United States Patent [19]

Heisler

[11] **3,740,919**

[45] **June 26, 1973**

[54] **APPARATUS AND METHOD FOR ORIENTING AND CASE PACKING BAILED CONTAINERS**

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[52] **U.S. Cl.** **53/26,** 53/29, 53/159, 53/186, 53/383, 53/387

[51] **Int. Cl.** **B65b 5/08,** B65b 35/56, B65b 43/28

[58] **Field of Search** ..... 53/26, 29, 159, 186, 53/244, 247, 374, 383, 387; 198/31 AC, 33 AB

[56] **References Cited**

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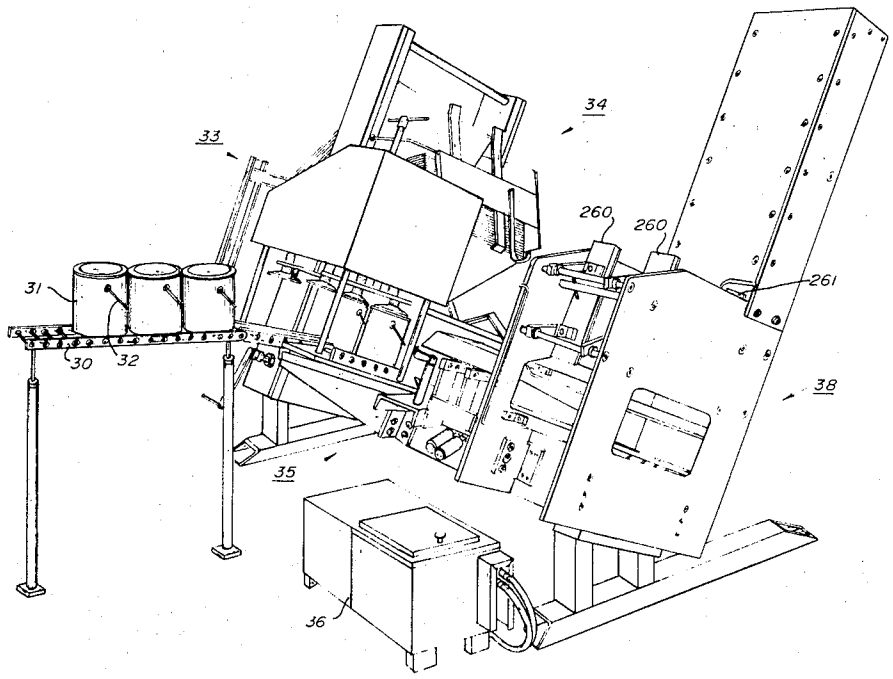
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Primary Examiner—Robert L. Spruill
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[57] **ABSTRACT**

An apparatus and method is disclosed for receiving bailed containers in a single file array from a delivery conveyor and to orient said containers so that they are delivered by gravity in two groups of twos into an automatically erected carton. After filling the carton with four containers is advanced to a closing, sealing and delivering mechanism. In this automatic mechanism the cartons for the case packing operation are placed in a delivery station from which they are advanced to an erecting station which is automatically actuated in response to the gravitational delivery of bailed containers to and through the orienting apparatus. Alternate embodiments for elevating the glued and sealed cartons are shown from which the cartons may be delivered to a conveyor or pallet. The containers as they are arranged in the carton may have their bails facing into the corners of the carton or facing toward the center of the carton.

38 Claims, 35 Drawing Figures



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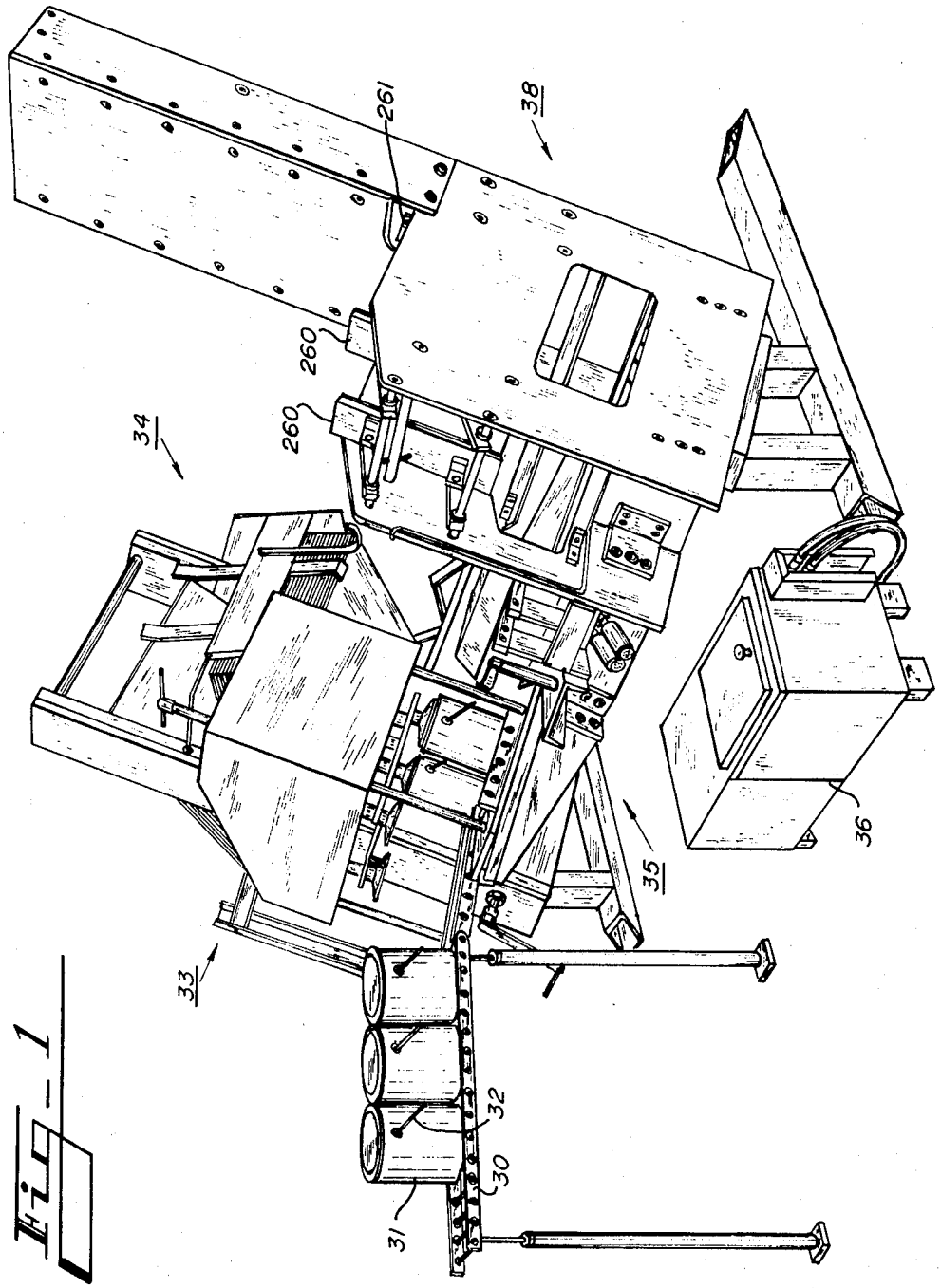


Fig. 1

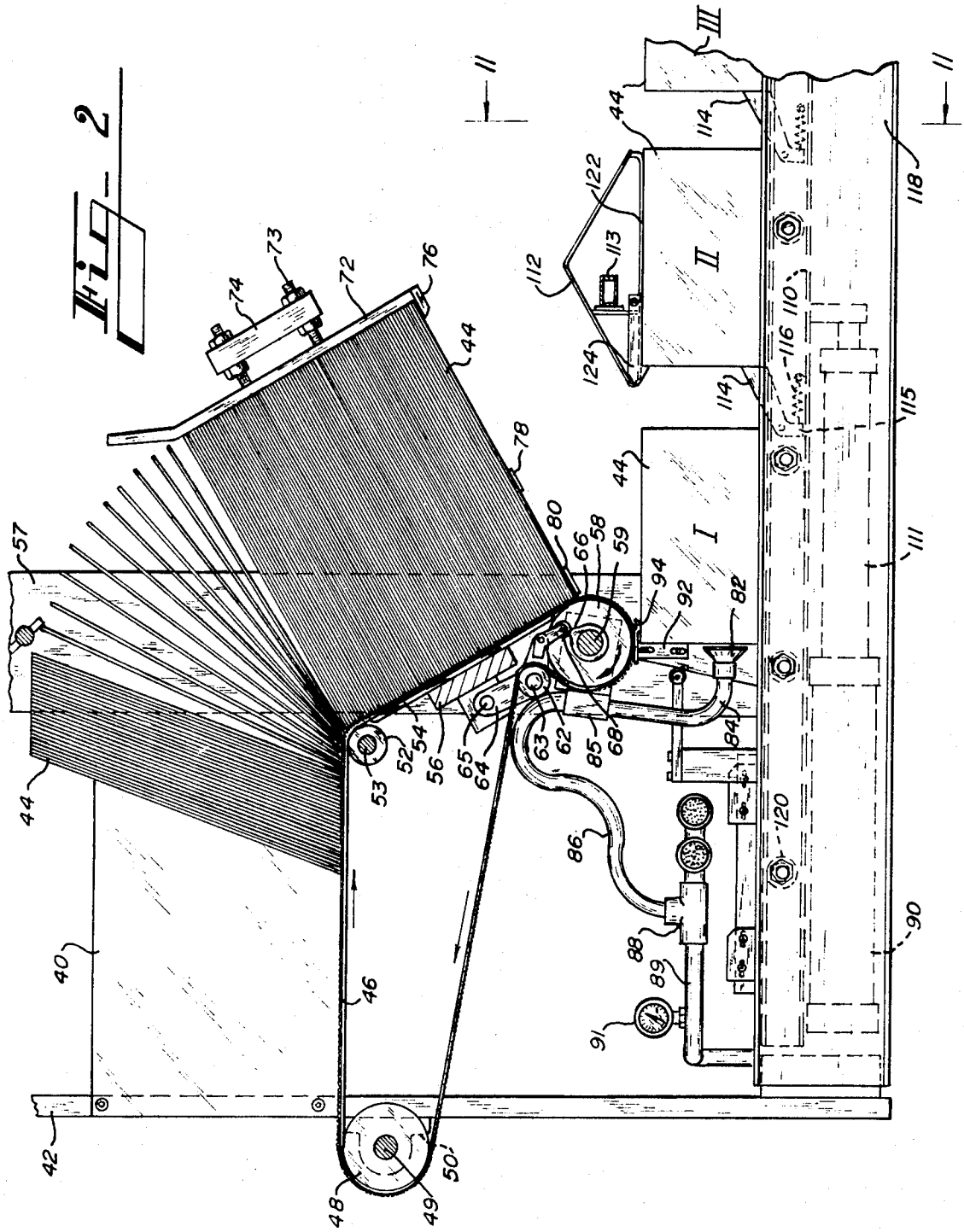
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FIG. 2



