Aug. 18, 1970 A. H. MERKNER ET AL 3,524,300

CASE PACKING MACHINE

Filed July 17, 1968 4 Sheets-Sheet 1

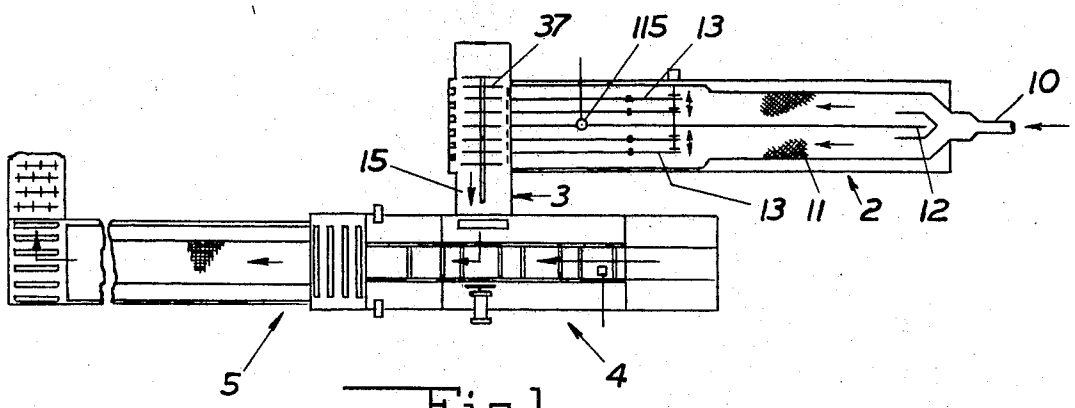


Fig. 1.

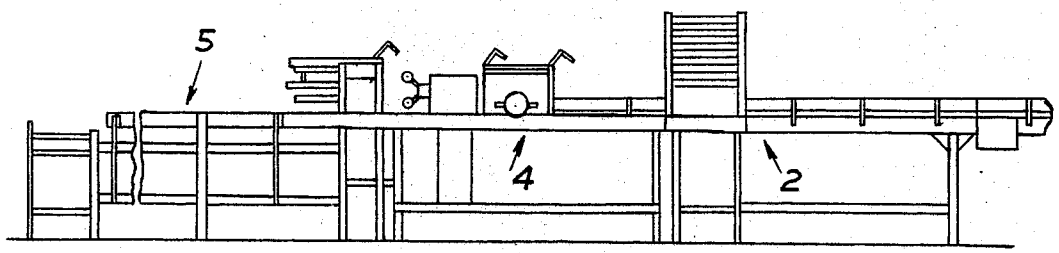


Fig. 2.

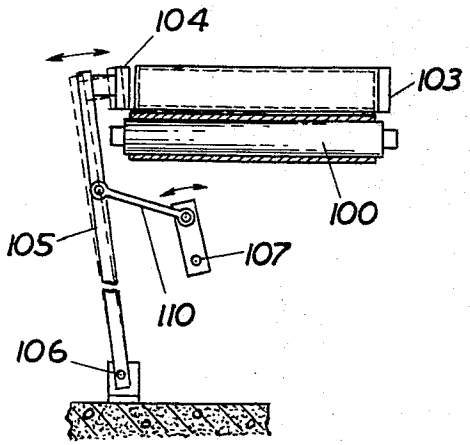


Fig. 8.

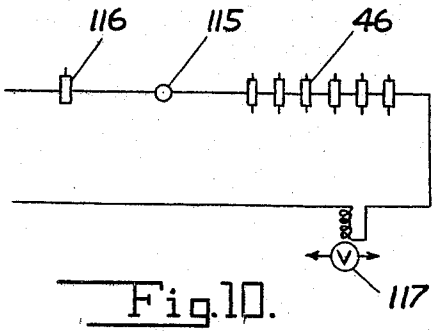


Fig. 10.

