

Aug. 24, 1965

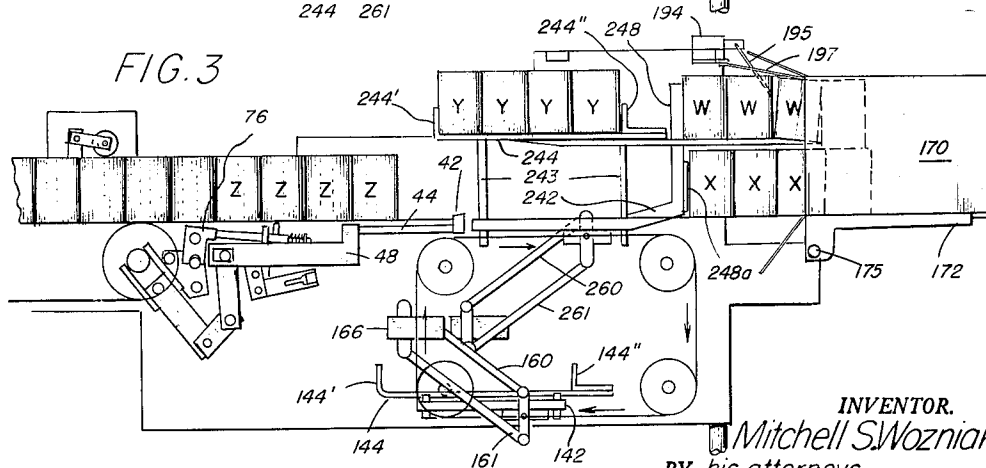
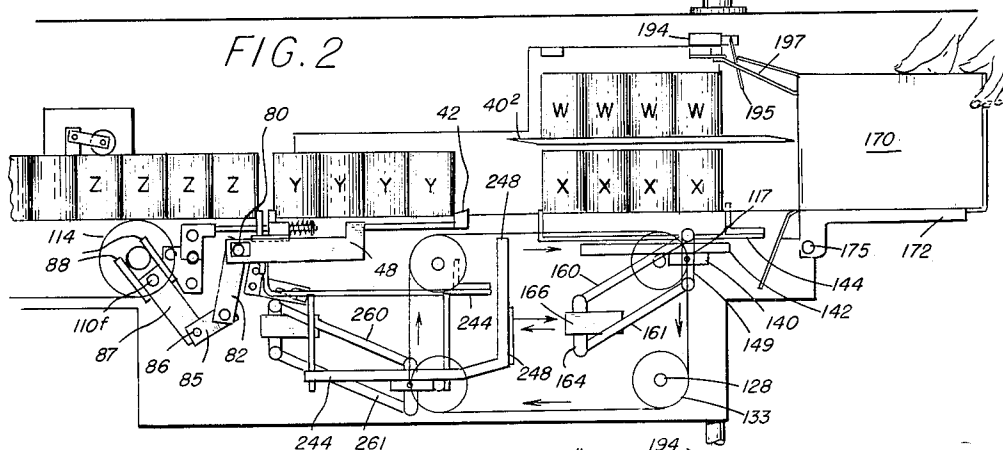
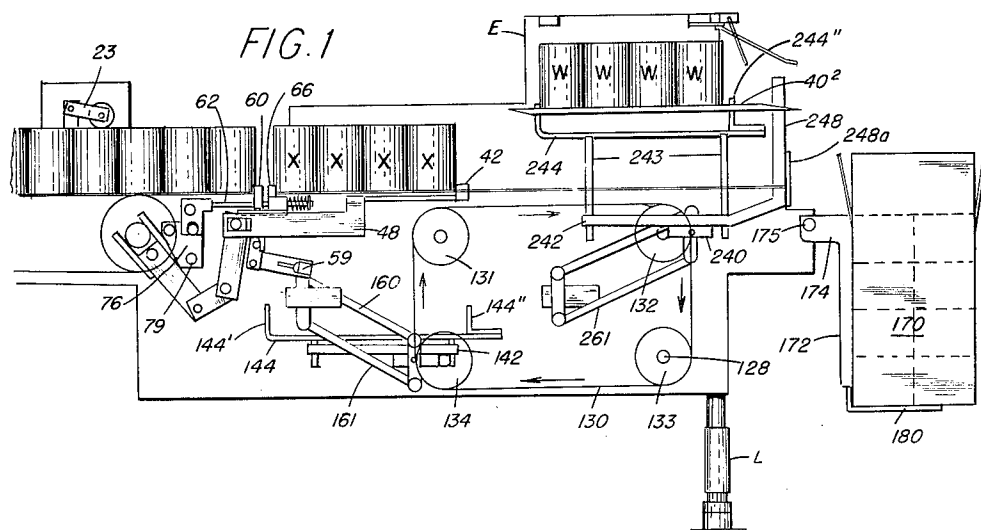
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3,201,912

CASE PACKING MACHINE

Filed Aug. 30, 1960

5 Sheets-Sheet 1



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Aug. 24, 1965

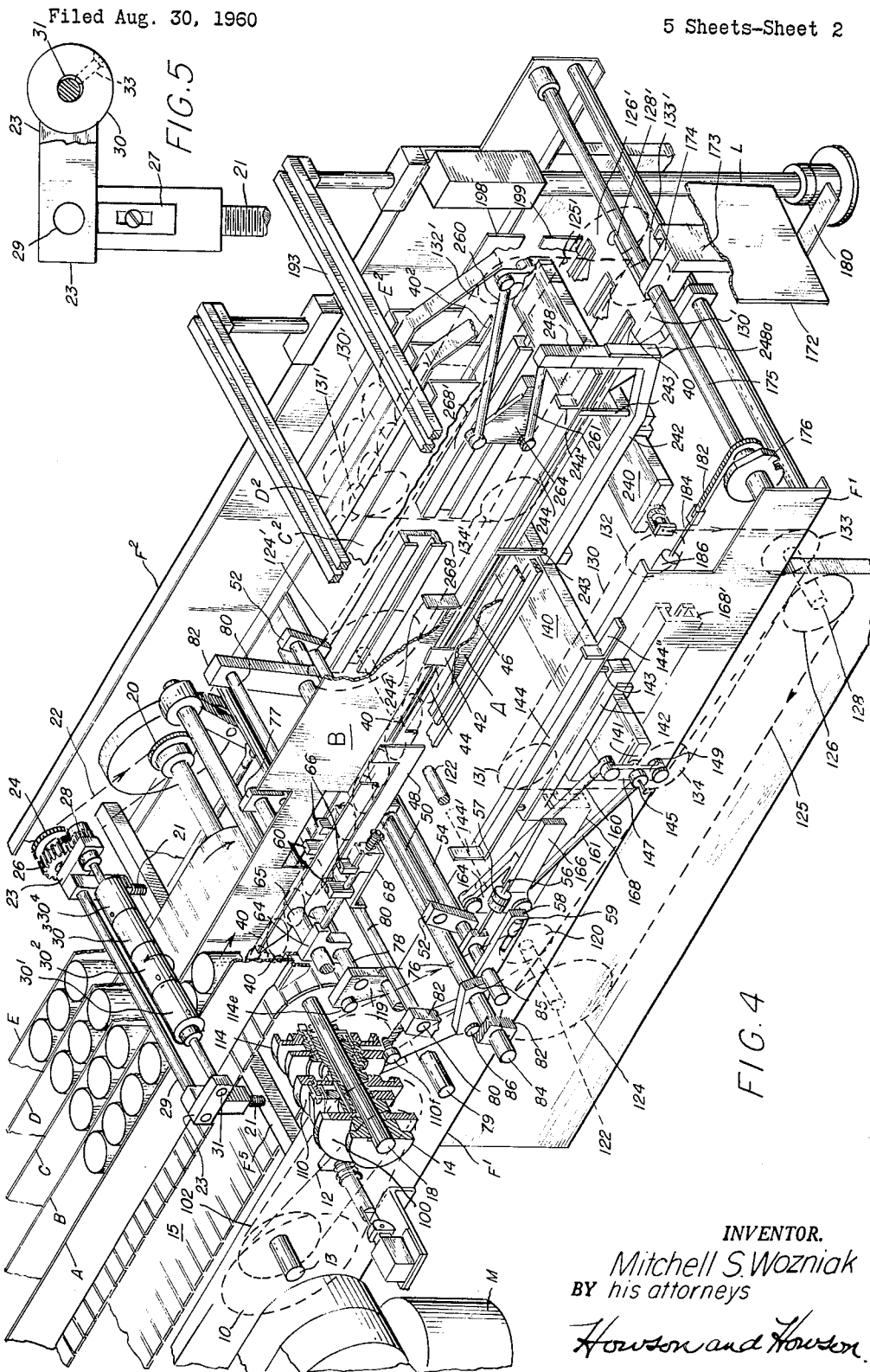
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CASE PACKING MACHINE

