series of drop-off detents, one for each runway, and similarly movable between can-engaging and can-releasing positions, linkage mechanism movable in opposite directions and operatively connected to said inlet and drop-off detents, with the inlet detents assuming their advanced positions when the drop-off detents assume their retracted positions and vice versa, a cylinder having a piston therein operatively connected to said linkage mechanism for operating the latter, a control valve for the cylinder, a source of motive fluid, said valve including a member operable when in one position to supply fluid to one end of the cylinder and operable when in another position to supply fluid to the other end of the cylinder, and an electromagnet operable under the control of the movements of the carton undergoing filling for controlling the movements of said valve member.

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