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CASE PACKING MACHINE

Filed July 17, 1968 4 Sheets-Sheet 2

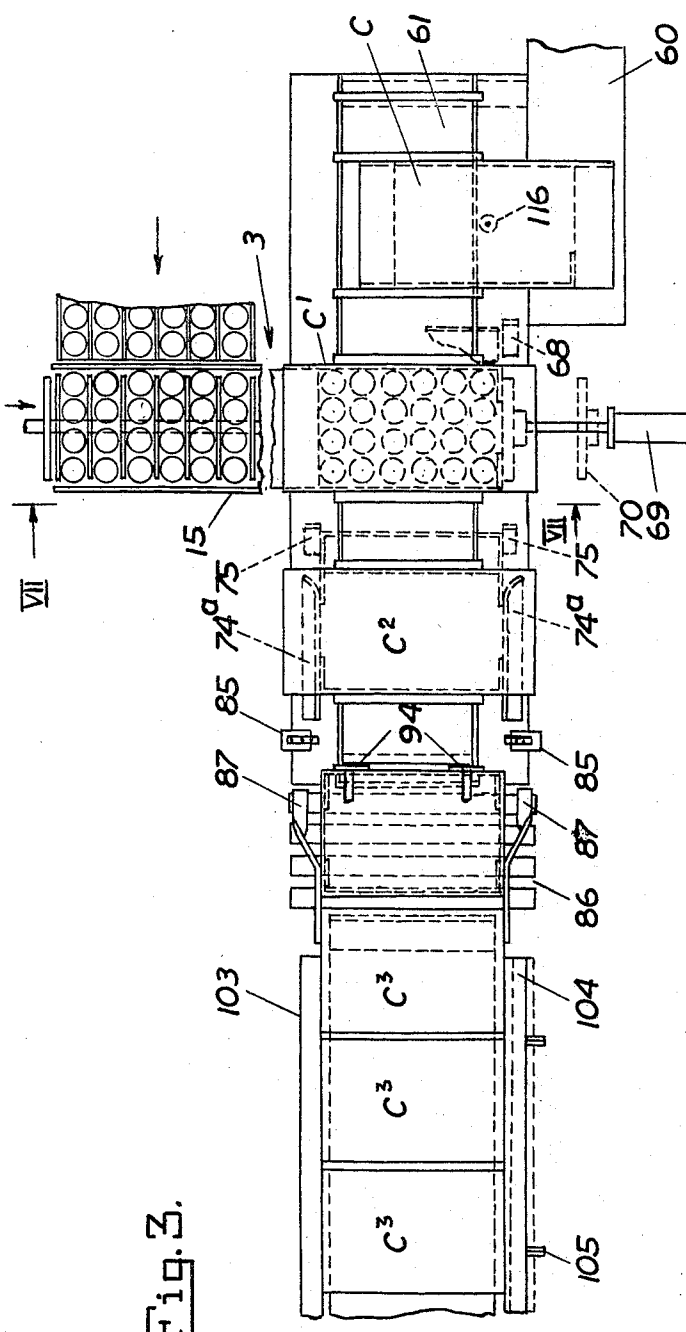


Fig. 3.

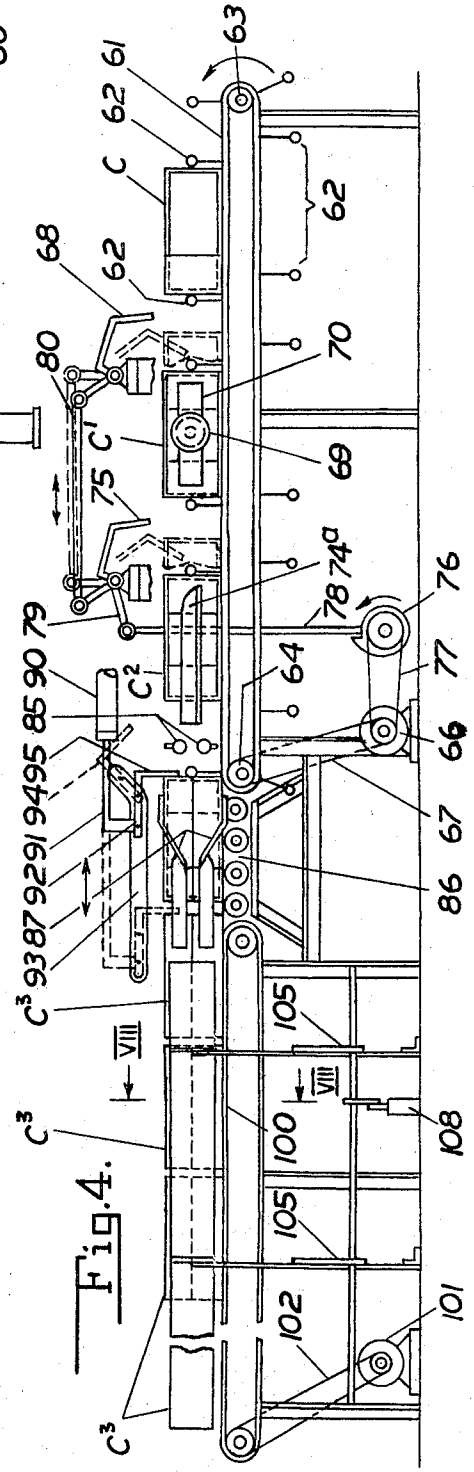


Fig. 4.

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CASE PACKING MACHINE

Filed July 17, 1968 4 Sheets-Sheet 3

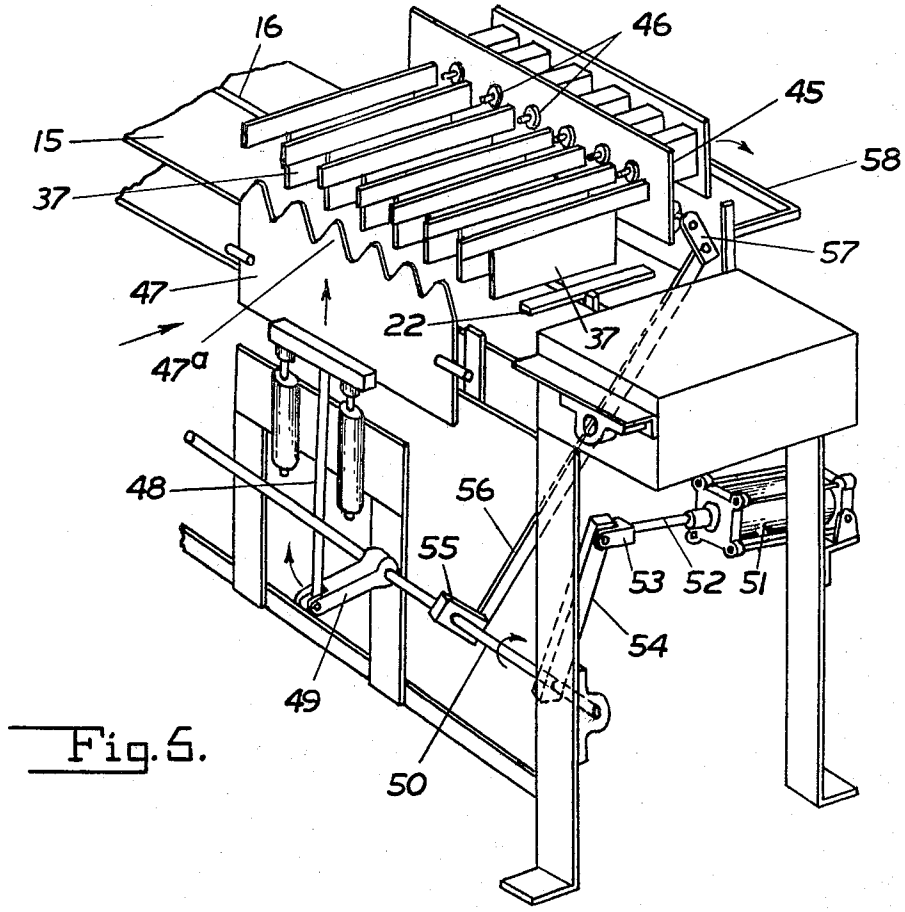


Fig. 5.