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5 Sheets-Sheet 2



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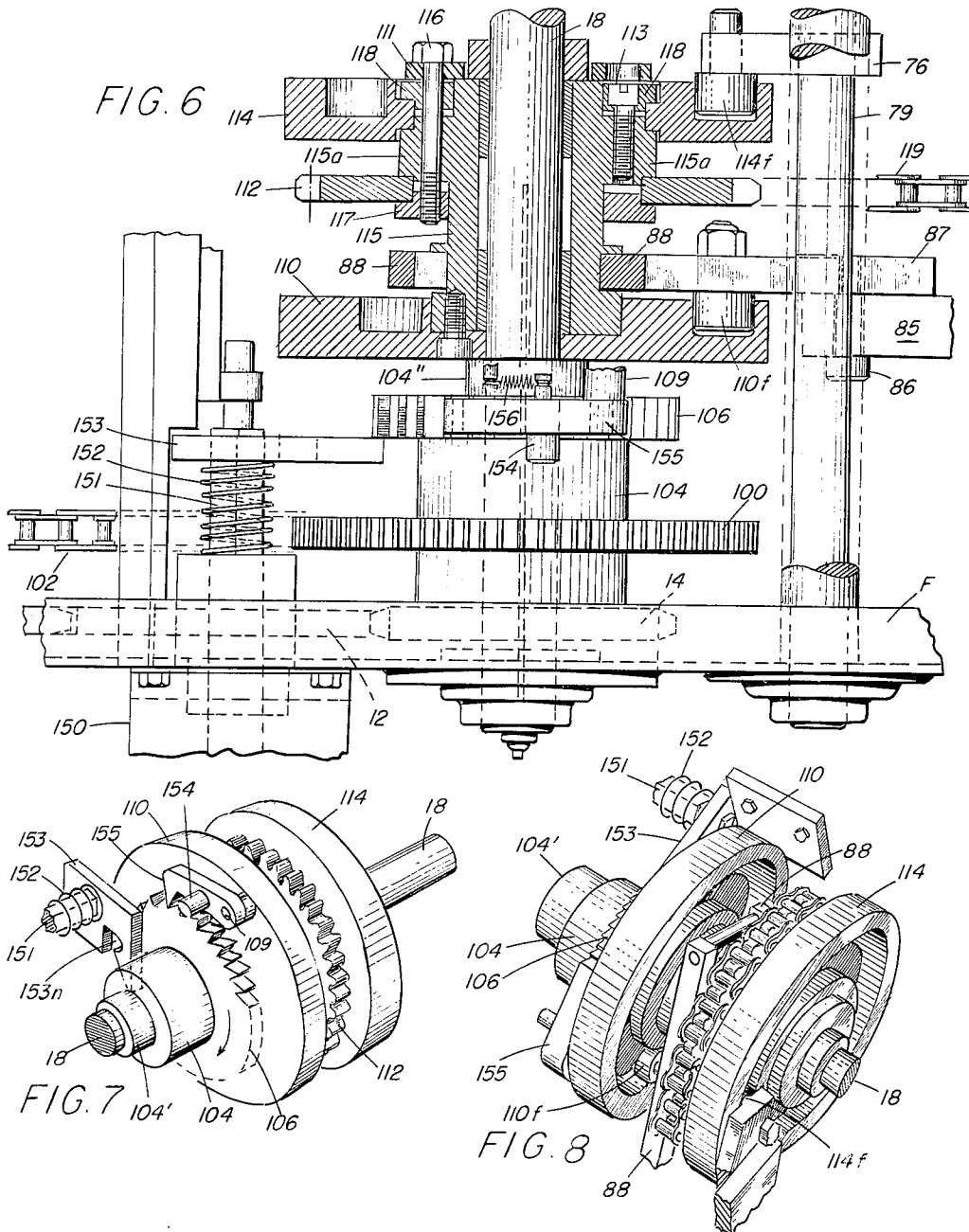
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CASE PACKING MACHINE