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Fig-3

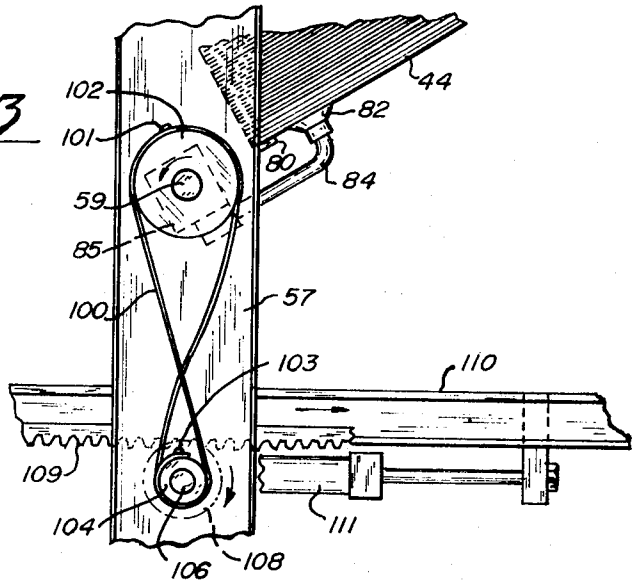
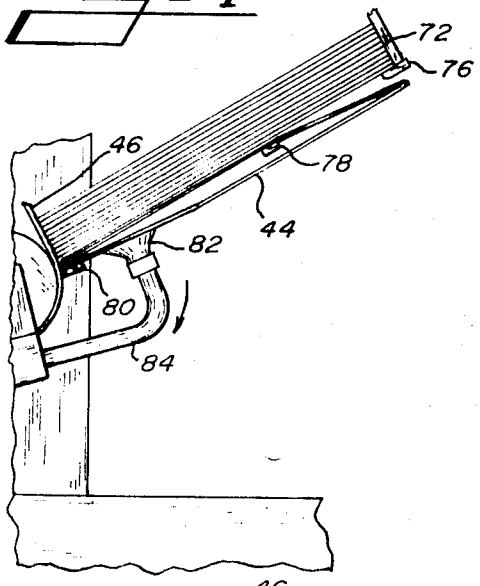


Fig-4



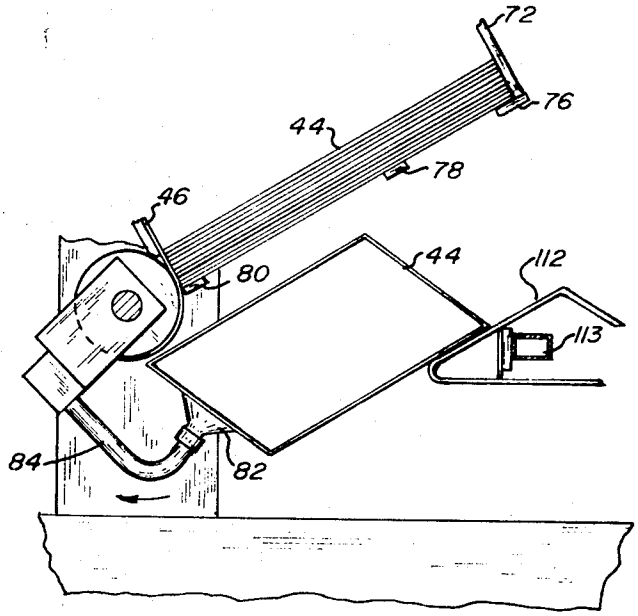
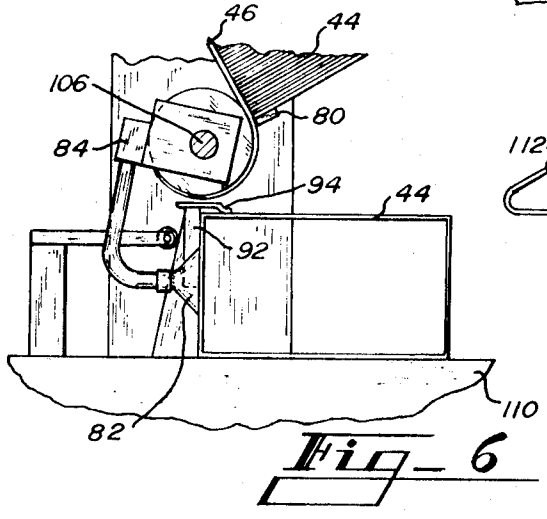


Fig-5



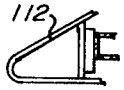


Fig-6

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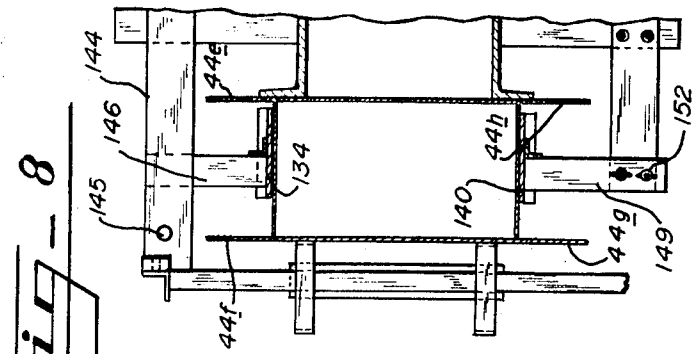