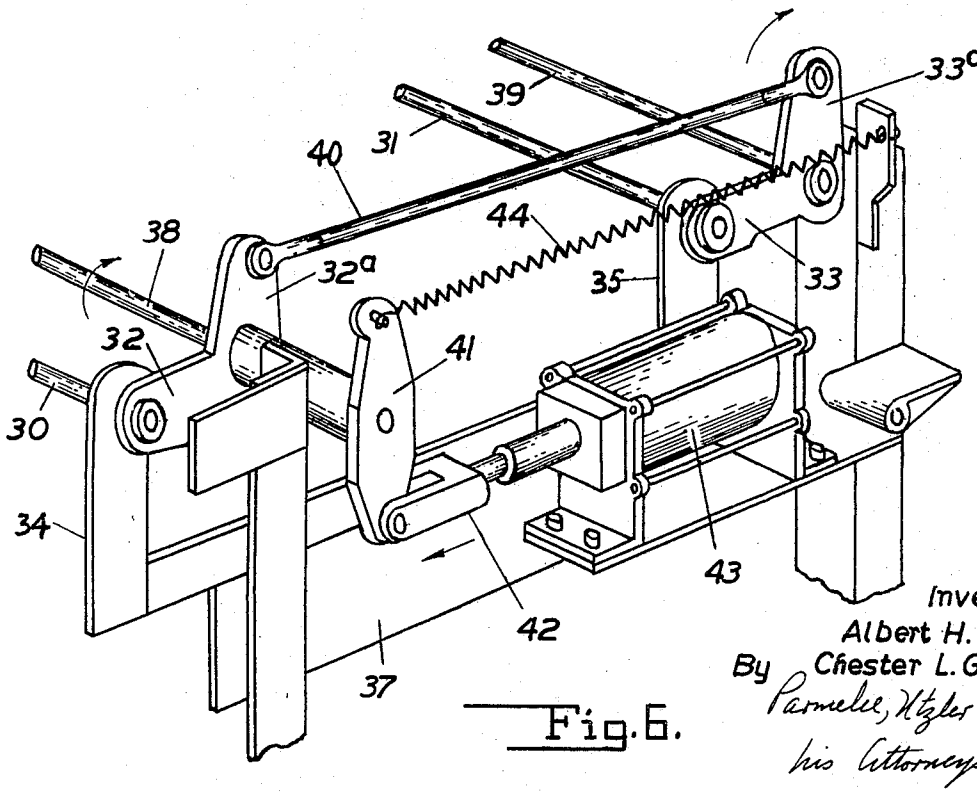


Fig. 6.

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CASE PACKING MACHINE

Filed July 17, 1968 4 Sheets-Sheet 4

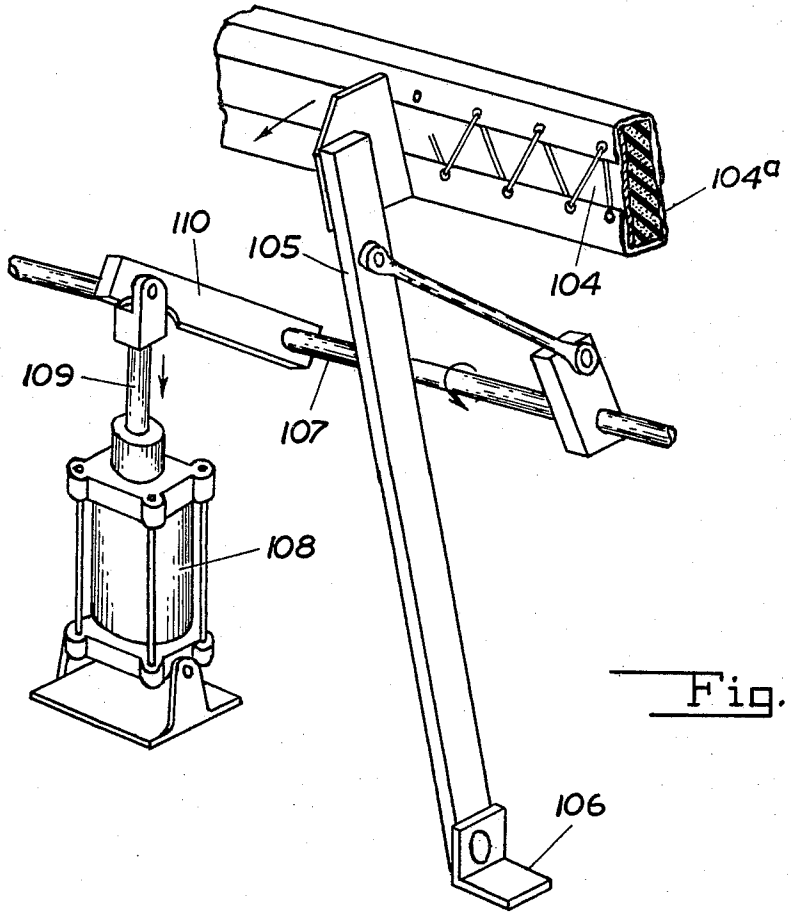


Fig. 9.