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5 Sheets-Sheet 3



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CASE PACKING MACHINE

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5 Sheets-Sheet 4

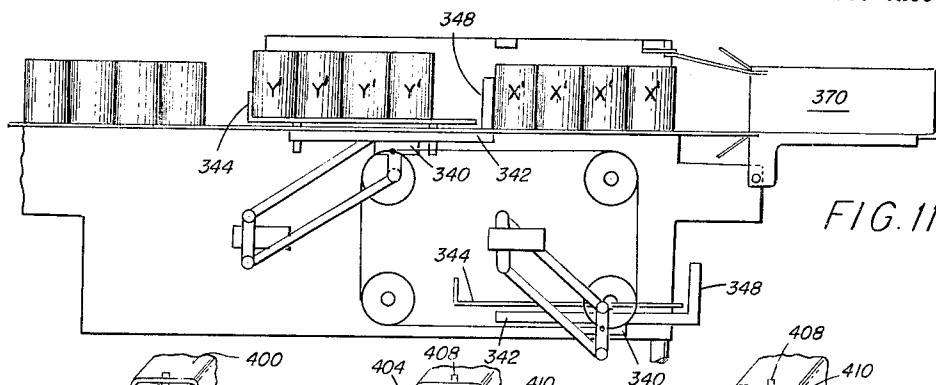


FIG. 11

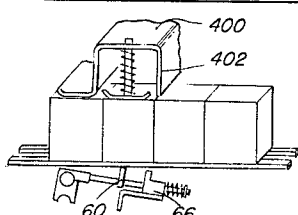


FIG. 12

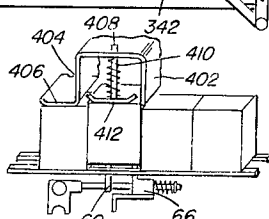


FIG. 13

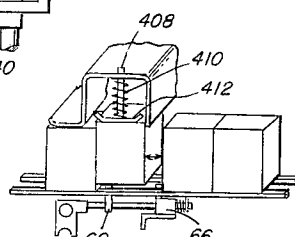


FIG. 14

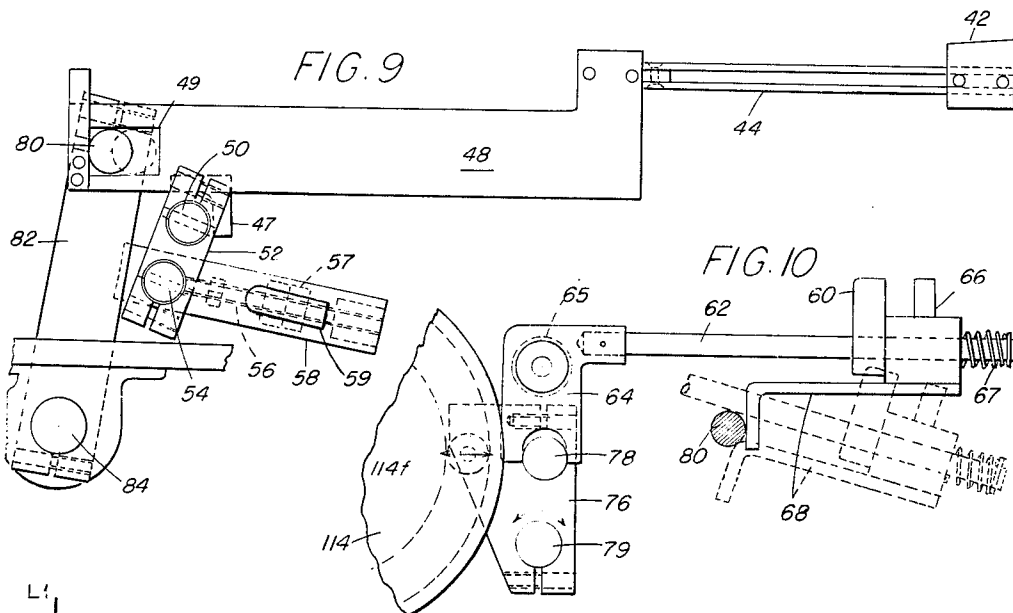


FIG. 9

FIG. 10

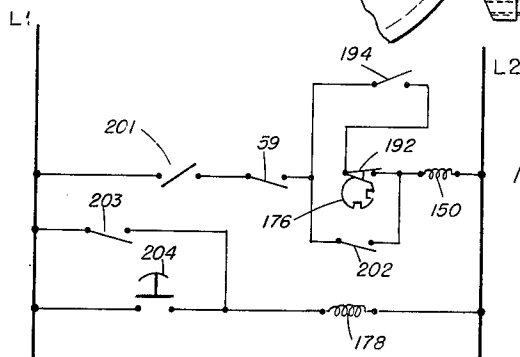


FIG. 17

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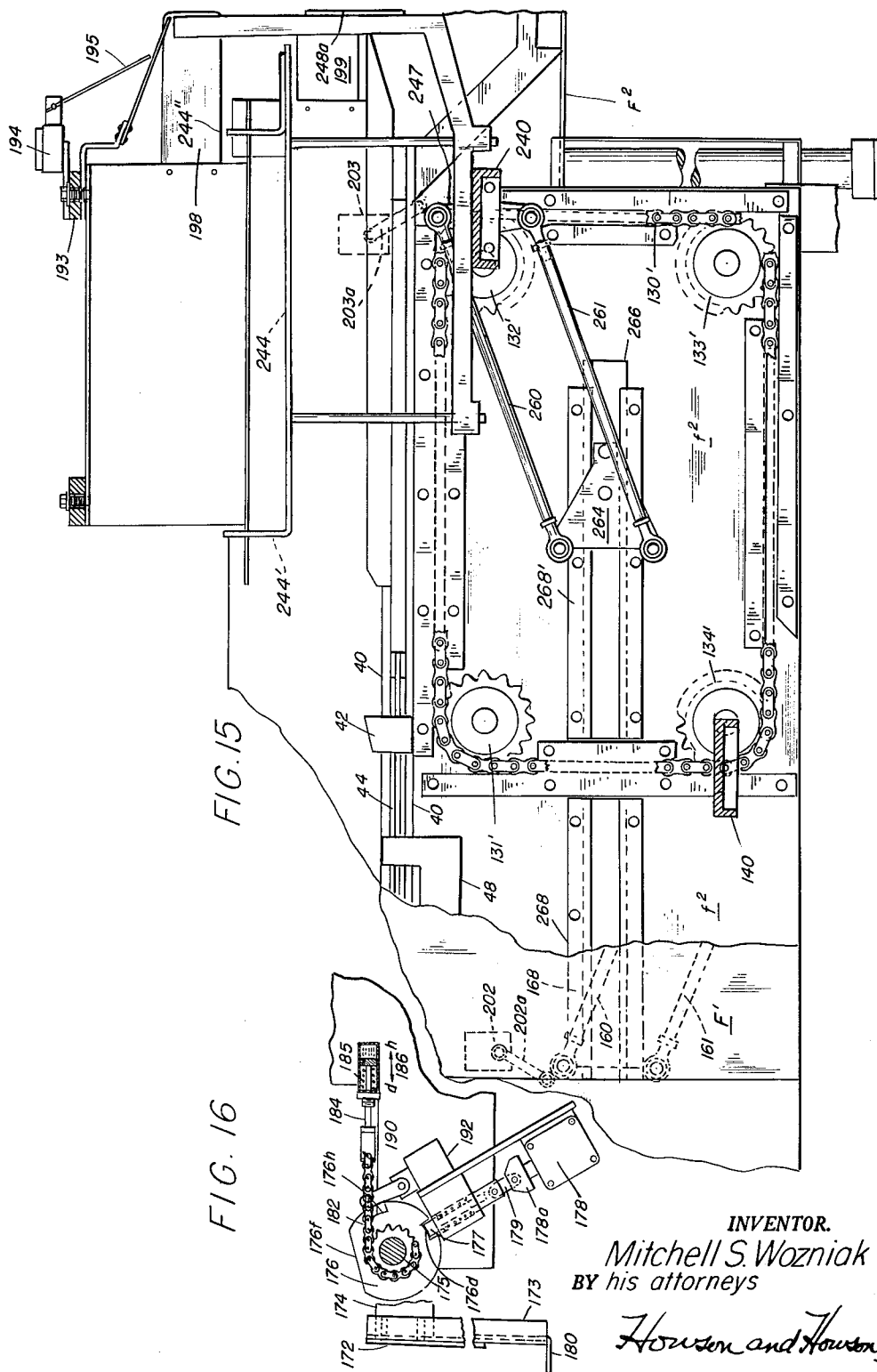
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CASE PACKING MACHINE

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3,201,912

CASE PACKING MACHINE

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Filed Aug. 30, 1960, Ser. No. 52,978

20 Claims. (Cl. 53-61)

This invention relates to a machine for packing cans, packages, jars and other containers into boxes, cases or other receptacles that are commonly used to hold a dozen or more of such articles.

In the following description, reference will be made to cans as typical containers, but it will be understood that the machine and invention are not limited to packing cans, but may also be used to pack rectangular packages, jars and other containers.

One object of the invention is to provide a comparatively small machine capable of packing cans and other articles at higher rates than prior packing machines for similar purposes.

Another object is to provide a machine as aforesaid capable of packing single or double tiers of cans in a case. A related object is to pack the two tiers of cans simultaneously.

Another object is to provide a machine as aforesaid whose construction is adaptable to modification readily for packing cans or jars or rectangular packages or six-can packs.

Another object is to provide, in a machine as aforesaid, a single-revolution-per-cycle clutch mechanism which will allow the machine to go through only one cycle for each revolution of the clutch, unless a full complement of cans or articles is ready to be picked up and moved forward for packing and the case is in proper position to receive the load.

Another object is to provide means in combination with the single-revolution clutch which will maintain the clutch engaged and the machine in continuous operation so long as there is a full complement of cans ready to be packed and the case platform is in proper position with a case on it to receive the cans.

Another object is to provide pressure on top of the cans on the conveyor in order to lessen the number of cans needed in the lanes to ensure movement of the cans off the conveyor.

Another object is to provide means to lower the packed case and to retard the lowering action thereof.

Another object is to provide means to prevent the movement of the tiers of can into the final case-packing position unless there is a case in position to receive the cans.

Other objects and advantages of the invention will become apparent as it is described in connection with the accompanying drawings.

In the drawings:

FIGS. 1, 2 and 3 are diagrammatic side elevation views of a machine embodying the invention and showing, respectively, an upper tier of cans in position, both upper and lower tiers of cans in position, and both upper and lower tiers being inserted in the case while another upper tier is being placed in position.

FIG. 4 is an isometric view, partly broken away and partly diagrammatic, of the machine of FIGS. 1, 2 and 3.

FIG. 5 is a fragmentary elevational section view of the pressure roller and its supporting means which apply pressure on the tops of the cans on the conveyor.

FIG. 6 is a detail view, showing in plan and partly in section, the single revolution clutch mechanism.

FIGS. 7 and 8 are fragmentary perspective views of a portion of the single revolution clutch mechanism taken from different positions.

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FIG. 9 is a detail view showing in elevation the slide assembly in connection with the can separating mechanism.

FIG. 10 is a detail view, showing in side elevation partly broken away the can separating assembly.

FIG. 11 is a diagrammatic side elevation view of another form of the invention which is adapted to pack single tiers of cans in an end-opening case.

FIGS. 12, 13 and 14 are fragmentary diagrammatic perspective views of another form of the invention adapted for packing rectangular packages and showing the action of separating a group of packages from the oncoming row of packages.

FIG. 15 is a fragmentary elevational view showing in longitudinal section the cam elevation mechanism on the right side of the machine facing the take-off end of the machine.

FIG. 16 is a fragmentary detail view showing in sectional elevation control of the full case lowering mechanism.

FIG. 17 is a circuit diagram of the electrical connection to the several switches employed in the invention.

Referring to the drawings, the machine parts are supported between longitudinal frame plates F' and F² which are supported by four or more legs L, and are suitably spaced apart by transverse connecting members, as will hereinafter more fully appear.

Conveying and feeding mechanism

The cans are fed along on an endless conveyor belt 15 which may conventionally consist of transverse slats or bars mounted upon chains at opposite sides of the machine driven by sprockets from a main drive motor M in usual fashion through a commercially available reduction gear and safety clutch (not shown) which allows the motor to continue turning in case the machine should jam and stop.

The cans are divided into lanes which, in the illustration shown, are four in number, but the number of lanes may be varied to give the desired number of cans in a pack. The lanes are formed by parallel guide plates A, B, C, D and E positioned over the conveyor belt, but extending beyond the end of the belt into an elevating and removing zone, as will hereinafter more fully appear.

To enable shorter lanes and a shorter conveyor, means are provided to apply pressure on the top of the cans. Since the cans are moved along the lanes by the pressure of succeeding cans against their predecessors and, thus pushing the forward cans, sufficient friction must be provided between the can bottoms and the conveyor to avoid slippage if a small number of cans is desired and a shorter machine is to be provided. Therefore, pressure roller means is provided extending over the lanes. The pressure roller means is mounted upon a transverse bar or frame member F-5 extending beneath the top run of the conveyor belt and supported from the side frame plates F-1, F-2.

Mounted upon the transverse bar F-5 at opposite sides of the conveyor belt are bracket posts 21 on which are pivotally mounted substantially horizontal arms 23 affixed on opposite ends of a pivot shaft 29 which extends above the lanes of cans. The arms 23 are pivoted at one end and are free to move up and down with the pivot shaft 29.

A small stop plate 27 on the outside surface of each of the post brackets 21 is adjustable on the post bracket by a screw and slot arrangement so as to adjust the height of the arms 23. Supported between and at the opposite ends of the arms 23 is a roller shaft 31 on which are revolvably mounted metal rollers 30', 30², 30³, 30⁴. The rollers 30', 30², 30³, 30⁴ are positioned to lie over each of the four lanes and are power driven.

In order to ensure the engagement of each roller with the cans in its lane so as to apply certain pressure on the cans in its lane, the rollers are provided with oversized bearing apertures and countersunk tapped radial bores into which are threaded set screws 33 so that the rollers are slightly eccentrically mounted on the shaft 31. Preferably in the example shown where there are four lanes, the rollers will be affixed progressively across the shaft and angularly 90° apart from one another. Thus, the full weight of the roller assembly may bear on one lane of cans at a time to ensure pressure and hence forward movement of the cans in all lanes because of the progressive exertion of pressure on the top of the cans of each lane in turn. Thus, irregularity in the height of the cans or of their positioning on the conveyor belt is taken into account.

For driving the roller shaft 31, a gear 28 is mounted on one end, which is adapted to mesh with another gear 26 turning on the shaft 29 together with a sprocket 24 also on that shaft. Power is provided for driving the roller shaft 31 by the motor M which is mounted on the frame of the machine at the opposite side. This motor also acts as the main driving means for all of the other moving parts, as hereinafter more fully appear.

Through reduction gearing, the motor M drives a shaft 13 which has a sprocket 10 mounted thereon. The sprocket 10 is constantly turning while the motor is going.

The sprocket 10, through a chain 12, drives a sprocket 14 keyed on one end of a transverse main drive shaft 18 extending across the machine frame and supported in bearings in the side plates F', F².

On the opposite end of the shaft 18, another sprocket 20 is keyed, and by a chain 22 drives the sprocket 24 loose on the shaft 29, which is bolted to gear 26.

The main shaft 18 also drives the conveyor. Hence so long as the motor is on, the conveyor will constantly be driven.