Fig. 8

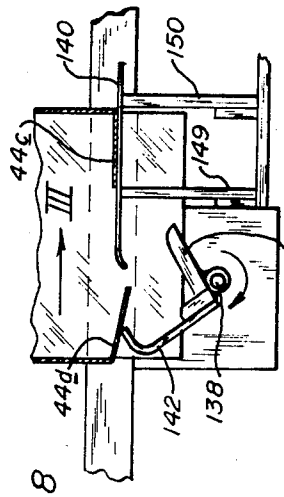


Fig. 10

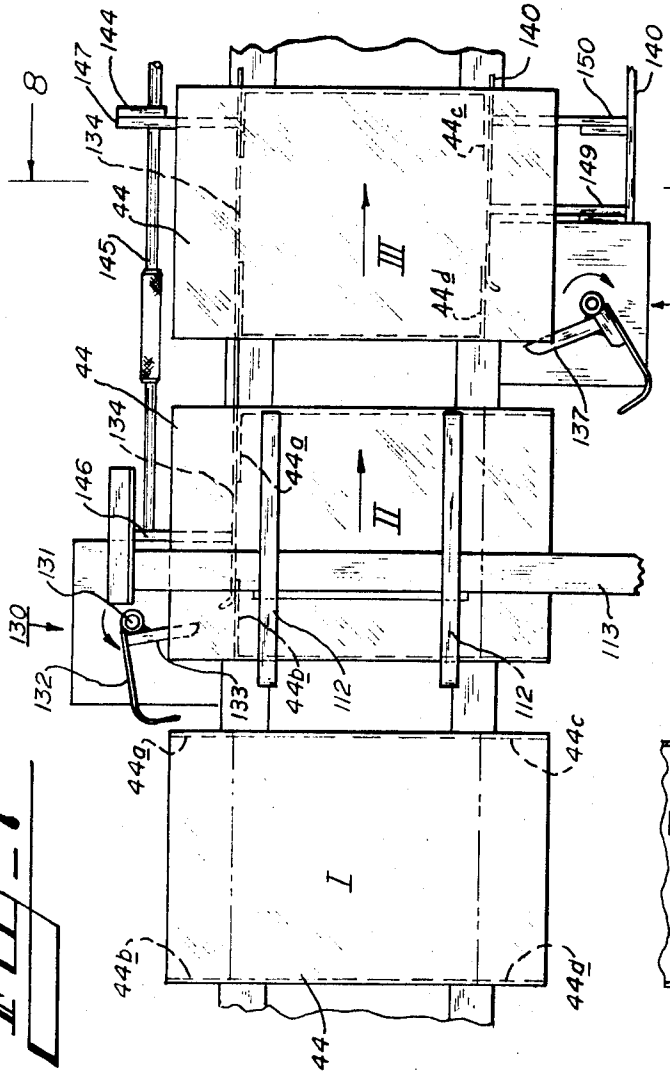


Fig. 7

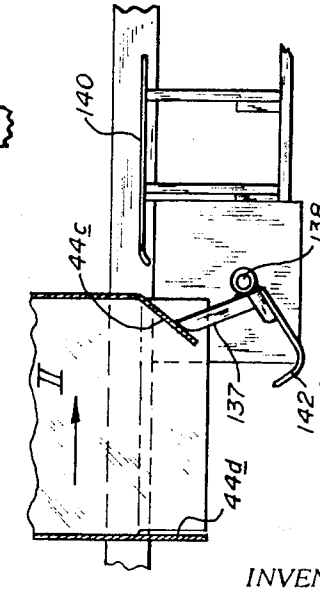


Fig. 9

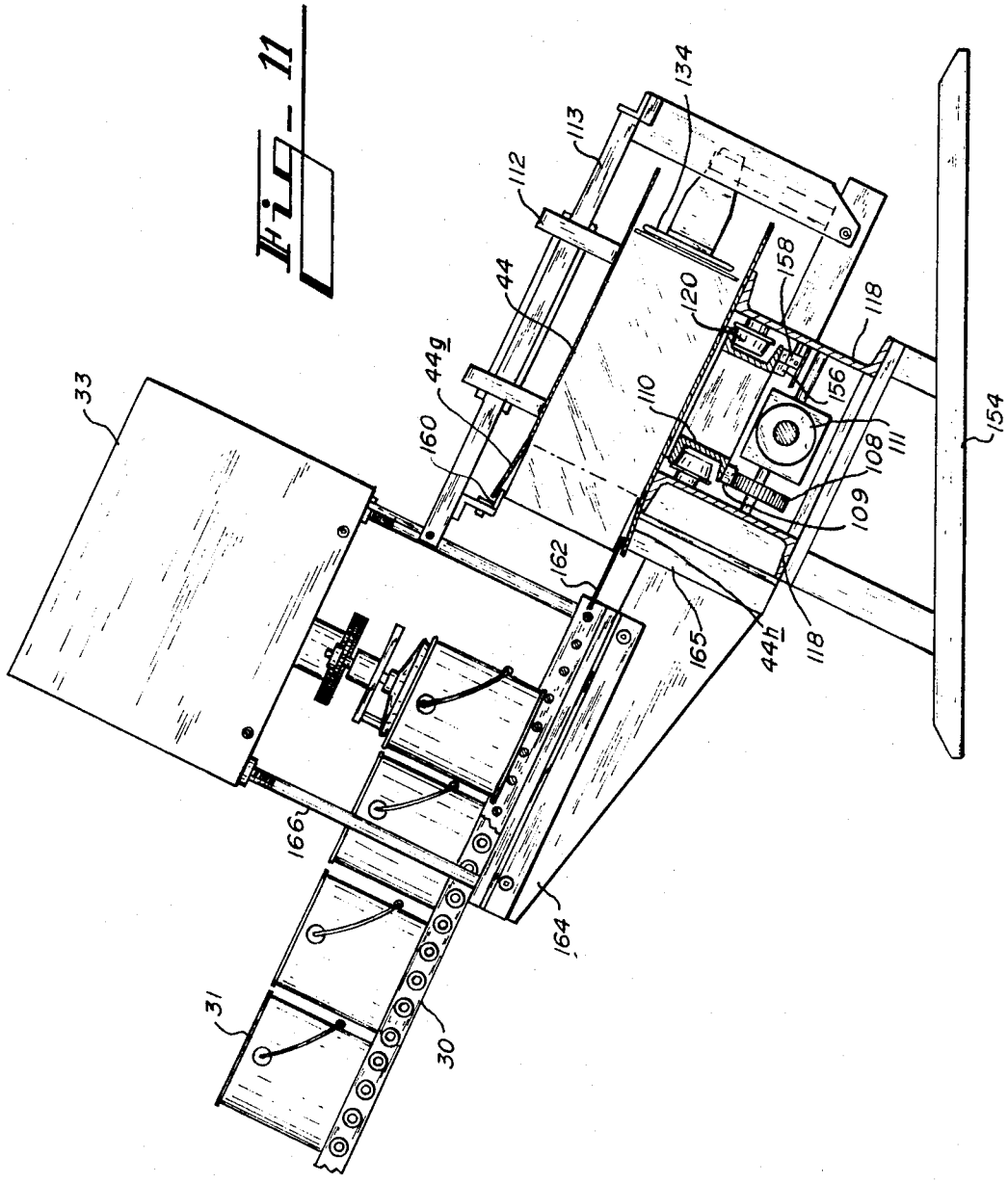
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Fig. 11



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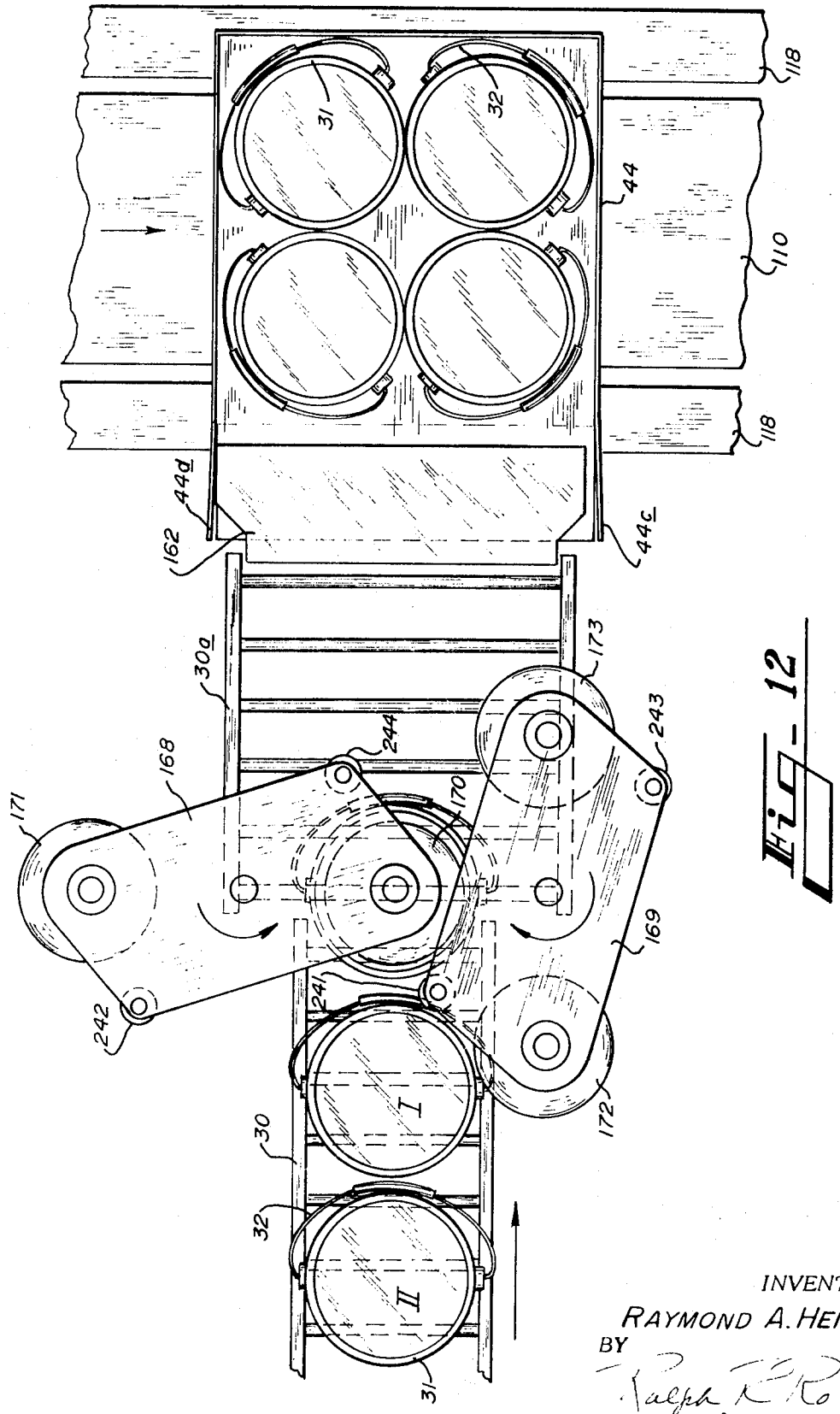


Fig. 12

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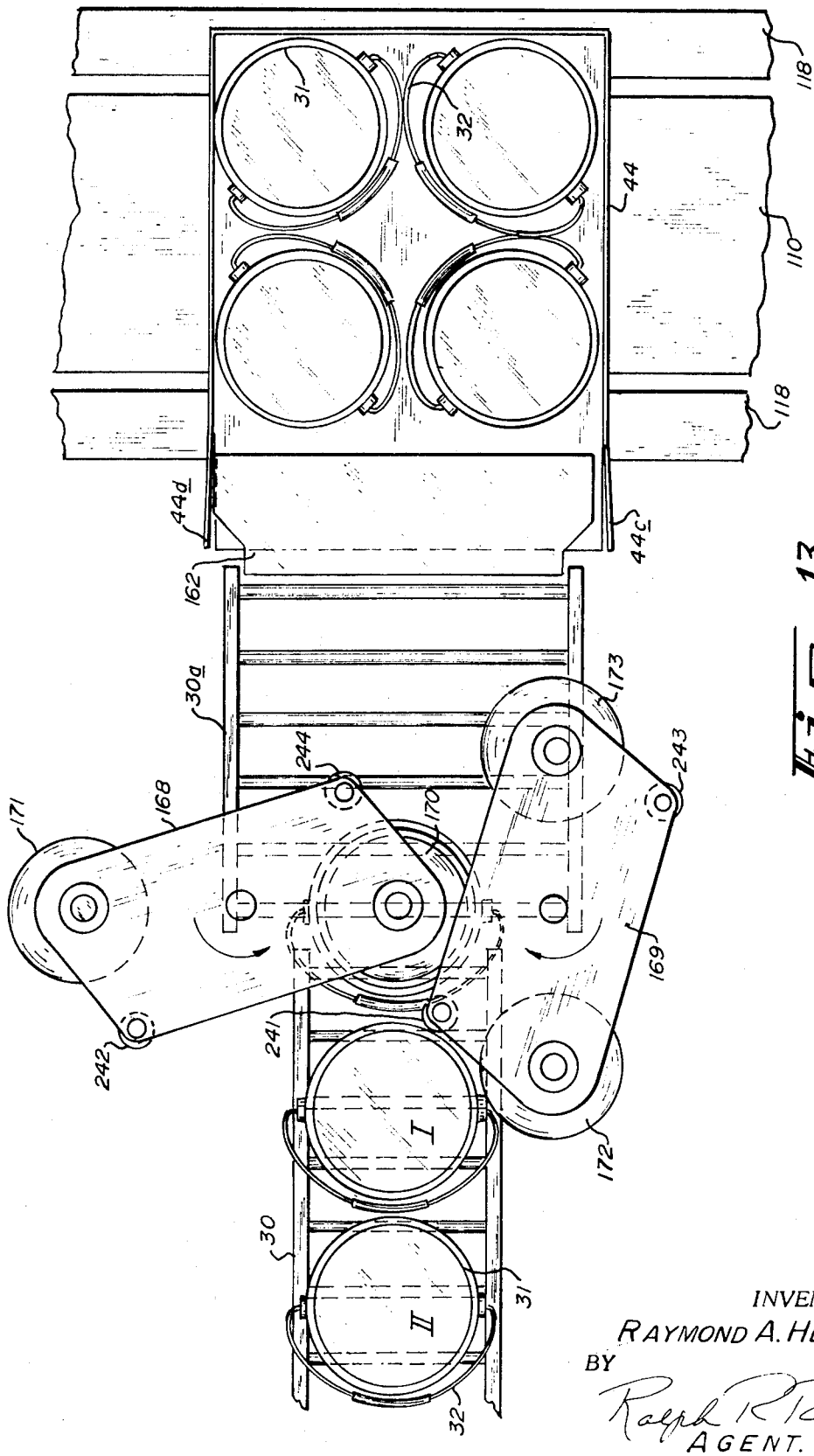