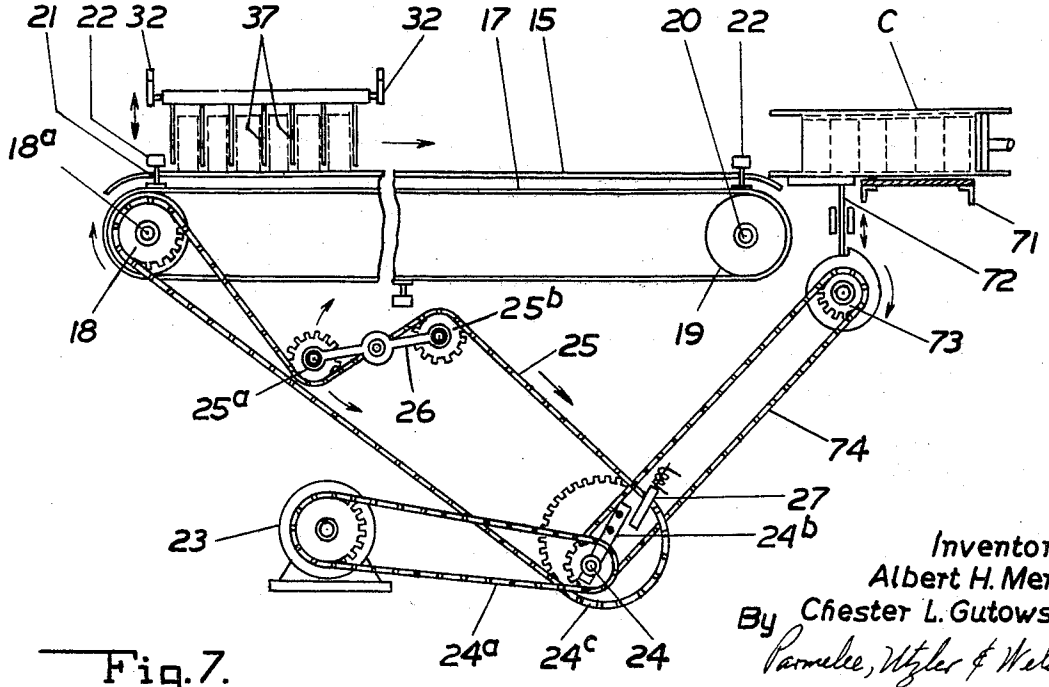


Fig. 7.

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United States Patent Office 3,524,300
Patented Aug. 18, 1970

3,524,300

CASE PACKING MACHINE

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Int. Cl. B65b 5/06, 57/14
U.S. Cl. 53—55 13 Claims

ABSTRACT OF THE DISCLOSURE

There is disclosed a machine for receiving cans from a conveyor, arranging them into a group having a preselected number of cans, usually twenty-four, then automatically moving the group without disturbing the arrangement of the cans in the group and discharging them into the open end of a single-layer carton, sealing the end flaps on the carton with glue, and retaining pressure on the flaps until the glue is set.

FIELD OF THE INVENTION

This application relates to the packaging art, and is for a machine for automatically placing a preselected number of cans or glass jars into a carton and sealing the carton, and then confining the carton until the glue for sealing it has set.

BACKGROUND AND PURPOSE OF THE INVENTION

In the manufacture of canned goods of various kinds, including the food industry, a selected number of containers are packed in a carton, the number of containers generally being designated a case lot. Generally this is twenty-four containers, and hereinafter that number will be used for purposes of describing this invention, but this is by way of illustration and there may be more or less. Commonly some cans are packed into a carton which accepts two layers of twelve cans each, but with other cans, as for example the size designated #82 cans, the entire lot is loaded into a carton of larger area and less height in a single layer. It is to the packing of cans in single-layer cartons or cases that this invention relates.

BRIEF SUMMARY OF THE INVENTION

According to this invention the cans, which in the case of food processing have been filled, sealed, sterilized and labeled, ready for the market, are carried single file on a chain conveyor to the packer. Upon discharge from this conveyor, they are crowded first into two lanes on a wire mesh feed conveyor. The exposed area of the feeder conveyor widens out beyond these two lanes, and assuming that there are twenty-four cans to a case, a partition arrangement directs the two lanes into six parallel lanes on this wider area. These six lanes extend to the discharge end of the feeder conveyor. There is a transfer table elongated crosswise of the feeder conveyor with its can-receiving end located close to the end of the wire mesh feeder conveyor. Cans moving out of the six lanes of the feeder conveyor are pushed onto the transfer table into six aligned cells or alleys formed between partitions or divider plates located over the receiving end of the transfer table.

When all six cells are filled with four cans each, forming a rectangular group of twenty-four cans, a circuit is energized to operate one mechanism that raises a stop plate to block further movement of cans off from the six lanes of the feeder conveyor, and simultaneously raise the divider plates over the transfer table to an elevated position where they are above the can tops. A pusher is then set into operation that moves the cans as a formed

group along the table and off the other end of the table into the open end of a properly-positioned single layer carton. The loaded carton is then moved in increments from can-receiving position to a side flap-closing position, and then to an end flap-gluing position to a top and bottom flap-closing position. The carton is then moved onto a clamping conveyor where the ends are clamped between side rails and released only at intervals when it is advanced in succession as one of a series of filled cartons in increments to the discharge end of the clamping conveyor.

With the moving of the filled carton out of can-receiving position, the partitions above the transfer table lower, the barrier or stop-plate moves out of can-obstructing position, and another case load of cans is arranged on the transfer table to repeat the cycle.

Important to the invention is the general organization wherein the cans moving in one direction are arranged into an organized group containing the preselected number of cans, after which the group is moved transversely to the direction of travel of the cans when they were being arranged in a group, and the group slid endwise into a single-layer carton and the carton closed, and glued, all without manual intervention.

An important object of the invention is therefore to provide an automatic machine of unique construction for arranging a predetermined number of cans into a group of the proper size and shape, and load the group into a single-layer carton.

The invention may be more fully understood by reference to the accompanying drawings showing a preferred embodiment of the invention, and in which:

FIG. 1 is an overall simplified plan view of the apparatus showing the general arrangement, the view being more or less schematic to illustrate the general organization of the machine;

FIG. 2 is a side elevation of FIG. 1;

FIG. 3 is a plan view on a larger scale of that part of the apparatus that includes the transfer table and apparatus immediately adjacent thereto, with the mid section of the transfer table broken out, and with certain overhead structure omitted for purposes of illustration;

FIG. 4 is a side elevation of the apparatus shown in FIG. 3, but with some of the overhead mechanism being shown;

FIG. 5 is an isometric view of the can-grouping end of the transfer table with the partition-operating mechanism removed;

FIG. 6 is a fragmentary detail isometric view of the partition raising and lowering mechanism;

FIG. 7 is a somewhat schematic transverse section with the supporting structures removed showing the transfer table and its pusher, the section being in the plane of line VII—VII of FIG. 3;

FIG. 8 is a transverse section in the plane of line VIII—VIII of FIG. 4;

FIG. 9 is a fragmentary perspective view of the movable side rail operating mechanism at one side of the carton end clamping conveyor; and

FIG. 10 is a schematic circuit diagram of a portion only of the circuitry through which the sequence of operations is effected.