Full lane detecting mechanism

As the cans leave the conveyor, they are pushed onto parallel rails 40 which extend along the guide plates A-E at their lower edges on each side of each plate. These rails are only wide enough to support the cans at opposite sides, leaving an open space between. This open space, as will hereinafter appear, is necessary to provide for movement of the lifting and packing mechanism.

As the cans move along the lanes onto the rails, they abut one another as must be, since each succeeding can pushes its predecessor along. The cans must be separated into groups for packing into a case. To do that, mechanism to stop the forward movement of the row of cans when the lane is full and associated mechanism to divide and separate the desired number into a group are provided.

Movement of the row of cans is stopped by engagement of the leading can with a stop or load-detecting lug 42 on a slidable load-detecting assembly supported by and slidable along one rail 40 of each lane.

As viewed in FIGS. 9 and 4, the slide assembly comprises a can stop or detecting lug 42 extending vertically up from one side of a horizontal slide 44 to which it is affixed and which slides between one of the fixed can supporting rails 40 and a fixed guide rail 46 parallel to and beneath it. The lug 42 is near the forward end of the slide 44 while the opposite end of the slide is affixed to an upward vertical extension on a tail plate 48 extending alongside and at a lower level than the rail 40 and extending still further back.

There is a slide assembly in each lane. When a predetermined number of cans is pushed on rails 40, the leading can applies pressure on the load-detecting lug 42, moving it forward about one-half inch. When all lanes have their slide assemblies moved forward, mechanism is started for taking the cans off the rail. To that end, a

detent 47 extends down from each slidable plate 48 in position to be engaged by and to hold a transverse rod 50 from moving in clockwise (forward) direction until all slides have been moved forward by the cans in their respective lanes. In FIG. 9, the slide is shown moved forward relative to rod 50.

Control rod 50 connects the ends of and is supported by lever arms 52 whose other ends are fixedly mounted on and turn with a fixed axis pivot shaft 54 whose ends are pivotally mounted in bearings in the side plates of the frame F' and F².

In order to bias the pivot shaft 54 so it will turn when the control rod 50 is released, a radially extending arm 56 is affixed on the pivot shaft 54 with a weight 57 adjustably mounted thereon. Also mounted on the pivot shaft 54 is another radial arm 58 carrying a mercury switch 59. This mercury switch is in an electric-series circuit so that when it closes and all other conditions are complied with, mechanism (controlled by a single revolution clutch illustrated in FIGS. 6, 7, 8) is started to move the cans from the rails 40 and also to move back the slide assemblies to their original positions ready to act when the new complement of cans on the rails is complete.

Separation of a group from a row of cans

In order to move the cans off the rails 40, the predetermined number, which is to constitute one row in the case when packed, must first be separated from the continuous row of cans in the lane on the rails. The starting of the mechanism for doing this is another result of the closing of the mercury switch 59.

The separation is accomplished by inserting in the space between the last can of the selected number which is to comprise the group, and the succeeding can a pair of lugs 60, 66 (see FIGS. 10 and 4). One lug 60 is a stop lug and is fixedly mounted on a rod 62 extending radially from a mounting bracket 64 on a transverse fixed-axis supporting shaft 65 which is mounted and supported at its ends in the frame plates F', F².

The other lug 66 is also mounted on rod 62, but is slidable thereon toward the forward end; and it is biased toward the lug 60 by a coiled-compression spring 67 coiled around the rod.

The pivotal mounting of the bracket 64 and its rod 62 on the supporting shaft 65 enables the lugs 60 and 66 to be inserted between the cans near the guides plates A-E when the rod and bracket are tilted up to substantially horizontal position and also to be withdrawn when the rod is tilted downwardly from horizontal. The tilting means, described below, is controlled in timed relation to the operator of the separation of the group of cans from the row.

The tilting is controlled by rotation of a cam 114' adjustably secured upon a sleeve or bushing 115 which is loosely mounted on the main shaft 18.

The sleeve 115 is driven from the main shaft 18 by a single revolution clutch mechanism (illustrated best in FIGS. 6, 7 and 8) as hereinafter more fully described.

Cam 114 has a grooved track in its inside face in which fits a follower pin 114f which extends laterally from an adjacent face of a triangular cam-actuated member 76. (FIGS. 4 and 10.) The cam-actuated member 76 pivots about a transverse shaft 79 extending crosswise of the machine and mounted in bearings and the frame plates F', F².

In the upper forward corner of the cam-actuated member 76, there is mounted one end of a transversely extending rod 78 which engages in downwardly facing slots in each of the lug-supporting brackets 64 at spaced points along rod 78 corresponding to the can lanes. The opposite end of the rod 78 is mounted on lever 77 affixed on shaft 79 paralleling the cam-actuated member 76.

Thus, as the cam-actuated member 76 is rocked about the pivot shaft 79 by follower pin 114f and cam 114, the rod 78 tilts the lug-supporting bracket 64 up or down

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about its supporting shaft 65. When it tilts upwardly, the lugs 60, 66 will enter between the cans which are to be separated. When it tilts downwardly, the lugs will move out of the way and permit the cans in the lane to move forwardly along the rails until the forward can strikes the stop lug 42 as before.

Provision is made for adjustment of the cam 114 relative to the bushing 115. This adjustment is hereinafter described in detail.

When the supporting bracket is tilted upwardly and the lugs are inserted, the lug 60 will stop the forward movement of all cans to the rear of it.

To move the small predetermined number of cans that are in front or in advance of the lugs away from the cans to the rear of the lugs, the lug 66 has mounted on its lower end beneath the rod 62 the longer horizontal leg of an L-shaped pusher member 68 while the shorter leg is directed downwardly in position to be engaged by a transverse pusher rod 80 extending across the machine. Pusher rod 80 has its ends mounted in and connecting the upper end of lever arms 82 located on opposite sides of the lanes. The lower ends of the levers 82 are fixedly mounted on a pivot shaft 84 extending transversely across the machine beneath the rails 40 and supported in bearings in the machine frame.

The shaft 84 is oscillated or rocked to cause rocking motion of arms 82 and pusher rod 80. This is done by cam action from a rotating cam 110 (see FIGS. 6, 7, and 8) turning with the sleeve 115 on the main shaft 18, when caused to do so by control means, as will presently be described. The rocking movement forwardly will push the pusher member 68 and the lug 66 carried thereby forward. This separates the predetermined group of cans from the row in the manner previously mentioned.

Cam 110 actuates the pusher rod 80 by the following linkage. See FIGS. 1-3 and 4. The cam follower 110f extends laterally from the upper end of an obliquely positioned link 87 which has parallel arms 88 affixed to its sides at its upper end and extending up along and touching opposite sides of the bushing 115 (see FIG. 8, also) which thus guides the substantially radial movement imparted to the link by the cam follower as the cam 110 rotates. Loosely pivoted to the lower end of link 87 by pivot pin 86 is the lower end of a downwardly extending arm 83 affixed at its upper end to oscillating shaft 84.

As previously stated, this shaft 84 has affixed thereon the lower ends of the upwardly extending arms 82. Since the transverse push rod 80 extends between and connects the upper ends of these arms, the push rod will move to and fro as the shaft 84 oscillates, such oscillation being responsive to the action of the cam 110. Also, as previously stated, the finger lug 66, by reason of the action of the push rod, separates the group of cans from the row in back of it.

Retractive movement of the slides 44 backward is caused by transverse rod 80 under control of the cam 110. Revolving of the cam 110 as the single revolution clutch operates, causes the transverse rod 80 to move first forwardly to operate the separating lugs 66, and then rearwardly. The rearward motion causes retraction of the slide to its original or detecting position by reason of the passage of the rod 80 through a rectangular opening 49 in the tail plate 48 of each slide. Because it is necessary for the detecting slide to be able to move forward when the leading can in the row pushes against the detecting or slide lug 42, the cam 110 has its track cut so that when it stops, the rod 80 will have moved about 1/2" forward again. This frees the slide for that much movement which is needed for detecting that the lane is full of cans.

Can elevating and take-off mechanism

After a group of cans have been separated from the line by the dividing and separating mechanism, it is desired

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to lift the group off the rails 40 from behind the stop 42 and move them forward over the stop 42 and set them down again on the rails 40 in advance of the stop 42 in position to be pushed off later into waiting cases.

Mechanism to do this comprises a pair of identical chains 130, 130', on opposite sides of the machine, each trained in rectangular form over four sprockets 131-134 and 131'-134'. These sprockets are mounted in bearings supported from inner frame plates f' and f'' parallel to and supported from the main frame plates F' , F'' , located as if in the corners of a rectangle. The lower forward sprockets 133, 133' of each set are keyed on coaxial stub shafts 128, 128' mounted in and extending through bearings in the inner frame plates f' , f'' . On the outer ends of shafts 128, 128' driving sprockets 126, 126' are keyed, which are driven by chains 125, 125' from sprockets 124, 124' keyed on the ends of a shaft 122 which extends across the machine and rotates in bearings in the machine frame.

Inwardly of the sprockets 124 is another smaller sprockets 120 also keyed on shaft 122 and driven by a chain 119 from the one revolution clutch mechanism (hereinafter described), when caused to do so by activation of the clutch upon certain conditions for operation being satisfied.

To lift a group of cans over the stop 42 and set them down on rails 40 in advance of stop 42, a cradle (which for convenience will be referred to as a lower-tier cradle) is supported from the chains 130, 130'. It comprises a transverse supporting beam 140 (see FIG. 4) on which are affixed at spaced positions across the beam, in register with the center line of each lane, parallel longitudinal beams 142 on each of which is mounted a can lifting member 144.