FIG-13

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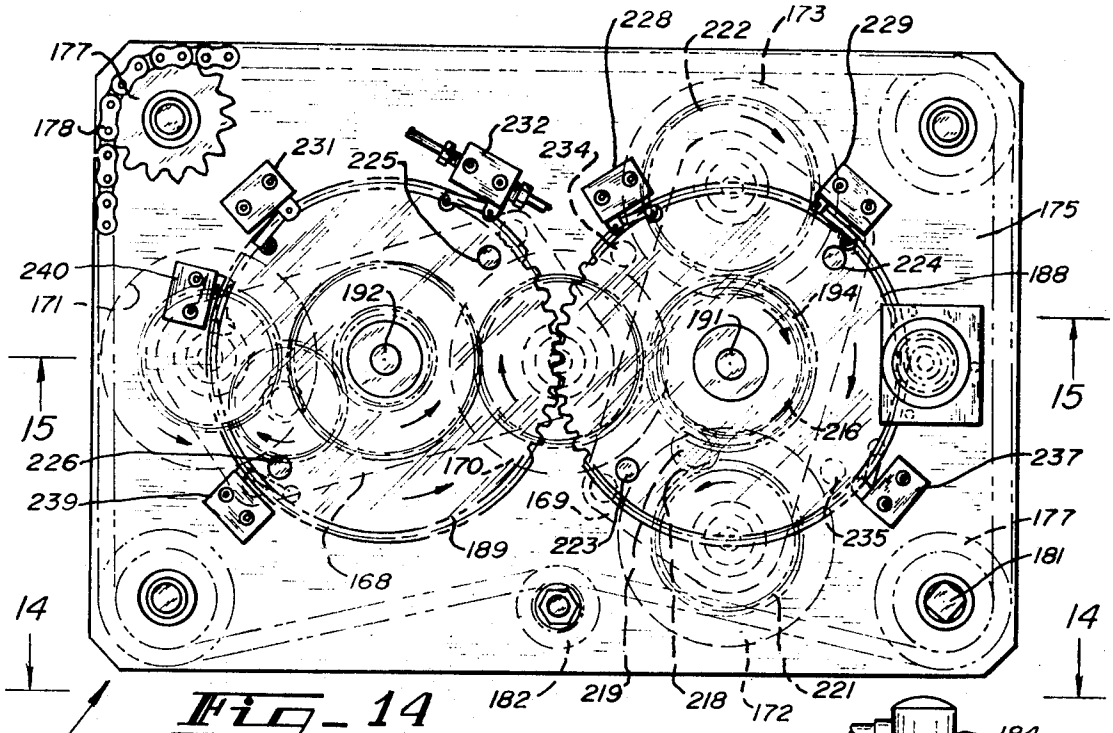


Fig. 14

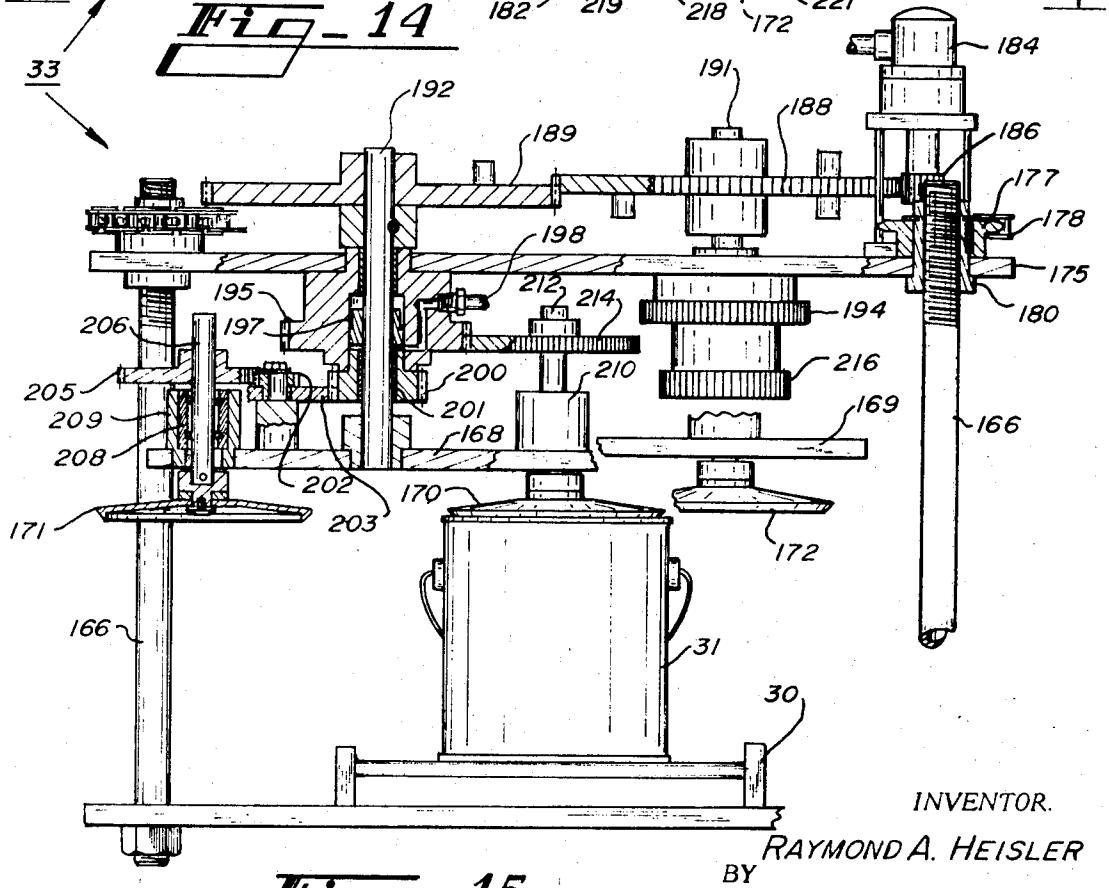


Fig. 15

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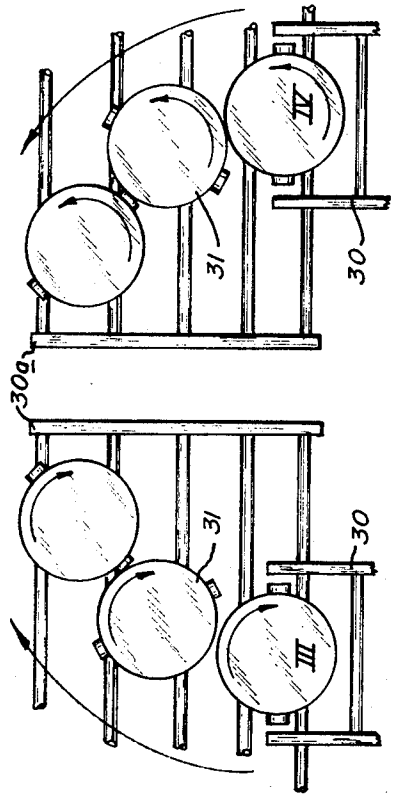


Fig-16D

Fig-16C

Fig-16B

Fig-16A

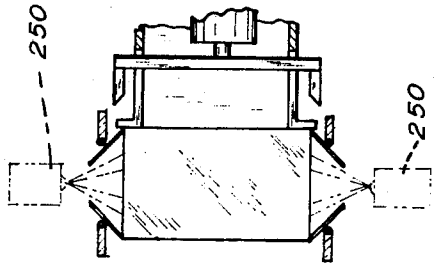


Fig-21

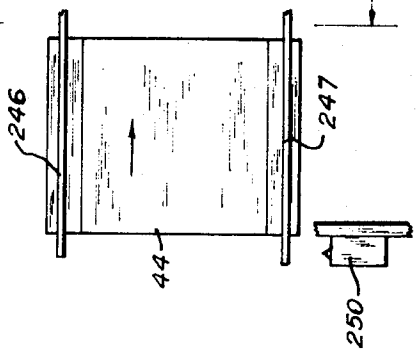


Fig-20

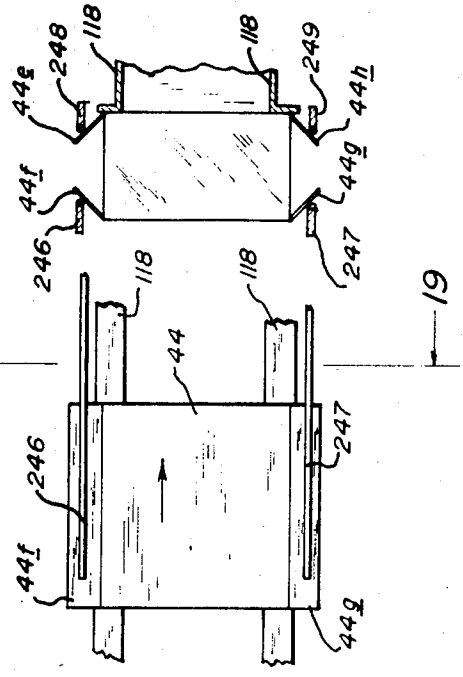
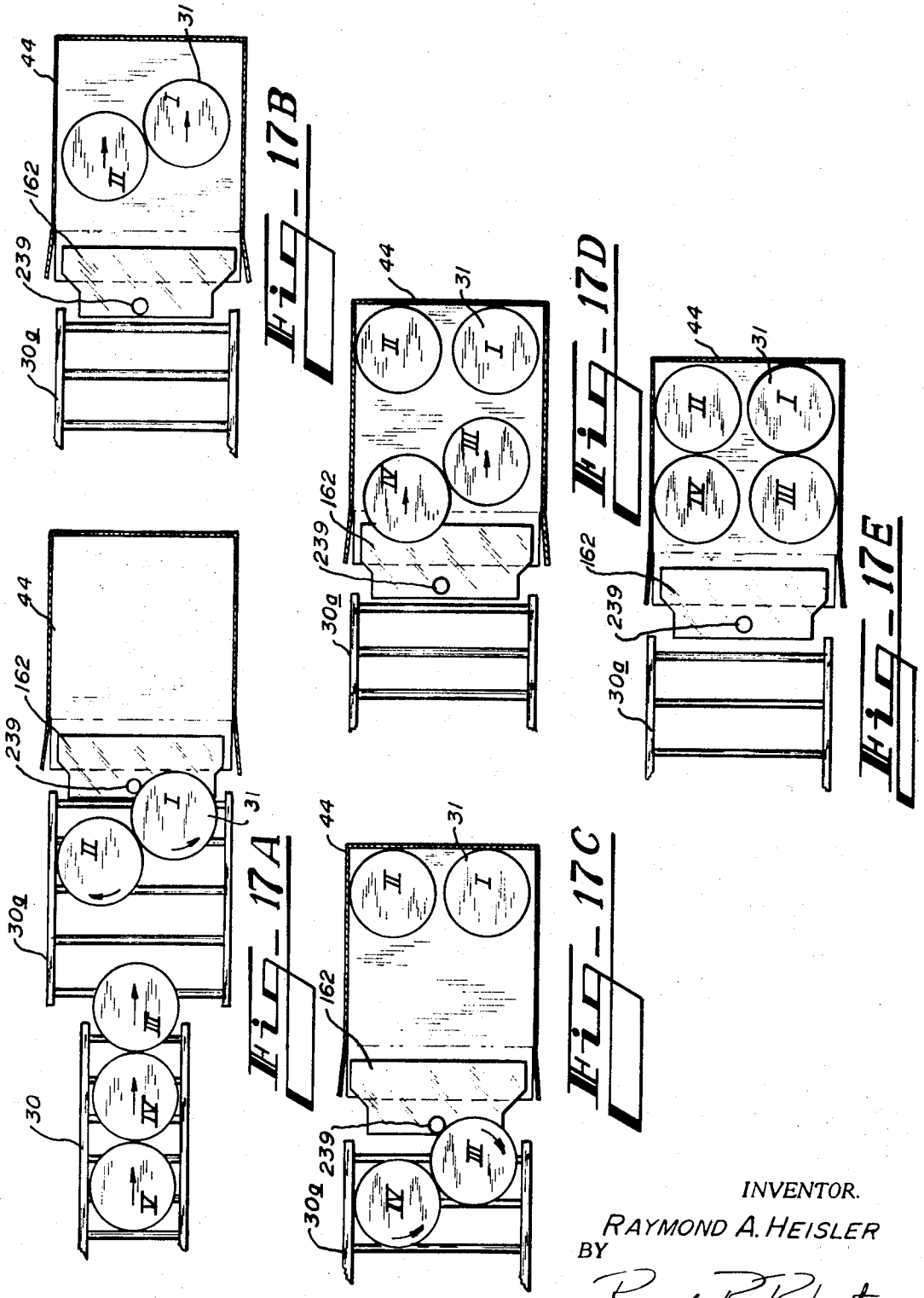