In the drawings, wherein like numerals designate like parts throughout, 2 designates generally the container delivery area from which the cans are delivered to the transfer table 3. The carton feeding and positioning apparatus is designated 4, and 5 is the runout apparatus where the filled cartons are received and clamping pressure applied until the glue on the end flaps has set.

The apparatus designated generally at 2 is for the most part known in the art. Containers, usually sealed cans, are

continuously supplied from a labeling machine or other source in single file from a conveyor **10** and discharged onto a metal screen feed or can-delivery conveyor **11**. A divider **12** first forms them into two lines and further along a plurality of transversely-vibrated partitions **13**, divides the flow of cans into several lanes. In the drawings where cans are divided into case lots of twenty-four, there are six such parallel lanes.

At the discharge end of the conveyor **11** there is the transfer table, designated generally as **3**. It extends crosswise or transversely of the feed conveyor **11**. It comprises a flat, rigid, elongated table **15** with a longitudinally-extending slot **16** (FIG. 5) lengthwise of its center. As best shown in FIG. 7, there is an endless chain **17** under the table, located just below the slot **16**. It passes around a sprocket wheel **18** at the container-receiving end, which is the left end as viewed in FIG. 7. The chain passes around a roll **19** on a shaft **20** at the other end of the table. On the chain **17** there is at least one pusher element comprising a rigid stem **21** that is designed to move along and project through the slot **16**. Preferably there are three such stems **21** equidistantly spaced. Each stem has a cross-bar **22** at the top which, as seen in FIG. 5, is nearly coextensive with the width of the table. Each pusher is therefore generally T-shaped with the stem extending perpendicularly from the chain, and with the cross-bar much longer than the stem, so that as the stem moves along the slot **16** in the table, the cross-bar, extending crosswise over the table, will push anything resting on the table in its path. As indicated by the arrow in FIG. 7, the pushers move along the table, when the chain is moving, from left to right. For clarity of illustration, the stem **21** is exaggerated in the drawing.

The shaft **18***a* with the drive sprocket **18** for the chain is driven through means that will gradually accelerate the pusher from a standing position shown in FIG. 7 to maximum speed, and then gradually decelerate to its stop position by a continuously-driven motor, speed reducer and magnetic clutch unit indicated at **23**. As here shown, the means for accelerating and decelerating the pusher comprises a shaft **24** driven by the motor through drive chain **24***a*. An arm **24***b* on shaft **24** is fixed to a large eccentrically-positioned sprocket wheel **24***c*. A chain **25** passes around this eccentric sprocket wheel and sprocket **18** on shaft **18***a*. The top reach of chain **25** passes under idler sprocket **25***a* and over idler sprocket **25***b*, these sprockets being at opposite ends of a lever **26** pivotally supported between its ends and spring-biased to keep the top reach of the chain **25** taut. It will be observed that the large sprocket wheel **24***c* is much larger than sprocket **18**. The size of sprocket **24***c* is such that one complete revolution of the shaft **24** will rotate shaft **18***a* just far enough to move the group of cans along the transfer table and into the waiting carton, and bring the next pusher into can-pushing position. As the eccentric sprocket **24***c* rotates, part of its initial travel tends to swing the lever **26** into a position where the idler sprockets are more nearly in line, causing the initial travel of the pusher to accelerate. As the eccentric sprocket rotates beyond the point of maximum eccentricity (with respect to shaft **18***a*), the slack that would otherwise develop in chain **25** is taken up by the lever **26** with its idler sprockets, this lever swinging back to the starting position and decelerating the speed of the pusher chain. In brief, the idler sprocket arrangement and eccentric sprocket **24***c* are in effect a lost-motion mechanism to impart non-uniform speed but exact incremental travel to the pusher chain and its drive is schematically represented by a magnetic latch or stop **27** engaging against arm **24***b* on the side of the eccentric sprocket **24***c*. This latch is withdrawn at the instant a rocker bar **45**, hereinafter described, is tilted to the full backward arc of its movement, and the latch is reset when the rocker arm comes back to normal position so that it will then be in position to prevent rotation of the eccentric sprocket past the latch until the next cycle of operation.

Over the can-receiving end of the transfer table there is a vertically-movable frame structure (see FIGS. 6 and 7) comprising front and rear cross-bars **30** and **31**, respectively, carried on the horizontal arms of front and rear bell cranks **32** and **33**. Depending hangers **34** on the cross-bar **30** and **35** on the rod **31** support spaced partition plates or divider plates **37**. There are seven of these plates that align with the partition plates **13** over the chain conveyor, and which form six alleys or cells that align with the six lanes of cans on the mesh conveyor **11**.

The bell cranks **32** are on a rock shaft **38**, and the bell cranks **33** are on a rock shaft **39**. The upwardly-extending arms **32***a* and **33***a* of the bell cranks **32** and **33** respectively are connected by a link **40**. On one end of rock shaft **38** there is a vertical cross-arm **41** to the lower end of which is connected piston rod **42** of an air cylinder and piston unit **43**. To the upper end of arm **41** there is attached a tension spring **44**.

The parts are normally in the position shown in FIGS. 5, 6 and 7, but when the cylinder **43** operates its piston, thrusting it forward as viewed in FIG. 6, the bell cranks are rocked to lift the partitions or divider plates **37** high enough to clear the tops of the containers that are in the alleys or cells between the partitions.

The cans or other containers are pushed forward by the conveyor **11** into the cells or alleys between the divider plates **37**. As best seen in FIG. 5, there is a rocker bar **45** with a plurality of micro-switches **46** thereon, one switch being at the back end of each alley, and these switches are in series.