The members 144 are L-shaped metal bars and are supported by two posts 143 from and slightly above the beams 142 with the short arms 144' projecting upwardly at their trailing ends so as to be able to enter in the space made between the row of cans and the group separated therefrom and to prevent rearward slide-off of the cans as the cradle starts moving forwardly. Similar upwardly extending arms 144'' are provided on the front ends of members 144 to prevent forward slide-off of the cans as the cradle reaches the end of its forward movement.

As the chains move the cradle upward and then forward, the separated group of cans will be picked up and moved forwardly over the stop 42.

As the chains move the cradle down at the end of their forward movement, the group of cans will be set down on the rail 40 in advance of the stop 42 (see FIG. 2 lower tier).

In order to hold the beam 140 of the lower-tier cradle horizontal at all times during its run around the four sides of the rectangular path through which the chains carry it, the beam 140 is affixed to the head of a supporting bracket 141 at one end. Extending horizontally and transversely from the head of the bracket 141 is a boss 145 bored to receive a horizontally extending pivot pin extending from a link of the chain 130. Extending radially up and down from the boss 145 are arms 147, 149 which are held vertically erect at all times in the following way.

Pivotaly connected to the ends of the arms 147, 149 are the ends of parallel tie bars or links 160, 161, respectively, whose opposite ends are likewise pivotaly connected to a triangular slide bracket 164 which is affixed to a horizontal slide bar 166. The slide bar 166 is guided in its horizontal sliding movement by stationary horizontal guide members 163, 163' affixed to the frame plate f' . These guide members are in alignment and actually are one continuous guide divided in its midportion to permit passage of the chain 130 and beam-supporting pin of the beam 140 upwardly through the gap between them.

The slide 166 is of such length that as one end passes across the gap between the parts 163, 163' of the guide,

that end will have fully entered and have started to slide in the second portion of the guide before the opposite end of the slide has left the first portion of the guide. Thus, the slide is long enough to fully bridge across and continue its sliding motion between the two parts of the slide.

The support of the opposite end of the beam 140 from the chain 130' is similar to the support of the end already described, but there are no upwardly and downwardly extending arms like 147, 149 on such other end for two reasons,

First, the maintenance of the beam 140 in horizontal condition by the rods 160, 161 is adequate on one side.

Second, the space is required for movement of rods 260, 261 like 160, 161 in guiding the flight of a second cradle.

It is desired for the machine to be capable of loading a case with two layers or tiers of cans, one on top of the other. For this purpose, a second or upper-tier cradle is provided which is in most respects similar to the lower-tier cradle. It comprises a horizontal transverse beam 240 on which are supported a series of parallel spaced longitudinal beams 242 (one for each lane) from each of which an L-shaped can lifting member 244 is supported by long posts 243. Upwardly extending ends 244', 244'' prevent rearward and forward slide-off, as before. However, this second or upper-tier loading cradle has its can lifting members 244 spaced by the posts 243 much higher above the beam 242 than their equivalents in the lower-tier cradle.

To receive the second tier of cans from the second tier cradle, parallel rails 40² comprising narrow bars are affixed longitudinally to opposite walls of upper partition plates such as C², D², E² (FIG. 4) aligned with and above the most advanced portions of the partition plates A-E, respectively. The rails 40² are at a level above the lower rails 40 not less than enough to provide free passage of the tops of the cans below the upper rails. As in the case of rails 40, the rails 40² support cans only adjacent their periphery, this time, however, to allow movement of vertical pusher arms 248 which extend up from the forward end of the longitudinal beams 242. The pusher arms 248 extend to the top of the cans loaded on the upper-tier rails.

Similarly, to the beam-guides 168, 168' for the slide 166, a gap is provided between aligned guide sections 268, 268' for the slide 266 (which is similar to slide 166) to allow for passage of the support of the beam 240 and chain 130 in their movement.

The upper and lower-tier cradles are positioned or spaced equidistant around the chain so that one cradle will start its rise when the other is starting its descent.

Under ordinary conditions, as will hereinafter appear, the machine will stop with a load of cans, W, on the upper tier and with the machine in the position of FIG. 1. With that in mind and from the foregoing description, it will be understood that as the chains 130, 130' move at the starting up of the machine, the lower-tier cradle will first lift a complement or group of cans, X, from the rails 40 and elevate them and move them forward past stop 42. Then the lower-tier cradle will start its descent and will set down the cans upon the rails 40 beneath the upper tier as shown in FIGURE 2. Meantime, the upper-tier cradle has started its upward ascent and in due course will lift up a new group of cans, Y, which meantime will have been separated by the separating mechanism from the row of cans in back of it again as indicated in FIGURE 2. This new group of cans will be lifted and carried forward by the upper-tier cradle preparatory to placing them upon the upper-tier rails 40². However, there are cans upon both the upper-tier and lower-tier, which the pusher arms 248 of the upper-tier cradle will engage in each lane, respectively, and will push them forward off both the bottom rails 40 and the upper rails 40² simultaneously into a waiting case 170 which will thus

be loaded with both upper and lower tier cans simultaneously as shown in FIGURE 3.

In order to overcome a tendency of the leading cans in the upper tier to tip over as the pushing of the load into the case starts—particularly when smaller diameter cans are being loaded—a plate 248a is affixed to the front face of the lower portion of each of the pusher arms 248. These plates terminate below the bottom of the upper-tier cans. Thus, the lower tier is pushed slightly in advance of the upper and affords support in advance of the runs of the upper-tier cans.

Full case handling and lowering

To receive the cans pushed off the lower and upper tier rails 40 and 40², respectively, a case 170 rests on its side with its end flaps opened and facing the oncoming cans. The case rests on a platform 172 which is movable from the horizontal position shown in FIGS. 2 and 3 for receiving the two tiers of cans to the vertical position of FIG. 1, when full. From the latter position, the full case is removed.

Referring to FIGS. 4 and 16, the platform 172 is mounted on a supporting arm 173 secured to one end of a leg 174 whose other end is affixed to the midpoint of a shaft 175 from which the arm extends perpendicularly. The shaft 175 extends across the machine and is pivotally supported at its ends in the machine frame.

To hold the shaft 175 in positions spaced 90° apart with the platform horizontal (FIGS. 2 and 3) or vertical (FIGS. 1 and 4), a disc 176 is fixedly mounted perpendicular to, and near one end of, the shaft. Into the periphery of the disc, two notches 176d and 176h are cut about 90° apart to receive a spring-pressed lock pin 177 urged constantly in a radial direction toward the periphery of the disc (see FIG. 16.)

The pin 177 may be withdrawn from whichever notch it is in by an electromagnetic solenoid 178 whose armature 178a is pivotally connected to a link 179 which, in turn, is pivotally connected to the pin.

When the platform is horizontal (FIG. 3), after the case is full, withdrawal of the locking pin 177 from notch 176h will allow the platform to pivot downwardly about shaft 175 until it reaches the position of FIGS. 4 and 16. When down, the case 170 is supported by an arm 180 extending horizontally perpendicular to the platform away from the machine. This arm may be arranged, with reference to a conventional conveyor for taking the case away from the machine, so that the case will be laid on the conveyor as the arm 180 reaches its lowest point.

In order to retard or slow down the lowering motion of the case, and also, to bias the shaft 175 and platform 172 into the horizontal position of the platform, a conventional hydraulic dashpot is connected to the shaft 175 by a flexible connection in the form of a chain 182.

As the case and platform move down, the chain winds part way around the shaft and pulls piston rod 184 and piston outwardly of a cylinder 186. This movement is retarded by oil within the cylinder, which must pass through a restricted orifice in usual fashion in such devices which are available on the market. When the platform is released by removal of the case and withdrawal of the pin from the notch 176d, a spring 185 in the cylinder pulls back the piston and piston rod 184 and chain and reversely turns the shaft 175 which raises the platform to a horizontal position again. It is locked there by the pin snapping into the notch 176h.

The letting-down of the full case is automatically controlled from the upper-tier cradle mechanism. For this purpose, a conventional limit switch 203 is affixed to the machine frame in position for its downwardly extending actuating arm 203a to be engaged by the upwardly extending arm 247 of the upper-tier cradle. The switch arm is pivoted by the cradle arm 247 as it passes by, causing momentary engagement of switch contacts within the switch housing. This energizes the solenoid 178

which is in series circuit with the solenoid, across power lines L¹, L² (FIG. 17). The solenoid withdraws locking pin 177 allowing the case and platform to drop pivotally downward. The switch arm 203a returns to original position and the contacts open under the urge of the usual biasing spring within the switch.

Restoration of the platform 172 to horizontal position is controlled by a momentary contact push button switch 204 conveniently located on the switch frame in position for the machine operator to actuate it after the full case is removed from the platform and replaced by an empty case. Switch 204 is in series with the pin-releasing solenoid 178 and in parallel with the upper-tier operated switch 203 so that when the switch 204 is operated, pin 177 is withdrawn releasing the platform for return to horizontal position from FIG. 16 position.

When the case-receiving platform 172 has been restored to horizontal position, a flat side 176f on the disc 176 comes under a pivoted actuating arm 190 of a conventional limit switch 192 which is mounted upon the machine frame at the side adjacent the disc 176. This closes the limit switch 192 and allows recycling, i.e. operation of the machine, but only if a case is in position to receive a new load of cans and the lanes are full.

In order to prevent operation of the machine until a case is in position on the platform, a case-presence or sensing switch 194 is mounted on a beam extending over the upper tier of cans. A spring-biased switch-contact actuating arm 195 which is pivotally mounted extends down in position to be engaged and moved by the flap of a case when the case is in can-receiving position on the platform.