Fig-19

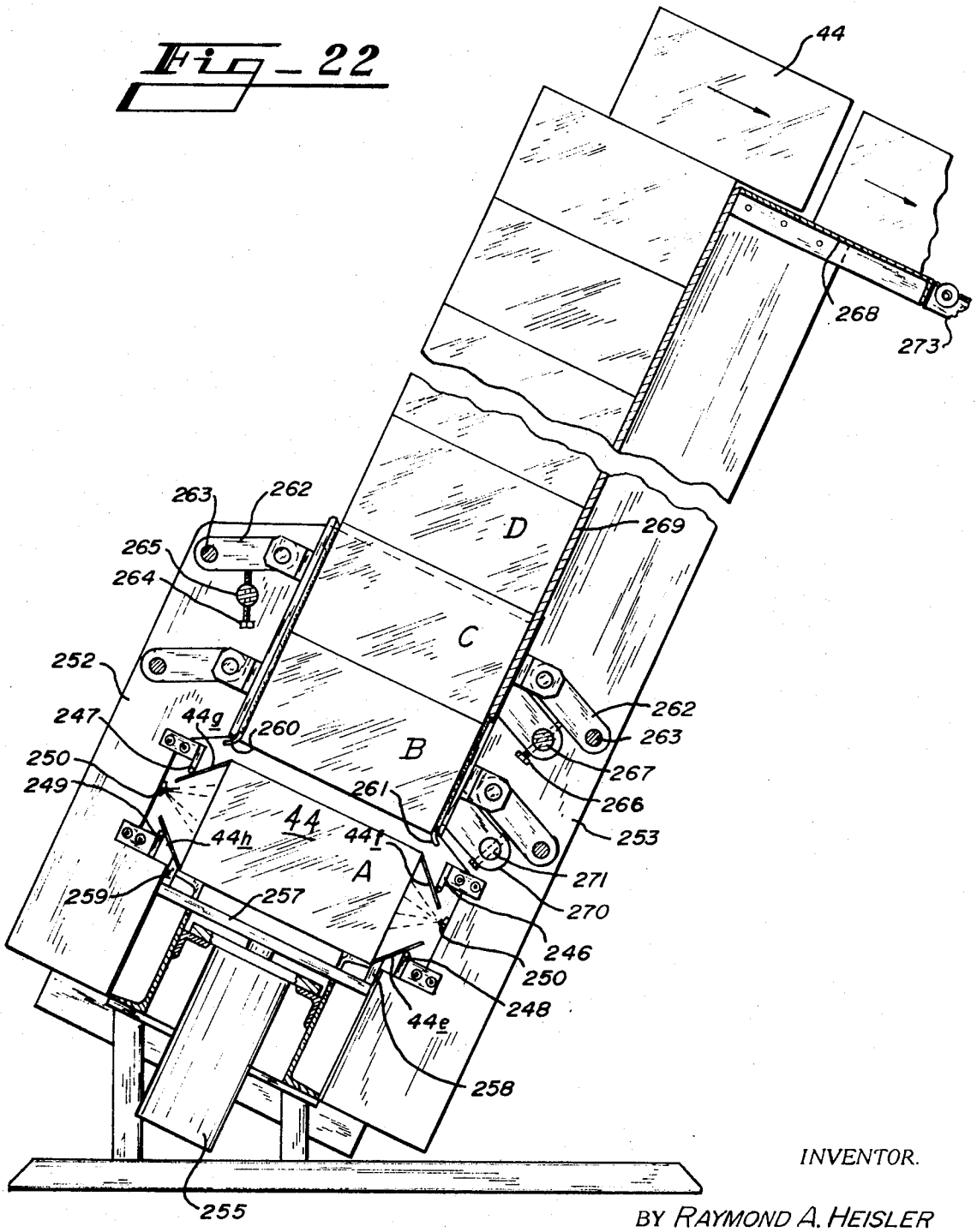
Fig-18

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Fig - 22



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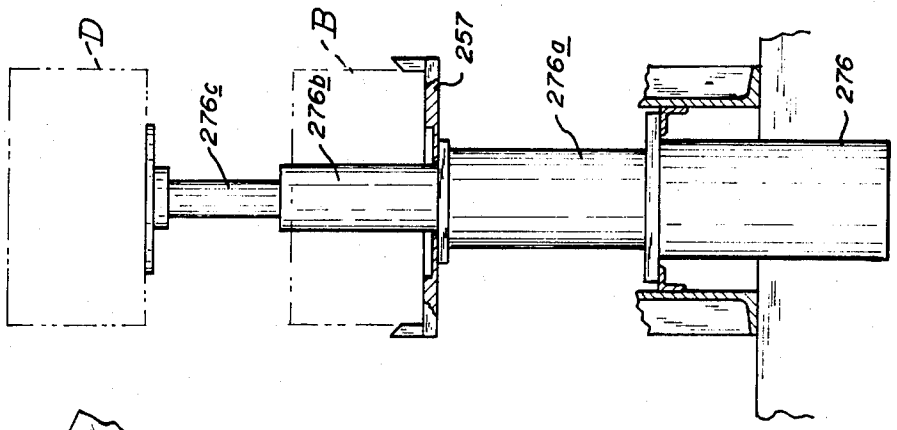