There is a vertically-movable stop plate **47** between the discharge end of the chain conveyor with a series of projections **47***a* on the top edge, one located to block each lane of the chain conveyor. This can be raised from a lowered position where it offers no obstruction to cans moving from the conveyor into the alleys of the transfer table to block the movement of cans from the several lanes. It is operated by a depending rod **48** which has its lower end pivotally connected to a crank arm **49** on a rock shaft **50** mounted in the machine frame. An air cylinder and piston unit **51** has its piston rod **52** pivotally connected at **53** to a lever **54** on the rock shaft **50**. Another crank arm **55** on the rock shaft **50** is connected through link **56** to an arm **57** at the end of the switch-carrying rocker bar **45**.

The operation of this part of the mechanism is as follows. When cans are pushed from the chain conveyor into the alleys of the transfer table, as each alley becomes full, the cans will press the micro-switches **46** on the rocker bar **45**. When all switches are closed, a relay (not shown) an electrically-operated valve (not shown), will admit air to the cylinder **51**, rocking the shaft **50** to raise the stop plate **47**, blocking any travel of more cans from the several lanes of the conveyor **17** toward the transfer table. At the same time the bar **45** will rock back against a bar **58**, to reset all of the micro-switches. The closing of the circuit to energize cylinder **51** also operates the cylinder unit **43** to effect a raising of the divider plates **37** to a level above the tops of the cans. There is then a formed group of twenty-four cans on the transfer table.

When the bar **45** is rocked back all the way it will engage a switch to energize the magnetic latch to withdraw latch **27** and operate the magnetic clutch in motor drive unit **23**, whereupon the pusher chain will be driven so that the pusher **22**, then in position behind the group of cans, will push the group of cans to the discharge end of the transfer table. Since the air cylinder units **43** and **51** must both operate before the rocker bar **45** is tilted back to energize the magnetic clutch to drive the pusher, the required time lapse is secured between the raising of the divider plates and the starting of the pusher to prevent the dividers from interfering with the movement of the cans along the transfer table.

The arrangement at the discharge end of the transfer table follows. This arrangement is crosswise of the transfer table and parallel with the feeder table at the receiving end of the transfer table. As best seen in FIG. 3, there is a carton-opening bench **60**. An operator stands alongside this table and removes flat cartons from an adjacent stack (not shown). Alongside this table there is an endless conveyor **61** having spaced pairs of flights **62** at regularly-spaced intervals therealong (FIG. 4). This conveyor extends past the discharge end of the transfer table, passing around a roll **63** at its right or loading end as viewed in FIG. 4 and around roll **65** at its discharge end, and it will be seen that the transfer table terminates in a position intermediate these two ends.

The operator at the bench **60** slides a single-layer carton onto the top flight of conveyor **61** between a pair of flights **62**, such a carton being indicated at C in FIGS. 3 and 4. As the carton is loaded on the conveyor, the flaps at the end facing the transfer table are open, there being two short side flaps and two long top and bottom flaps. The similar flaps on the rear or opposite ends of the carton are also open.

The conveyor **61** is driven by a motor and magnetic clutch **66** through a chain **67**. This clutch is operated to drive the conveyor at the same time that the drive motor **23** for the transfer table pusher is activated by the backward movement of rocker bar **45**, and the carton which has been loaded onto the flight conveyor is moved to the position shown in FIG. 7 where its open end confronts the discharge end of the transfer conveyor with the open bottom flap just below the level of the flat top of the transfer table, and the side flaps at this end will have been opened out by "flippers" (not shown, but commonly used in the carton-filling industry).

As the carton moves into this position marked C^1, the leading side flap at the opposite or rear end of the carton is folded in by a fixed guide, and the trailing side flap on this end is moved to closed position by an overhead flipper **68** schematically shown in FIG. 4, and as the carton comes to rest, a fluid pressure cylinder **69** opposite the conveyor from the transfer table is energized by a solenoid valve of conventional construction to thrust a back-up plate **70** in against the side or vertical flaps of the carton at its rear end to hold the carton firmly in this position.

By the time the carton has been brought to this position and backed up, the pusher will have reached a point where the group of cans is forced into the open end of the carton. The forward end of the carton rests on a vertically-movable plate **71**, the raising and lowering of which is effected by a lift rod **72** engaging a cam **73** driven by chain **74** from shaft **24**, and so coordinated with the pusher chain that as the last row of the group of cans moves onto the open bottom flap of the carton, the plate **71** lifts to cause the cans to slide all the way back into the carton, after which this plate lowers. The pushers **22** are so positioned that the drive chain stops before the pusher engages the forwardly-extending carton flap, and the next pusher is just in position to engage the next group of cans on the receiving end of the transfer table. This may be accomplished in a number of ways, as by a limit switch operated by the pushers and that effects movement of the magnetic limit stop **27** into the path of arm **24***b*, and through relay switches to effect the release of the magnetic clutches for drive units **23** and **66**. This same circuitry might also effect the withdrawal of the back-up plate **70** through operating the cylinder **69** to retract it.

At the same time the pusher comes to a halt, fluid pressure cylinder **43** is de-energized so that spring **44** quickly acts to lower the divider plates while the piston of cylinder **51** is operated in a reverse direction, i.e., the rod **52** is extended to rotate shaft **50** in a direction to lower the stop-plate **47** so that another group of cans will be formed on the transfer table. This is made possible because the pusher elements **22** move along the transfer table from a starting position at the receviing end of the transfer table in a container contacting path in only one direction, the return path for the pusher elements being one which is clear of the table, or containers on the table and clear of the divider plates **37**. In the preferred construction here shown this return path is beneath the table.

With the next cycle, the travel of conveyor **61** to bring the next carton into position to be loaded will carry the previously-loaded carton to a position C^2 where plows **74***a* will close or keep closed the side flaps at the leading side of the carton, and overhead flippers **75** will close the side flaps at the trailing side of the carton. The flippers **68** and **75** are both operated in proper synchronized relation to the movement of the flight conveyor by a cam **76** driven by chain **77** from conveyor drive **66**. This cam operates a vertically-movable push rod **78** to rock bell crank **79** to move flipper **75** downwardly from the full-line position to close the flap. A link **80** transmits motion from bell crank **79** to simultaneously operate flipper **68**. At this time the main closure flaps at the top and bottom of the carton at both ends are still opened out and held open by plows **74***a*.