Movement of this switch arm 195 closes switch contacts within the housing of the switch 194. When the case is let down or if it is removed or not in place, the switch arm 195 is urged outwardly by its biasing spring and the switch contacts within the switch 194 open. This prevents operation of the machine, as will more fully appear in connection with the description of the wiring diagram.

It is necessary to properly locate the opened case 170 with relation to the load to be pushed off the upper and lower tier rails and to guide the cans into the case. For those purposes, a series of leaf-spring fingers 197 equal in number to, and aligned with, the lanes are each supported at one end upon an S-shaped bracket (FIG. 15) mounted on the transverse beam 193. For sidewise guidance of the cans, upper and lower vertically-disposed spring guide plates 198, 199 are affixed to the two outside partition plates E and E² (e.g. see E² and 198 in FIG. 4). Similar spring-guide plates are affixed similarly at the other side of the machine.

The ends of the fingers 197 and vertical edges of plates 198, 199 extend just into the case as it sits on platform 172 when the latter is horizontal. The fingers and plates are bent toward the cans to press against them and guide them into the case. The fingers and plates 197, 198, 199 constitute a funnel on which an empty case can be manually placed, opening and holding open the side and top flaps of the case. The bottom flaps are caused to bend down by tapering the ends of the rails 40 under which that flap slides as the platform carries the empty case up to horizontal position.

Main drive and operation of single revolution clutch mechanism

From the foregoing, the movement of the cans along the lanes and their removal will be generally understood.

The mechanism for transmitting power to the can elevating and take-off mechanism and for shutting off power to stop operation of the can-elevating and take-off mechanism in timed relation to the accumulation of a full complement of cans on the rails will now be more fully described. This mechanism includes both a single revolution mechanical clutch and electric switching circuits.

Before this mechanism is caused to operate, certain conditions in the sequence of machine operations must be met. These conditions are:

(1) There must be enough cans in the lanes to push the row of cans along the rails 40 into position for one full tier or group to be lifted.

(2) The leading cans in all lanes must have pressed against and moved forward the stop lug 42 and slides 44 in all lanes.

(3) The platform must be horizontal and in readiness to receive the cans as they are pushed off the rails of the lanes.

(4) A case must be on the platform 172 to receive the cans.

If any one of these four conditions is not satisfied, the clutch mechanism will not be actuated and cans will not move past the stop lugs 42 on slide 44.

(5) Alternative to conditions 3 and 4; when the lanes are full and there are no cans on the lower tier (but there may be cans on the upper tier) operation of the single revolution clutch may take place for one revolution without conditions 3 and 4 being fulfilled. This provides for automatic starting but limits running to one revolution of the clutch and stops operation before the load is pushed off the upper and lower tier rails, unless conditions 3 and 4 are fulfilled.

The first conditions to be satisfied are the filling of the lanes and the movement of the cans forward on the rails 40 to push all slides 44 forward. When the last slide is pushed forward the transverse rod 50 (on the lever arms 52, hereinabove described, see FIGS. 4 and 9) is freed to pivot together with its mounting shaft 54 about the axis of that shaft. This tilts the mercury switch 59 downwardly and closes the mercury switch, since it is also mounted on the shaft 54.

Now as the platform 172 is swung up to horizontal, the shaft 175 and cam disc 176 will rotate so that the flat 176f will be under the arm 190 of the switch 192, closing that switch. A case (which will have been manually placed and held on the funnel 197, 198, 199 while the platform was down) will be supported by the platform when it moves into horizontal position. In that position, the top flap of the case will hold the arm 195 of the case-sensing switch 194 in switch-closed position. Closing of the last switch, whether it be the platform switch 192 or mercury switch 59, will energize a clutch-controlling electromagnetic solenoid 150 mounted on the machine frame plate F. The armature of the solenoid is connected to a plunger 151, see FIGURES 6 to 8, inclusive that is non-rotatable about its axis but is pressed inwardly of the machine (outwardly of the solenoid) by a spring 152 and has a latch arm 153 radially extending therefrom substantially horizontally. The arm 153 has a notch 153n in its lower edge to receive a pin 154 laterally extending from a pawl 155 in position to be caught and held by the latch arm at a certain time as will presently appear.

The pawl 155 is pivotally mounted on the cam 110 on the opposite radial face from the cam tract. The pawl is biased toward the main shaft by a coiled tension spring 156 whose ends are coiled around anchor pins extending in opposite directions toward each other from adjacent faces of the pawl and cam, respectively. The pawl is spaced from the surface of the cam by enlarging the diameter of its pivot pin 109 between the surface of the cam and the adjacent surface of the pawl, as shown at 109a. This space provides room for the spring 156. The nose or tooth of the pawl is biased toward engagement with the teeth of a ratchet 106. The pawl lies in the same plane as the ratchet which is fixedly mounted on a reduced portion 104' of a hub 104 loosely mounted on the end of the main drive shaft 18. The hub 104 also has fixedly mounted on another reduced portion 104' (FIG. 7) a sprocket 100 which is continuously driven by a chain 102 from the sprocket 15 on the outward

shaft 13 of the gear reduction. Thus, whenever the pawl and ratchet are in engagement, cam 110, cam 114 and sprocket 112 will be driven as a unit by the pawl and ratchet from motor M via the gear reduction and chain of connections just described.

When the cam, pawl, ratchet and hub are permitted to rotate as a unit, by energization of the clutch-controlling solenoid 150 pulling away or disengaging the latch arm 153 from the laterally extending pin 154 on the pawl, the rotation can continue only so long as the solenoid is energized. Upon deenergization of the clutch solenoid 150, the spring 152 will move the armature and latch arm back into the plane in which the pawl pin 154 is rotating. When the pawl pin reaches the latch arm 155, the pin 154 will engage an inclined surface in the notch 153n and will be lifted from its engagement with the teeth of the ratchet. For this purpose, the surface of the notch 153n is tangential with reference to the orbit of pawl pin 154 and in position to be engaged by that pin. The notch 153n is undercut from the inclined surface so that as the pin rides along the inclined surface, the pin will eventually fall into the undercut and be held there with pawl disengaged from the ratchet 106. This stops rotation of the cam 110, cam 114 and sprocket 112, but the ratchet, hub and sprocket 100 will continue to rotate so that as soon as the clutch solenoid is again energized the pawl will be freed for reengagement with the ratchet and the rotation of the cam 110 will resume.

The solenoid will remain energized as long as all four of the conditions, or the first, second and fifth conditions, for machine operation as above itemized are fulfilled. Thus, if the solenoid be only momentarily energized to release the pawl pin 154, only one revolution can take place before a pawl pin 154 is again caught within the notch 153n and lifted away from the ratchet 106.

The machine will always stop in the same position except under emergency conditions such as by slipping or temporary manual disengagement of the overload clutch (not shown) between the reduction gearing and the drive sprockets; or interruption of electric power to the motor by (a) opening the main switch, or (b) tripping of conventional current-overload devices. But such emergency stops will not upset the timing of the machine operations.

Stopping in the same position is ensured by the one revolution clutch always cutting out at the same place and by coordinating the can-elevating mechanism (chains 130, 130', etc.) with the clutch so that the clutch revolves once as each tier of cans is put in place. In other words, a full trip of the chain around its path will involve two revolutions of the single-revolution clutch. This is necessary because two groups of cans must be separated from each row—one for the lower and one for the upper tier—to fill each double tier case.

In order that the machine may start cycling automatically when the main switch is closed and there are enough cans on the conveyor to feed continuously into the lanes, there is a conventional limit switch 202 attached to the machine frame with an actuating arm 202a extending down in position to be engaged by the upper corner of the triangular member 164 attached to the slide of the lower-tier cradle operating mechanism. The engagement will take place and will close the contacts of the switch as that member 164 reaches the end of its travel rearwardly, i.e. just as the lower-tier cradle beam 140 is to start up. The engagement will continue during the upward travel of the cradle, but will terminate thereafter with the result that the contacts of switch 202 will open and remain so during the remainder of the travel of the cradles with the chain. The upper-tier slide will not affect this switch 202 because the lower-tier slide is on the opposite side of the machine. As is shown in the wiring diagram of FIG. 17, switch 202 bridges the case-sensing switch 194 and platform switch 192 so that with both these switches open, one cycling of the

one revolution clutch to place a lower tier of cans in place can take place. Thereafter, the machine will stop unless both the case-sensing switch and the platform switch are closed.

Adjustment of the cams 110 and 114

It is necessary for the action of the insertion and retraction of the separating fingers 60 and 66 by the cam 114 and the separating movement of the finger 66 by the cam 110 to be coordinated and for both to be accurately timed relative to the whole cycle of operations of the machine. To provide for adjustment of the cams with relation to the sprocket 112 in its drive of the take-off mechanism (hereinbefore described) the cams are mounted on the bushing or sleeve 115 on the main shaft 18 so that the cam 114 can be adjusted relative thereto individually and the sprocket 112 can be adjusted relative thereto also individually.

Referring to FIGS. 6, 7 and 8 particularly, the separating-cam 110 is bolted against the end or is otherwise fixedly secured to the sleeve 115 which, as previously indicated, is rotatively mounted on main drive shaft 18. On the other end of sleeve 115, the cam 114 is adjustably mounted. Between cam 114 and cam 110 the sprocket 112 is adjustably mounted on the sleeve 115. This sprocket drives the chain 119 which, it will be recalled, drives the can-elevating and take-off mechanism.