Fig-24

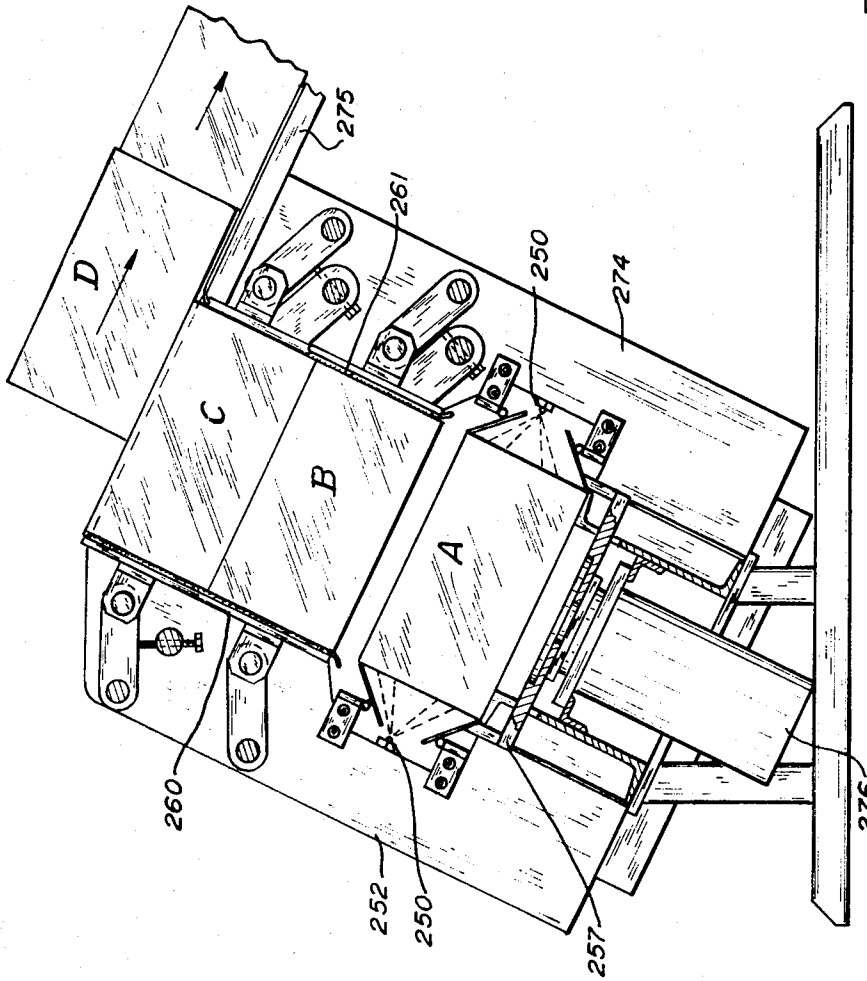


Fig-23

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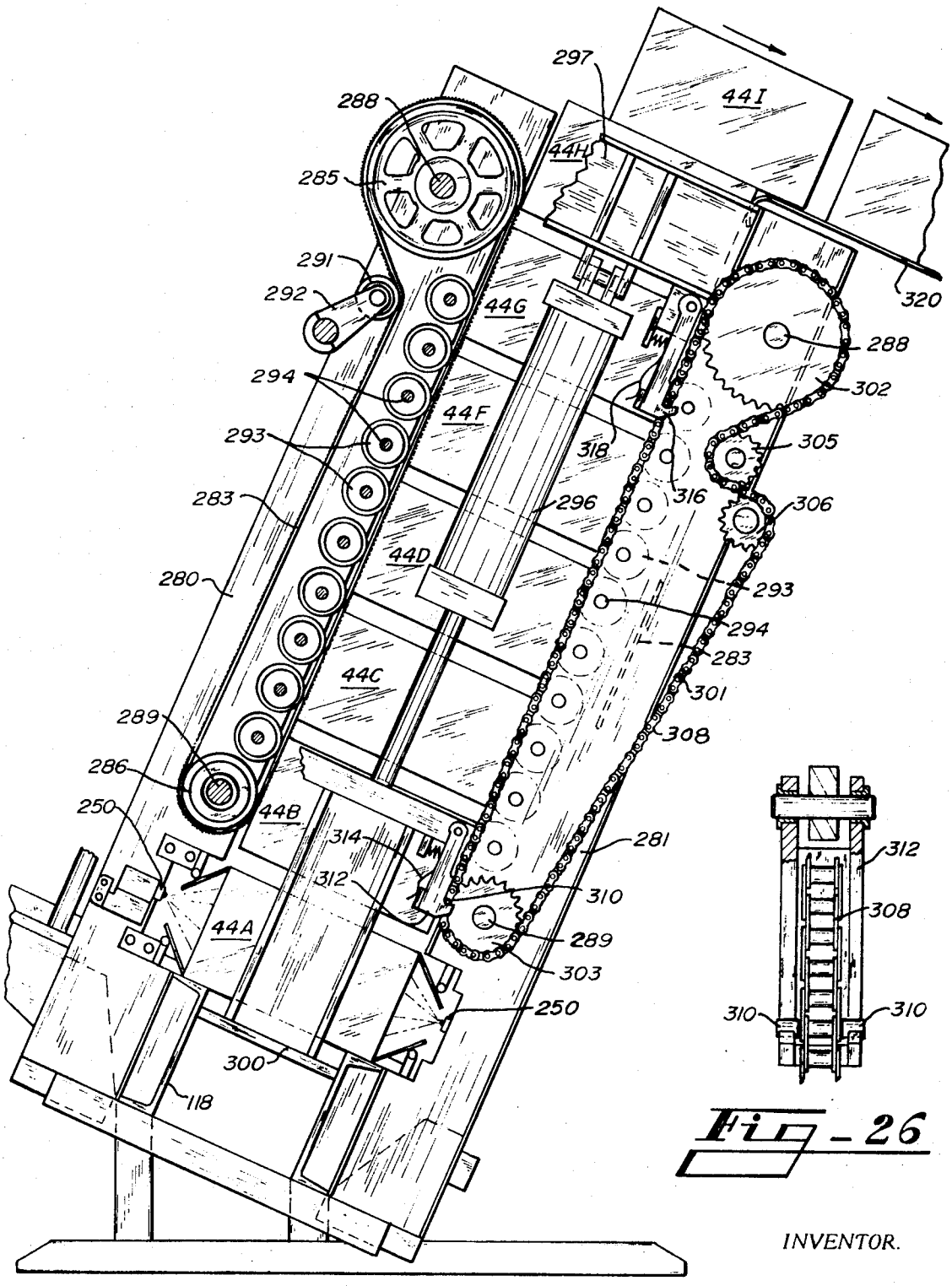


Fig - 25

Fig - 26

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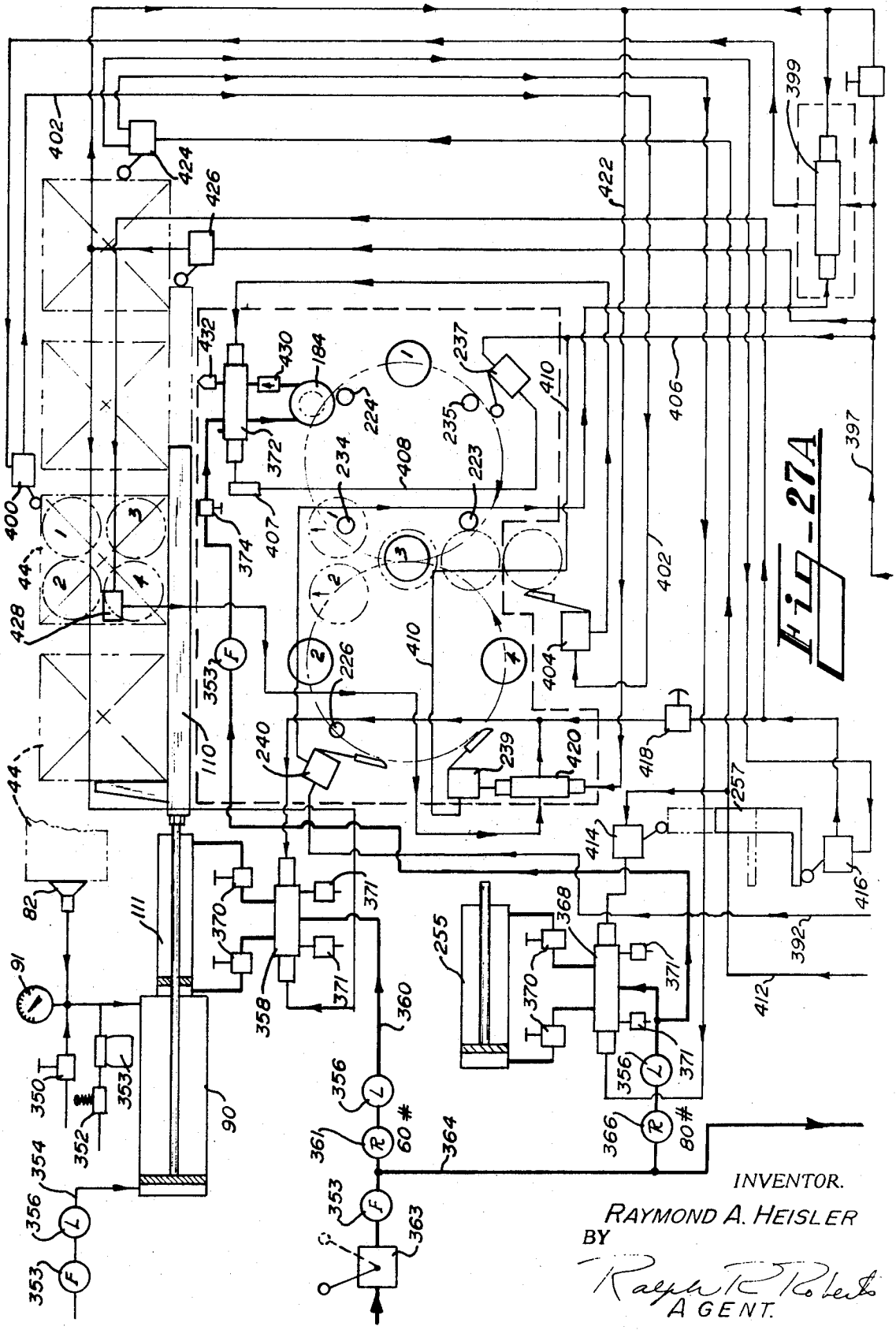


Fig-27A

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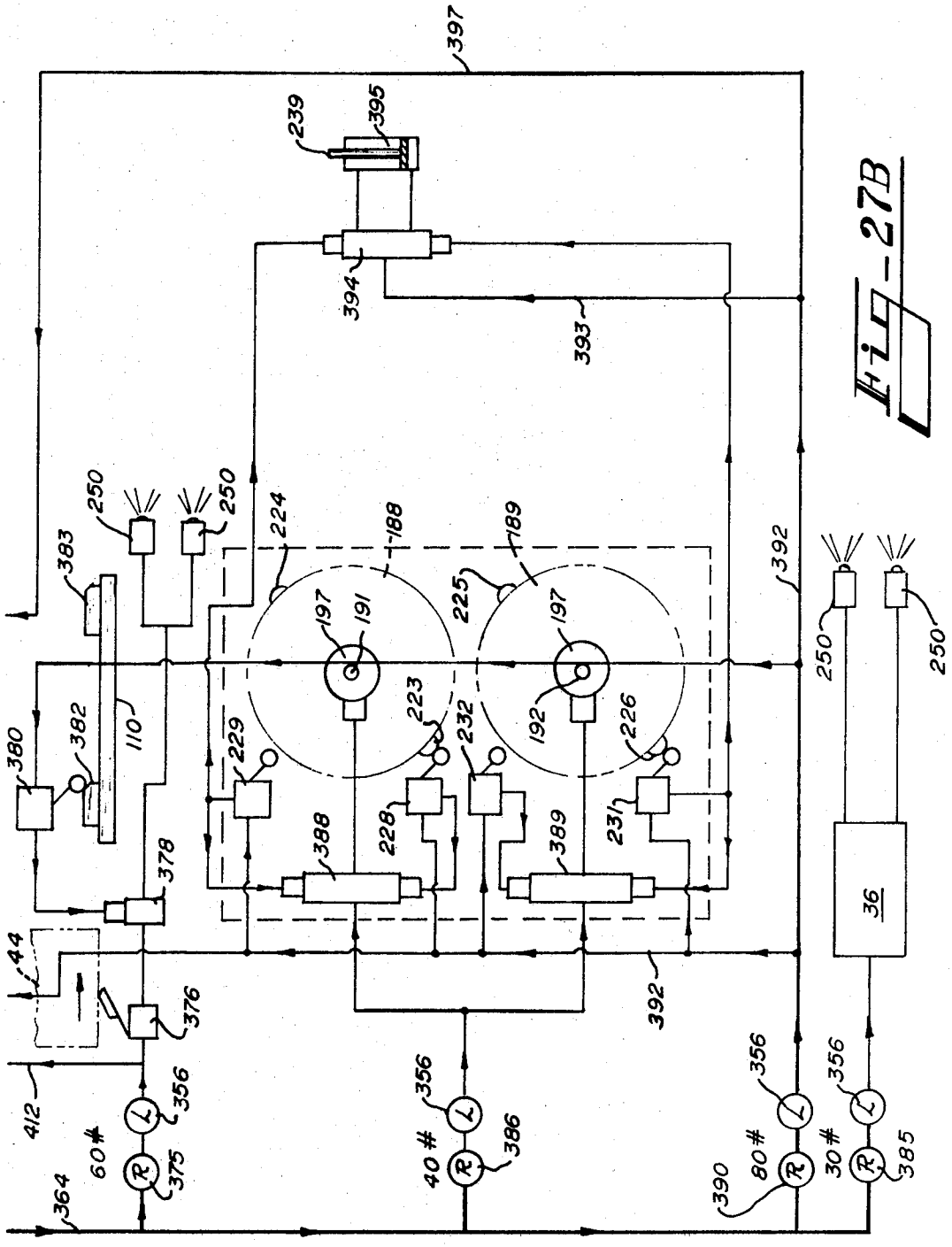