On the next cycle of operation of the conveyor **61**, the carton will be moved past upper and lower glue-applying fountains **85** which apply glue to the under surface of each of the still horizontal top and bottom end flaps at each end of the carton as the carton is moved off the conveyor **61** onto a roller table **86**. Fixed guides or plows **87** above each side of this roller table fold the end flaps at the front end of the carton in, and at the opposite side of the roller table, fold the main rear flaps in. The bottom flaps fold up first, and then the top flaps fold down, bringing the two freshly-glued surfaces into contact.

Above the roller table there is a reciprocating pusher comprising a cylinder and piston unit **90** with a piston rod **91** that is attached to one end of a slide **92** movable along a fixed guide frame **93**. There is a pusher **94** having a depending arm **95** on this slide, and the guide frame is arranged to hold the arm **95** elevated above the cartons as they move onto the roller table, as shown in the dotted line position at the right in FIG. 4. When the cylinder is energized after a carton has moved onto the roller table, the pusher first lowers to the full-line position and the pusher then moves the carton to the left off the roller table onto a conveyor belt **100**, the stroke of the piston being about the width of a carton. The dotted line position at the left of FIG. 4 shows the pusher at the far limit of its travel. After having moved a carton onto the conveyor **100**, the pusher is immediately returned to its right-hand raised position to await the next carton. The pusher may be controlled through an appropriate switch activated by a carton or by the conveyor **61** or its drive, or by the same switch that operates the pusher.

The conveyor **100** is driven through a slip clutch or torque motor **101** and belt or chain **102**. Along one side of this conveyor there is a fixed side rail **103**. Along the other side of the conveyor **100** is a transversely-movable clamping rail **104**. This rail is mounted at the upper ends of levers **105**, only one of which is shown in FIG. 9, pivoted to the floor at **106**. There is a longitudinally-extending rock shaft **107** under the conveyor, and a fluid pressure cylinder and piston unit **108** rocks this shaft through a limited arc by means of its piston rod **109** pivotally coupled to crank arm **110** on the rock shaft. Downward movement of the piston moves the guide bar or rail **104** outwardly from the center of the conveyor, and in the opposite direction when the piston rod raises. There may be a replaceable protective covering **104***a* on this rail. This may be operated under the control of the same switch and circuit that controls cylinder **90**, or by a carton-operated flap switch and valve.

The operation of this portion of the apparatus follows. With the activation of the pusher arm **95** to push a carton off the roller table **86** onto the belt conveyor **100**, the clamping rail **104** is momentarily moved outward with re-

spect to the center-line of the conveyor **100** so that the freshly-glued and closed carton may slide onto the conveyor **100**. Then the clamping rail moves inward, pressing the carton against the opposite fixed rail **103**, thereby holding the freshly-glued carton ends closed. Pressure is maintained on this clamping rail at all times except when it is temporarily relieved for the arrival of another carton. As each succeeding carton moves onto the conveyor **100**, each carton advances a distance of about one carton, so that there are several cartons C^3 confined on the conveyor **100**, which is of a length to assure that when a given carton reaches the discharge end of the conveyor, the glue will be set. When the cartons are clamped between the fixed and movable rails, the conveyor belt **100** slips along under the cartons while the cartons remain stationary.

In general the electric circuits and fluid pressure valving presents nothing unique, and presents no problem to those skilled in the art. Switches of various types operated by moving parts to open and close circuits are well known, as are relays and electromagnetic valves, and for reasons of brevity and clarity of illustration, such details have not been shown or described. There is, however, one portion of the circuitry that guards against malfunction. There is a photo-electric cell arrangement schematically indicated in FIG. 1 at **115** over all six lanes of the can supply conveyor. It is spaced back from the discharge end of this conveyor a distance at least as great as four cans. There is also a microswitch **116** alongside the conveyor **61** in the approximate location indicated in dotted lines in FIG. 3. If there is no carton on the conveyor **61** above the switch **116**, the switch will be open. FIG. 10 shows a simplified schematic diagram wherein switch **116**, photo-electric cell and micro-switches **46** on the rocker bar are all in series, and in series with an electro-magnetic valve **117** for initiating the operation of the cylinders **51** and **43**. Without the operation of cylinder **51**, the rocker bar **45** will not be moved back to start the travel of the pusher along the transfer table, and without operation of cylinder **43** the dividers **37** are not lifted. If there are not at least sufficient cans in the six lanes of the feeder or can-delivery conveyor to form a complete group, the photo-electric cell will not close the circuit. If there is no carton on the carton conveyor over switch **116** ready for movement to can-receiving position, the circuit will remain open. If each cell or alley between the divider plates **37** does not have the full number of cans, one or more of the micro-switches **46** will remain open. The machine accordingly will not operate unless there is a complete group of cans on the feeder or can-delivery table, a full case load on the transfer table, and a carton in place to be moved to a position to receive the case load when it is transferred.

The entire operating cycle is simple. Cans from the parallel lanes of the delivery conveyor **11** move into the aligned cells on the transfer table between the divider plates **37** until these cells are full. When the cells are full the stop plate **47** will raise to block further movement of cans from the delivery conveyor, the plates **37** will be lifted, and the rocker bar will tilt back to initiate travel of the chain **17** to move a group of cans by means of one of its pushers to the other end of the transfer table. At the same time the conveyor **61** will move a carton from alongside the bench **60** to a position where its open end receives the group of cans from the discharge end of the transfer table while the back-up plate **70** holds the carton against the thrust of the incoming cans. With the next cycle of operation, the just-loaded carton is advanced one station, and the side flaps are folded in. In the next cycle, glue is applied to the top and bottom end flaps at each end of the carton as it moves onto the roller table **86**, and the top and bottom flaps are closed at this station. Also, at this station fluid pressure cylinder **90** with its pusher **94** thrusts the carton from the roller table onto belt conveyor **100** where clamping rail **104** moves to clamp the carton and hold the end flaps under pressure. The loaded carton then travels intermittently as one of a series along conveyor **100** with the end pressure on the flaps only temporarily released as the carton makes its next increment of travel, finally reaching the discharge end of conveyor **100**, at which time the glue on the flaps will be set. From there is may be loaded onto another conveyor, discharged into a chute or gravity conveyor, or be lifted manually and placed on a factory truck or pallet. The entire operation is automatic except for one attendant at bench **60** who opens out the collapsed carton and places it on conveyor **61**.