For securing the adjustment of the sprocket 112 relative to the sleeve 115, a diametrically split clamping ring 117 is mounted on the sleeve on one side of the sprocket. On the other side of the sprocket there is a circumferential or annular enlargement 115a on the sleeve. Both the clamping ring and the enlargement have their adjacent edges cut in toward the main shaft thus providing annular recesses and shoulder facing one another and facing the sprocket. The periphery of the open center of the sprocket is received in these recesses which thus locate the sprocket relative to the axis of the main shaft.

To clamp the sprocket between the enlargement 115a and the clamping ring 117, a bolt 116 parallel to the main shaft has its end threaded into the clamping ring and its shank passing through the sleeve enlargement 115a. The bolt 116 also passes through a stop-ring 111 against the outer surface of which the underside of the bolt head presses. The ring 111 abuts the end of the sleeve 115 so that as the bolt is tightened the clamping ring 117 is drawn toward the sprocket and the sprocket is clamped between that ring and the enlargement 115a. The ring 111 by reason of its abutment against the end of the sleeve limits movement of the bolt and of the stop-ring 111. Clearance is provided between the stop-ring and the hereinafter described clamping ring for cam 114, so that bolt 116 performs no clamping action with respect to cam 114. Thus, it will be seen that the sprocket 112 is clamped to a sleeve 115 in the properly adjusted position independently of any other part or the sleeve.

Adjustment of the cam 114 on the sleeve may be made independently of the sprocket 112 and while the sprocket is secured. For that purpose the periphery of the open center of the cam 114 is cut at both edges to provide similar oppositely facing annular shoulders and recesses. In one recess the cam-clamping ring 118 seats. Into the other recess the edge of the enlargement 115a on the sleeve is extended.

To clamp the cam 114 between the ring 118 and the sleeve enlargement 115a a bolt 113 parallel to the axis of the main shaft 18 passes through the ring 118 and threads into a bore in the sleeve enlargement 115a. The head of the bolt 113 is countersunk into the clamping ring 118 so that as the bolt 113 is tightened it is drawn into the sleeve and its head presses the ring 118 against the annular radial shoulder of the cam thus clamping the cam 114, ring 113 and sleeve 115 together. Loosening of the bolt 113 will allow the cam 114 to be rotated

FIG. 11 illustrates the single tier form. The cradles are both similar to the lower tier loading cradle of the previously described form having longitudinal beams 342 on transverse beams 340 and L-shaped lifting members 344. But the vertical pusher arms 348 on the forward end of the longitudinal beams 342 need only be high enough to push the lower tier into a single tier case.

The first cradle to rise will take the group of cans X' from behind the detecting lugs (not shown in FIG. 11), lift the group over and deposit it in advance thereof. Then the second cradle will do the same with the next group Y', but in moving forward will push group X' into case 370. The lower tier switch 202 will be disconnected in this use and a lug will be attached to the transverse beam 140 at the end nearest to the chain 130' in position to engage arm 203^a of the case-platform dropping switch 203 so that the platform and filled case will drop automatically on each passage of a cradle, i.e. each filling of a case.

Packing rectangular packages

A diagrammatic illustration of a modification to pack rectangular boxes is shown in FIGS. 12, 13 and 14. The separating mechanism is substantially as in can packing, but due to the absence of space for the lugs 60 and 66 to enter at the sides of the lanes between the peripheries of adjacent cans, the lugs 60 and 66 in this instance lift one box slightly before causing the group to be separated from it and the remaining boxes in the row.

In each lane, an inverted U-shaped bracket, designated by numeral 400, wider than the box is affixed to the machine frame just over the tops of the box. The forward leg 402 of the bracket becomes engaged by the forward top edge of the box and holds the box from further advance. The lug 66 pushes the group in advance of it to separate the group from the boxes behind in the row.

To keep the box that is next in the row to the elevated box from also being elevated during the upward movement of the former, due to friction between the abutting sides of those two boxes, a horizontal foot 406 extends from the end of the bracket lug 404 and lies over the top of said next box.

When the support of the lugs 60 and 66 tilts down, in following the sequence of machine operations as in can packing, the elevated box drops down also, and the row can move forward again.

To assist and ensure the dropping, an elevated T-shaped presser member 412 is mounted in the transverse portion of the U-part of bracket 400, and is pressed down on the box top by a spring 410 coiled about the leg 408 of the presser.

The invention as described in the foregoing embodiments is applied to a machine to pack single and double-tier can or package loads into end-opening cases. With only a slight modification, the machine can be adapted to pack either six-can packs in a single tier or in a double tier or rectangular containers in single or double tiers. It can also be adapted with slight modification to pack six-can packs in either single or double tiers in top-opening cases and end-opening cases and to pack rectangular packages in single or double tier in top-opening cases. Likewise, with slight modification, it can pack single or double tier cans or six-can packs in side-opening cases.

Many modifications within the scope of the invention will occur to those skilled in the art. Therefore, the invention is not limited to the specific embodiments described.

I claim:

1. In a case-loading machine, a conveyor supporting articles to be loaded, means to maintain the articles in parallel rows during conveyance, supporting means onto which said articles are moved by said conveyor, means to separate from each row of articles on said supporting

means a group to be loaded in a case, loading means including endless conveying means to transport said group into a case-loading position, while inserting a preceding group from said position into a case.

2. In a case-loading machine, a conveyor supporting articles to be loaded, means to maintain the articles in parallel rows during conveyance, supporting means onto which said articles are moved by said conveyor, means to detect the presence of a full row of articles on said supporting means, means to separate from each row of articles on said supporting means a group to be loaded into a case, said separating means being activated by said detecting means, loading means including endless conveying means to transport said group into a case-loading position while inserting a preceding group from said position into a case.

3. A case-loading machine as claimed in claim 2 in which the separating means comprises separable members, means to move said members into the path and to withdraw them from the path of said articles, and means to move said separable members relative to each other to separate a group from its row.

4. A case-loading machine as claimed in claim 3 wherein the separable members are mounted on tiltable support, and wherein the means to move said separable members into and from the article path includes a cam which is revolvable once to separate a group from its row.

5. A case-loading machine as defined in claim 2 wherein the means activated by the detecting means includes a normally disengaged rotary clutch which when engaged remains operable for one full revolution during which only one group is transported to case-loading position; wherein there is provided means biased to disengage said clutch and to maintain it disengaged after said one revolution; and wherein there is provided means activated by the detecting means to deactivate said disengaging means.

6. In a case-loading machine, means supporting a plurality of parallel rows of articles to be loaded, means to pick up from said supporting means a complement of articles from each row to form a group and to transport the group into a case-loading position, and means to remove the group from case-loading position and to insert the same into a case while placing a succeeding similar group in case-loading position, wherein the transporting means comprises endless conveying means, cradle means carried by said conveying means for lifting up a group and moving it longitudinally of the machine and then lowering it into case-loading position, said cradle means having an article-bearing portion, and means maintaining the article-bearing portion of said cradle means substantially horizontal at all times during its travel.

7. A case-loading machine as claimed in claim 6 having a pivotally-mounted case support, means to latch said support in position to receive the articles from said case-loading position and means to automatically unlatch said case support on completion of loading to allow the loaded case and support to pivot downwardly.

8. A case-loading machine as defined in claim 7 having means to retard and cushion the downward movement of said support and case, means for latching said case support in down position, and means preventing operation of said removing means when said support is not in loading position with a case thereon, said transporting means including means for operating said automatic unlatching means.

9. In a case-loading machine wherein rows of articles to be loaded are supported in parallel rows, means to pick up from each row a complement of articles to form a group and to transport the group into another position comprising endless conveying means, cradle means carried by said conveying means for lifting up a group and moving it longitudinally of the machine and then lowering it into said other position, said cradle means having

about the axis of the shaft without changing the position of any other part on the sleeve 115 or moving the sleeve itself. Thus, the relative positions of the cams 110, 114 and the sprocket 112 can be varied, independent adjustment of the sprocket 112 being by loosening of the bolt 116 and independent adjustment of the cam 114 being by loosening the bolt 113.

Operation

The operation of the machine will be described in connection with the wiring diagram of FIG. 17.

For normal manual control of the cycling without stopping the main motor and conveyor 15, an auxiliary or selector switch 201 is placed in series in the cyclic control circuit where its opening or closing will interrupt or allow cycling.

Various conditions may have brought about stopping of the cycling of the machine after previous operation.

1. There may have been insufficient cans in the lanes to detect a load.
2. The platform may be down.
3. There may be no case to be filled on the platform.
4. The main switch may have been opened with the lanes full.
5. An auxiliary or selector switch may have been manually opened.

6. An overload, mechanical or electrical, may have caused stoppage or the overload clutch may have been opened manually.

The machine is started by closing a conventional main line switch (not shown) which starts the motor M. This immediately starts driving the main shaft 18 and, hence, the conveyor and the ratchet 112 of the single revolution clutch mechanism and the presser roll 30.

If condition No. 1 above exists, additional cans must be put on the conveyor, whereupon the cans will be moved forward along the lanes by the conveyor until all lanes are full and the leading can in each lane has engaged the stop or detecting lug 42 pushing the slide 44 forward with its detent 7. When all have been pushed forward, the detents 7 will have released the shaft 50 which thereupon tilts, causing closing of the mercury switch 59.