Fig-27B

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APPARATUS AND METHOD FOR ORIENTING AND CASE PACKING BAILED CONTAINERS

BACKGROUND OF THE INVENTION

1. Field of the Invention

With reference to the classification of art as established in the United States Patent Office the field of art to which this invention pertains is found in the general class of "Package Making" and more particularly in the subclass of "automatic or trigger control" and more particularly in the further subclass of "group feed triggered by completion of group." Another pertinent subclass in this general class is "group forming of contents unit and subsequent or further packaging" and more particularly to the subclass of "layers, stacks or columns." Another subclass of interest in this general class is "depositing articles and arranging material in preformed receptacles" and more particularly to the further subclass of "simultaneous deposit of plural articles."

2. Description of the Prior Art

In the prior art, apparatus is known wherein eared containers with attached bails are oriented and fed into erected cartons which are then sealed. The mechanism for orienting and feeding these containers is usually complex, expensive and often is capable of an operating speed which is less than that now achieved in filling lines having automatic bail-applying mechanism. An example of said bail-applying mechanism is found in my U.S. Pat. No. 3,241,578 which issued Mar. 22, 1966. This bail-applying mechanism is used on hundreds of production lines such as paint filling lines many of which, if not all, are presently operating at speeds of 75 or more containers per minute. It is desirable and necessary that case packing apparatus used with these filling lines have sustained operating capacities as great as, and preferably in excess of, those operating speeds.

Several recent U.S. Patents pertaining to apparatus for article positioning and case loading have been issued. Among these patents are U.S. Pat. No. 3,209,512 to Ferguson, Jr., etal which issued on Oct. 5, 1965; U.S. Pat. No. 3,284,985 to Roth which issued on Nov. 15, 1966 and also U.S. Pat. No. 3,462,912 to Anderson which issued on Aug. 26, 1969. In these and other known systems it is the intent to receive bailed eared containers and to orient these containers so that with their bails laid against the side of the containers these containers, as a grouping, may be fed into an open erected carton and with the containers in a determined oriented condition the carton is closed and sealed. Insofar as is known by the applicant the apparatus aboveidentified and shown in these patents as well as others which have been used in industry have not provided the reliability and speed necessary for present paint filling lines.

In the present invention and as reduced to practice, the rate for the orienting and placing the bailed containers in an erected carton is at least ten percent greater than the 75 containers per minute now found on some of the faster paint filling lines. The present invention receives bailed containers on a conveyor leading from the bail-applying mechanism and immediately thereafter feeds these containers by gravity into an orienting mechanism where they are oriented in a determined manner and arranged in groups of twos. As oriented pairs, these containers are then fed by gravity

into the open side of an erected carton whose bottom panel is disposed at an angle or slope. After the carton has been filled with four containers the carton is advanced to a closing, sealing and delivering mechanism. The rate of operation of the mechanism of the present invention is established by the receipt of the containers from the bail-applying mechanism or other feeder lines. The bailed containers, as oriented, may be arranged in the carton with their bails facing into the four corners of the carton or if desired the bails may be facing toward the center of the carton.

SUMMARY OF THE INVENTION

This invention may be summarized at least in part with reference to its objects.

It is an object of this invention to provide, and it does provide, an orienting apparatus adapted to receive bailed eared containers aligned in a determined array and to feed these containers in a single file to an apparatus wherein the containers are oriented in a desired array and arranged into columns of twos and as oriented pairs are discharged into an open side of an erected carton. After the carton has been filled with four oriented containers it is transferred to closing, gluing and discharging operations.

It is a further object of this invention to provide, and it does provide, orienting apparatus adapted to receive bailed eared containers delivered in single file array and to reorient the containers so that they are delivered two at a time as oriented pairs to and into an erected carton after which the flaps of the carton are closed and glued as and after which the carton is advanced for delivery to a conveyor or pallet. The carton erecting equipment includes a flat carton receiving station whereat a supply of cartons is stored in a substantially vertical condition and from which they are fed to a carton chute in which a supply of cartons is supported in a more or less horizontal condition. From the bottom of the chute the cartons are engaged by suction cups carried on an arm which is cycled so as to withdraw a carton from the chute and erect this same carton while delivering to a carton conveyor apparatus.

The orienting and case packing apparatus and method provided by this invention includes a receiving conveyor adapted to feed bailed containers one at a time to an orienting station where the containers are advanced by means of a gravity conveyor. Each container as it enters the orienting station engages a drive pin which moves the apparatus during which a pressure disc is caused to be moved downwardly to engage the top of the bailed container. The orienting apparatus then moves the engaged pressure disc apparatus forwardly to the extent that the container is rotated as it is displaced sidewards and forwardly to a determined orientated position. The orienting mechanism then stops until a succeeding container enters and engages another drive pin which releases the orienting apparatus to cause an orienting actuation during which the pressure disc engages and moves a second container sidewards and forwardly while this pressure disc rotates this engaged container a determined amount to bring this second container to the desired oriented condition. When this second container has been brought to substantially the same forward alignment as the first container the two containers are released from the orienting station to roll forwardly on a gravity conveyor into an erected carton.

The third and fourth containers are fed sequentially into the same orienting station whereat they are oriented separately and consecutively until they are brought to a more or less side-by-side arrangement similar to that accorded the first pair. As with the first two containers the third and fourth containers are oriented to a determined degree of rotation and when the fourth container has reached its displaced oriented condition it and the third container are released to be fed by gravity into the erected carton. This action initiates a signal means for automatically causing the filled carton to be advanced and closed while a just-erected carton is moved into place for filling with the next four containers. Sealing and delivering of the filled cartons to a pallet or conveyor are shown in the apparatus to be more fully described.

In addition to the above summary of the following disclosure is detailed to insure adequacy and aid in understanding of the invention. This disclosure, however, is not intended to prejudice that purpose of a patent which is to cover each new inventive concept therein no matter how it may later be disguised by variations in form or additions of further improvement. For this reason there has been chosen a specific embodiment of the orienting apparatus for rotating and positioning the containers and case packing the bailed eared containers as adopted for use with container bailing or container conveying mechanism and showing a preferred means for orienting and grouping the containers into groups of two and then in a group of four placing them in a carton. This specific embodiment and an alternate embodiment of an elevating mechanism have been chosen for the purposes of illustration and description as shown in the accompanying drawings wherein:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 represents a perspective view of the case packer of this invention and showing in particular an arrangement for feeding bailed containers to an orienting mechanism and delivering these containers to an erected carton and for gluing and closing the carton and then delivering this sealed carton to a conveyor, a pallet or other receiving means;

FIG. 2 represents, in an enlarged scale, a side view, partly in section, a portion of the apparatus of FIG. 1 and showing in particular the preferred apparatus for storing and feeding the cartons from a receiving station to an erecting station for delivery to an advancing conveyor and loading station;

FIG. 3 represents a fragmentary sectional side view of the carton erecting and delivery mechanism of FIG. 2 and showing in particular a lower carton in the initial stage of being grasped by a plurality of suction cups each carried by a delivery arm;

FIG. 4 represents a sectional side view of the apparatus of FIG. 3 after the suction cups have engaged the carton and with the arms beginning to move the carton downwardly a small distance;

FIG. 5 represents a sectional side view of the same apparatus as in FIGS. 3 and 4 but with the delivery arms now moved downwardly to a point of operation where the carton is about three-quarters erected;

FIG. 6 represents a sectional side view of the apparatus of FIG. 5 but with the transfer arms now moved so as to bring the carton into a fully erected condition;

FIG. 7 represents a somewhat diagrammatic plan view showing a portion of the carton erecting and transferring apparatus providing for closing the end flaps of the carton as it is brought into and through the opening and loading station and then toward the closing station;

FIG. 8 represents a fragmentary sectional view taken on the line 8—8 of FIG. 7 and showing in particular the apparatus for retaining the flaps of the carton in a closed position;

FIG. 9 represents a fragmentary plan view showing in an enlarged scale and detail the apparatus for tucking in a flap of the carton and with the apparatus in an initial stage for closing or folding said flap;

FIG. 10 represents a fragmentary view of the apparatus of FIG. 9 with the carton now advanced so as to utilize a closing action for the trailing flap of the carton;

FIG. 11 represents a partly diagrammatic sectional side view of the orienting station and showing the bailed containers as they are fed into said orienting station for delivery into an open carton;

FIG. 12 represents a plan view in an enlarged scale, partly diagrammatic, showing in particular the mechanism for orienting the containers with the bails disposed toward the corners of the carton;

FIG. 13 represents a plan view like the view of FIG. 12 but showing the containers with the bails disposed toward the center of the carton;

FIG. 14 represents a plan view, partly diagrammatic, of the orienting apparatus and showing in particular the drive mechanism for moving the orienting arms, the view being taken on the line 14—14 of FIG. 15 and looking in the direction of the arrows;

FIG. 15 represents a side view, partly in section, of the apparatus of FIG. 14 and showing the mechanism for sequentially orienting the bailed containers, the view taken on the line 15—15 of FIG. 14 and looking in the direction of the arrows;

FIG. 16A represents a plan view, somewhat diagrammatic, of the rotative action imparted to container one for its orientation;

FIG. 16B represents a plan view, somewhat diagrammatic, of the rotative action imparted to container two for its orientation;

FIG. 16C represents a plan view, somewhat diagrammatic, of the rotative action imparted to container three for its orientation;

FIG. 16D represents a plan view, somewhat diagrammatic, of the rotative action imparted to container four for its orientation;