While we have shown and described in detail one apparatus embodying a preferred form of the invention, various changes and modifications may be made in various parts of the apparatus without departing from the overall organization of the machine. Such changes and modifications are contemplated under the scope of the following claims.

We claim:

1. A case packer for assembling a continuous succession of containers into uniformly patterned groups and introducing each group in succession into a separate carton comprising:

(a) a conveyor with cooperating partitions for receiving containers from a source of supply and arranging them into parallel lanes,

(b) a transfer table extending crosswise of said conveyor having a receiving end and a discharge end and onto the receiving end of which containers are received from the conveyor, said transfer table at its receiving end having a plurality of movable partitions positioned above the table movable from a group-forming position in which they provide a series of alleys aligned with the lanes of containers on the conveyor to a retracted position where they are clear of the containers on the table,

(c) movable supporting means above the table from which the partitions are suspended for retracting the movable partitions from the group-forming position to the retracted position only when each of the alleys is full of containers,

(d) barrier means between the conveyor and transfer table to block the movement of containers onto the transfer table when the alleys are all full and retracting it when the alleys are empty and the movable partitions are in group-forming position,

(e) means at the discharge end of the transfer table for holding a carton in position to receive a group of containers from the transfer table, and

(f) pusher means for moving the group of containers from the container-receiving end of the transfer table and pushing it into the open end of a carton held in position at the discharge end to receive said group from the transfer table, said pushing means being arranged to move in one direction from a starting position at the container receiving end of the transfer table along said table and push a group of containers therealong into the open end of a carton located to receive containers at the opposite end of the table, which pushing means returns to said starting position along a return path that is clear of any containers on the transfer table and said movable partitions located over the transfer table.

2. A case packer as defined in claim **1** wherein the pusher means comprises an endless chain with at least one pusher element thereon.

3. A case packer as defined in claim **1** wherein the pusher means comprises an endless chain with a plurality of equally-spaced pusher elements thereon, and drive means for intermittently moving the drive chain in one direction only, the pusher elements being so spaced on the chain that when one pusher has traveled from the receiving end of the transfer table to the other end where the group of containers have moved into the carton, an-

other pusher elememnt will be brought into position at the receiving end to engage the next group of containers.

4. A case packer as defined in claim 3 wherein said drive means is arranged to accelerate the speed of travel of the chain from a starting position for moving the containers to a maximum speed and decelerate the speed of the pusher as the group of containers is pushed into the carton.

5. A case packer as defined in claim 1 wherein means is provided for temporarily raising the end of the carton into which the containers are pushed and then lowering it only after the group of containers has been received in the carton.

6. A case packer as defined in claim 1 wherein said means for holding a carton in position comprises:

(a) an intermittently-movable carton-supporting conveyor on which the cartons are placed in advance of the position where the containers are pushed into them and carry to the end of the transfer table,

(b) a movable back-up means spaced from but confronting the discharge end of the transfer table movable into and out of position to engage the opposite end of a carton from the one into which the group of containers is pushed and then retract from said position, and

(c) means for operating said back-up means.

7. A case packer as defined in claim 6 wherein said carton-supporting conveyor is generally parallel with the conveyor on which the lanes of containers are formed and extends to each side of the position where the carton is held to receive containers, the portion of the conveyor in advance of the position where cans are pushed into the carton comprising a carton-receiving station, and the portion of the conveyor following said position where containers are received comprising a glue-applying station, and means at the glue-applying station for applying glue to certain end flaps of the cartons as the loaded cartons are carried along by the carton conveyor.

8. A case packer as defined in claim 7 wherein means is provided beyond said glue-applying station for closing the glued flaps of the cartons and holding them closed until the glue has set.

9. A case packer as defined in claim 8 wherein said means beyond the glue-applying station comprises:

(a) a roller conveyor in line with the carton conveyor positioned to receive cartons with glue on the flaps from the carton conveyor and having means at opposite sides thereof for folding the top and bottom carton flaps at both ends of the carton into carton-closing overlapping position,

(b) a closed-carton conveyor in line with the roller conveyor having a side rail therealong at each side thereof, at least one of which is movable transversely to the length of the closed-carton conveyor for normally clamping a carton with the closed end flaps confined between the two side rails but intermittently movable to a release position for movement of the carton along the conveyor, and

(c) means for pushing a carton from the roller conveyor onto the closed-carton conveyor when said movable side rail is in a release position.

10. Apparatus as defined in claim 9 wherein means is provided at the carton-receiving station of said first carton conveyor for rendering the entire machine inoperative until a carton has been placed in position on said carton conveyor.

11. Apparatus as defined in claim 9 wherein said means is a switch positioned to be engaged by an empty carton at the carton-receiving station and wherein said switch is in series with means on said first conveyor for rendering said switch operative for operating the machine only if there are adequate containers in the lanes to form a complete group on the transfer table.

12. A case packer as defined in claim 1 wherein said means for retracting the partitions and operating the barrier comprises a bar element positioned at the ends of the alleys between the partitions remote from the ends in which the cans enter having a series of electric switches thereon, one at the end of each alley, which switches are in series and are positioned to be operated by contact with cans pushing into the alleys, and mechanism controlled by said series of switches for lifting the partitions and raising the barrier when all switches are closed.

13. A case packer as defined in claim 12 wherein said bar element is movable from an operating position to a retracted position when all switches of said series are closed to then reset said switches for the next cycle of operation, and arranged upon retraction to initiate operation of the means for moving the group of cans along the transfer table.

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