Assuming the auxiliary switch 201 to be closed, the closing of the mercury switch 59 will energize the single revolution clutch-control solenoid 150 — provided the case-platform switch 192 is closed (the platform 172 is horizontal) and the case-sensing switch 194 also is closed (a case in place on the platform 172), all of these switches being in series with the clutch solenoid across lines L1, L2.

Energizing the clutch solenoid 150 will activate the single revolution clutch. During one revolution of the clutch, the following actions will occur:

(a) The cam 114 will tilt the bracket and rod 64, 62 upwardly, causing insertion of separating lugs 60 and 66 between the cans.

(b) Separating-cam 110 will cause the transverse push rod 80 to move lug 66 forward of lug 60, thus separating a group of cans from the row.

(c) Cam 110 will return the slides 44 to their original positions in readiness to detect the next group of cans.

(d) Also, while the clutch is revolving, the chains 130 and 130' of the can elevating mechanism will be driven to transport the cans to case-loading position (FIGS. 1 and 2).

Alternatively to the foregoing, if the platform switch 192 or case-sensing switch 194, or both, are open as they will be after loading a case, the lower-tier-operated switch 202 may possibly be in closed position due to failure of can supply to the detecting means, i.e. movement of slides 44 by cans abutting stop lugs 42. When the supply is resumed and the detector is activated, mercury switch 59 will close while the switches 194, 192 are by-passed by switch 202. Hence, the clutch solenoid 150 will be ener-

gized and the machine can cycle once to place a lower tier load in position for loading into a case.

If the machine has stopped after loading a case when the supply of cans is adequate, a group of cans, W, will have been left on the upper-tier rails (see FIG. 1) and the lower-tier cradle will have picked up and moved into loading position a group of cans X for the lower tier. This will allow the conveyor to move cans Y and Z forward in the lanes and for a new load Y to be detected by the action of the leading can pushing the detector lug 42 and slide 44 forward again. The machine will stop, however, with cans on both upper and lower tiers because both the case-sensing switch 194 and the normally-open lower-tier switch 202 are open, the lower-tier cradle being "forward" and not touching switch 202.

To get the load consisting of upper tier W and lower tier X into the case by starting the cycling, the previously loaded case is removed manually (or by conveying means not shown) and an empty case will be manually placed and held on the funnel 197, 198, 199. Then the momentary manual push-button switch 204 is pressed. This momentarily energizes the case-drop solenoid 178 withdrawing the pin 177 from the notch 176d into which it had been snapped by its biasing spring when the loaded case was let down. The release of disc 176 allows the case platform 172 to be returned back up to horizontal position by the spring 185 in the cylinder 186. The platform now supports the empty case which is now ready to receive the load W, X; the platform switch 192 is closed and case-sensing switch 194 has been closed.

Closing switches 192 and 194 energizes the clutch solenoid 150 and the machine starts cycling, with the upper-tier cradle being the first in this instance to pick up a new group or load Y. On picking up group Y, the upper-tier cradle will move that group onto the upper-tier rails while pusher 248 pushes the lower tier and the upper tier W into the waiting case.

As the pusher 248 completes loading of the case, the upper-tier cradle momentarily actuates the switch 203 closing it as the upper-tier cradle passes by. This energizes the case-drop solenoid 178 (FIG. 16) withdrawing pin 177 from the notch 176h allowing the case platform and case to be let down slowly under the retardation effect of the oil cylinder 186.

Recycling will continue as long as the operator continues to replace the full case with an empty one and to push the manual momentary push button switch 204, and so long as there is a supply of cans fed by the conveyor along the rails adequate to activate the detecting lugs 42 and slides 44.

If the main line switch is opened at any time (condition 4 above), or if an overload has caused stoppage (condition 5), everything will stop at once, immediately. Reclosing of the main switch or removal of the overload will result in starting the machine at the precise place in the cycle where it stopped.

If stoppage occurs for lack of cans to detect a load (condition 1) or because the platform was not up or by absence of a case in position to be filled (conditions 2 and 3), the satisfying of those conditions will automatically start the machine cycling again.

If the auxiliary or selector switch 201 is opened to stop the cycling, can-transporting movement of the endless chain conveyor and cradles will continue, but only until the single revolution clutch completes the revolution it had started. Reclosing switch 201 restarts the cycling beginning with transporting to either the upper tier or lower tier depending on which tier was not served last.

Single tier packing

The embodiment just described packs double tier can loads into end-opening cases. By making both cradles alike and of height to only insert cans into the lower tier, the machine will load single tier cases.

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an article-bearing portion and means maintaining the article of said cradle means substantially horizontal at all times during its travel.

10. The pick up and transporting means as claimed in claim 9 wherein the endless conveying means comprises parallel chains, a plurality of sprockets driving the chains in synchronism, a transverse beam pivotally supported from said chains, and wherein the means to maintain the article bearing portion horizontal includes slidable means, parallel linkage means pivotally connected to said slidable means and to said chains, there being two cradle means equally spaced along said chain, the parallel linkage and slidable means for one cradle means being on one side of the machine while the slidable means and linkage for the other cradle means is on the other side of the machine.

11. The pick up and transporting means as claimed in claim 9 wherein the endless conveying means comprises parallel chains, a plurality of sprockets driving the chains in synchronism, and a transverse beam pivotally supported from said chains; wherein the article-bearing portion is carried by the transverse beam; wherein the means to maintain the article-bearing portion horizontal includes slidable means, parallel linkage means pivotally connected to said slidable means and at least one chain; and wherein the linkage means comprises parallel links of equal length, each pivotally connected at one end to said slidable means at vertically spaced pivot points, the opposite ends of said links being pivotally connected to said cradle means at pivot points which are spaced at a distance equal to the spacing of the pivot points at said one end.

12. In a case-loading machine wherein rows of articles to be loaded are supported in parallel rows in upright position, means to pick up from each row a complement of articles to form a group and to transport the group to another position comprising endless conveying means, cradle means carried by said conveying means and having an article bearing portion, means to maintain said article-bearing portion substantially horizontal while picking up and transporting said group, said conveying means being constructed and arranged to move said cradle means substantially vertically to pick up said group and substantially horizontally toward said other position and substantially vertically to deposit the group in said other position.

13. In a case-loading machine, means supporting a plurality of parallel rows of articles to be loaded, means to pick up from said supporting means a complement of articles from each row to form a group and to transport the group into case-loading position at one level, means to pick up from said supporting means a complement of articles from each row to form a second group and to transport said second group into case-loading position on another level, means to remove both groups from their positions and to insert them into a case while placing a succeeding group into the case-loading position of said first group.

14. A case-loading machine as claimed in claim 13 wherein the transporting means includes endless conveying means, cradle means supported on and moved by said conveying means, and means to maintain said cradle means with said articles in upright position during pick-up and transporting into loading position; said machine having fixed rail means thereon at said different levels on which said articles are placed; said means for picking up and transporting one of said groups including means to slide both groups along said rails into an open case; means to cause the articles on the lower level to enter the case slightly in advance of the articles of the upper level.

15. In a case-loading machine, a conveyor supporting articles to be loaded, means to maintain the articles in

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parallel rows, supporting means onto which said articles are moved by said conveyor, means to transport from said supporting means a complement of articles from each row as a group into case-loading position at one level, means to transport from said supporting means a complement of articles from each row as a group into case-loading position at another level, means to detect the presence of said complements on said supporting means, means activated by said detecting means to cause operation of said transporting means, means to limit the operation of said transporting means to transport only one group into case-loading position for each said activation by the detecting means.

16. In a case-loading machine as claimed in claim 15 wherein the limiting means and the means activated by the detecting means includes a normally disengaged rotary clutch which when engaged remains operable for one full revolution, and means biased to disengage said clutch and to maintain it disengaged after one revolution, and means activated by the detecting means to deactivate said disengaging means.

17. In a case-loading machine, a conveyor supporting articles to be loaded, means to maintain the articles in parallel rows, supporting means onto which said articles are moved by said conveyor, means to transport from said supporting means a complement of articles from each row as a group into case-loading position at one level, means to transport from said supporting means a complement of articles from each row as a group into case-loading position at another level, means to detect the presence of said complements on said supporting means, rotary means activated by said detecting means to cause operation of said transporting means for transporting only one group to said case-loading position each time said detecting means operates.

18. In a case-loading machine, a conveyor supporting articles to be loaded, means to maintain the articles in parallel rows, supporting means onto which said articles are moved by said conveyor, means to transport from said supporting means a complement of articles from each row as a group into case-loading position at one level, means to transport from said supporting means a complement of articles from each row as a group into case-loading position at another level, means to detect the presence of said complements on said supporting means, means activated by said detecting means to cause operation of said transporting means including a normally disengaged rotary clutch which when engaged remains operable for one full revolution, and means biased to disengage said clutch and to maintain it disengaged after one revolution, and means activated by the detecting means to deactivate said disengaging means.

19. In a case-loading machine, means supporting a plurality of parallel rows of articles to be loaded, means to pick up from said supporting means a complement of articles from each row to form a group and to transport the group into case-loading position at one level, means to pick up from said supporting means a complement of articles from each row to form a second group and to transport said second group into case-loading position on another level, means to remove both groups from their positions and to insert them into a case, and means causing the articles on the lower level to enter the case slightly in advance of the articles on the upper level.

20. In a case-loading machine wherein rows of articles to be loaded are supported in parallel rows, the mechanism to pick up from each row a complement of articles to form a group and to transport the group into another position comprising endless conveying means, cradle means carried by said conveying means for picking up a group and moving it into said other position, said cradle means having an article-bearing portion and means

maintaining the article of said cradle means substantially horizontal at all times during its travel.

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