FIG. 17A represents a diagrammatic plan view of the orienting conveyor with containers one and two ready for release into the carton;

FIG. 17B represents the plan view of FIG. 17A but with the now released containers one and two moving into the carton;

FIG. 17C represents the plan view of FIG. 17A with containers one and two now fully into the carton and containers three and four retained for release;

FIG. 17D represents the plan view of FIG. 17A but with the now released containers three and four moving into the carton;

FIG. 17E represents the plan view of FIG. 17A but with the containers one, two, three and four now fully in the carton;

FIG. 18 represents a fragmentary plan view of the carton station wherein the end flaps are retained in a semi-open condition;

FIG. 19 represents an end view taken on the line 19—19 of FIG. 18 and looking in the direction of the arrows;

FIG. 20 represents a fragmentary plan view of a carton as it passes the glue applicator;

FIG. 21 represents an end view taken on the line 21—21 of FIG. 20 and looking in the direction of the arrows;

FIG. 22 represents an end view showing the apparatus for gluing and elevating a series of filled cartons and showing in particular a means for closing the outer flaps of the carton and for the delivery of this and subsequent cartons to and from the elevator to a pallet or conveyor;

FIG. 23 represents an end view showing an alternate apparatus also adapted for gluing and elevating a series of filled cartons and from a short accumulating elevating section the filled and sealed cartons are delivered to a conveyor or pallet;

FIG. 24 represents a somewhat diagrammatic end view of the apparatus of FIG. 23;

FIG. 25 represents an end view of yet another alternate apparatus for gluing and elevating cartons in a manner similar to that of FIG. 22 and showing in particular an alternate method of pressing the flaps after the cartons have been glued and for retaining the cartons in an upwardly advancing station as they are moved to a discharge condition;

FIG. 26 represents a fragmentary face or front view showing in enlarged detail a hook means for engaging pins on a roller chain and for retaining the elevator at selected positions;

FIG. 27A represents the upper half of a schematic diagram of the operating circuit of the preferred apparatus, and

FIG. 27B represents the lower half of the schematic diagram for use with FIG. 27A.

In the following description and in the claims various details will be identified by specific names for convenience; these names, however, are intended to be generic in their application. Corresponding reference characters refer to like members throughout the several figures of the drawings.

The drawings accompanying, and forming part of, this specification disclose certain details of construction for the purpose of explanation of the broader aspects of the invention, but it should be understood that structural details may be modified in various respects without departure from the concept and principles of the invention and that the invention may be incorporated in other structural forms than shown.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now in particular to FIG. 1 wherein an automatic case packer is shown in which from and on a receiving conveyor 30 a succession of bailed containers 31 is carried. Each container ha a pivotally attached wire bail 32 and is fed in a single-file array to an orienting mechanism generally indicated as 33. This orienting mechanism is more fully described in relation to FIGS. 14 and 15 wherein means is provided for rotating four bailed containers into four separate orientating conditions. In this orienting apparatus, the containers are caused to be brought into groups of two, and aligned in pairs are fed into an erected carton lying at an angle. The carton is disposed with a pair of side flaps of the carton open so that the containers, with the bails in a determined array, may be fed to and slid into this open side of the carton. A carton storage and feeding apparatus is generally indicated as 34 and is adapted to receive cartons in a flat folded condition and in a substantially vertical condition. In this attitude advancing means moves these cartons to a delivery chute where these cartons are here grasped one at a time by means of a plurality of vacuum cups each carried at the end of a delivery arm. The grasped carton is brought into a carton-erecting mechanism generally indicated as 35. This erecting station will be hereinafter more fully described in conjunction with specific details and specific arrangements as shown in other more detailed figures.

After four bailed containers have been oriented and delivered to and into the open side of the angularly disposed carton, the carton is advanced to a flap-closing station whereat a hot-melt glue as delivered from a glue application mechanism 36 is applied as by spraying onto the flaps of the carton, after which the flaps are closed and the sealed cartons are lifted by elevating mechanism generally indicated as 38 for delivery to and onto a delivery conveyor or onto a pallet for stacking (not shown). The means of accumulating the sealed cartons is merely a matter of selection to accommodate the apparatus at the customer's plant. As seen in this FIG. 1 and in more detail in other views, the elevating mechanism for the carton includes a hydraulic cylinder acting in combination with pivoted stops carried in a frame. An alternate retaining and pressing mechanism employing a roller chain apparatus is shown in other views whereby the cartons are lifted in a cycling motion actuated also by a cylinder mechanism which operates in a timed relationship to the other operations performed by this automatic case packer.

CARTON-FEEDING AND DELIVERY MECHANISM OF FIG. 2

Referring next to FIG. 2, there is shown a side view, partly in section, of the carton-feeding and delivery mechanism 34. As depicted, a chute 40, carried on a framework 42, is adapted to receive a group of flat folded cartons 44 which are delivered and stored in the chute in a substantially vertical manner. This chute 40 is open at the top and back (left end) so that, as the cartons are used, other cartons are supplied to the delivery system by an attendant without the necessity of shutting down the operation of the case packer to replenish the carton supply. The cartons 44, as they are deposited in the chute, rest upon a toothed belt 46 which has its left end carried by an idler pulley 48 mounted on and carried by a shaft 49 supported by and rotatably retained by a pair of pillow block bearings 50 mounted on a pair of the upright members of the framework 42.

To the right of idler pulley 48 is a smaller pulley 52 mounted on shaft 53. This shaft is supported and rotatably retained by bearings not shown. The toothed belt 46 on its upper extent or reach extends from pulley 48 to pulley 52 in a substantially horizontal manner. After passing over pulley 52, the belt 46 is directed downwardly at an approximately 60° to 70° angle. In this downward travel this extent of belt is supported by and slides on a slide plate 54. This slide plate is secured to and is retained in a determined condition by a bolster or header member 56 which is attached to and is carried by a front frame member 57. The belt in its downward-supported travel continues to a drive pulley 58

which is carried by drive shaft 59 rotatably retained in bearings not shown. These bearings are secured to and carried by frame 57.

The toothed belt 46 is directed around drive pulley 58 to a tightening pulley 62 rotatably carried on a shaft 63 secured to a pivot arm 64 whose pivoted end is mounted and retained on a pivot pin 65 carried by bolster 56. From pulley 62 the belt 46 extends to pulley 48 and travels in the direction as indicated by the arrows. The drive or advancement of the belt 46 is intermittent and is accomplished and regulated by means of a drive system which includes a lobe provided on a cam member 66 which is secured to and rotated with shaft 59. As shaft 59 is rotated clockwise as indicated by the arrow, the lobe 66 is brought in way of and engages a roller 68 so as to lift arm 64 around pivot pin 65. With lobe 66 in engagement with roller 68 and the arm 64 in lifted condition the roller 62 is moved upwardly to tighten belt 46 and cause it to be advanced with the clockwise rotation of pulley 58.

Adjustably carried on the opposite side of the slide plate 54 and defining an angled carton-retaining means is a pair of guide rails 72. These rails are carried on threaded studs 73 extending through a header member 74 attached to and supported by frame 57. On the forward or downward end of each of the rails 72 is provided an inturning lip or stop 76 which engages and supports the stack of cartons and particularly the lowermost carton 44. Extending inwardly a short distance from each side of the chute 40 is an ear or tab 78 disposed to engage this lowermost carton at its outer edge to prevent sagging or unwanted dropping of the carton 44. In an alignment with the downwardly sloped extent of belt 46, there is provided a pair of stops 80 which engages the lower edge and face of the carton to prevent its dropping or accidental displacement from the chute until the carton is removed by means of vacuum cups 82 carried on arms 84.

As reduced to practice, there are four vacuum cups 82, each attached to an arm 84. Each arm is a bent tube carried in a bracket 85 secured to shaft 59 and moved therewith. A flexible tube or conductor 86 is attached to each arm 84 at the bracket 85 and at the other end each tube is connected to a header member 88 which is connected by a line or pipe 89 to a cylinder 90. A gauge 91 is flow-connected to this line to indicate the amount of vacuum developed by the movement of the piston in cylinder 90 as this piston is moved by another connected power cylinder used to actuate the apparatus for erecting and transporting a carton. A stop 92 is disposed to engage a carton and to limit and retain the upper edge of this carton as it is being erected. A guide finger 94 engages and retains the erected carton during the erection and retaining sequence.

CARTON-ERECTING APPARATUS OF FIGS. 3 THRU 6

Referring next to the carton-erecting mechanism of FIGS. 3 through 6, it is to be noted that in FIG. 3 the attached vacuum cup 82 and arm 84 are in carton-engaging position. Shaft 59 as carried by front frame 57 has been rotated counterclockwise by a flexible belt 100 fixedly attached by means of a screw 101 to a driven pulley 102 which is fixedly attached to shaft 59. The other end of the belt 100 is secured by means of a cap screw 103 to a drive pulley 104 carried on a drive or power shaft 106 also rotatably supported by front frame 57. Shaft 106 is rotated both clockwise and counterclockwise by means of a pinion 108 driven by a rack 109 carried by a reciprocated frame 110 which is moved by a power piston portion 111 of cylinder 90.

It is to be noted that belt 100, as shown, is crossed but not twisted as it is secured to both pulleys 102 and 104. A determined amount of slack or play is provided in the mounting and securing of this belt to the pulleys. This slack permits and provides a determined degree of lost motion in the relative rotation of shaft 106 as it is moved in response to the rotation of shaft 59.

As seen in FIG. 3, the piston portion 111 has reached the forward end of its stroke imparting a clockwise rotation to the pinion 108 as driven by rack 109 in its rightward travel. The tensioned side of belt 100 has pulled driven pulley 102 counterclockwise and the arm 84 has been swung by shaft 59 until the suction cup 82 has been brought into a pressed engagement with the under surface of the lowermost of the cartons 44. With the cup 82 now in engagement with the face of the carton, the power piston portion 111 is caused to move leftwardly, as well as the connected frame 110. As to be more fully described in conjunction with the operational sequence depicted in the circuit diagram, the piston in cylinder 90 is also moved leftwardly by the power piston portion 111, causing a vacuum to be applied in the arms 84 and at the cups 82. The pinion 108 is now rotated counterclockwise and when the slack in belt 100 has been taken up the pulley 102 is rotated clockwise.

Referring next to FIG. 4, it is to be noted that the vacuum cups 82 have, by vacuum, attached themselves to the lower panel of the carton 44 and as the arm 84 is begun to be swung clockwise around shaft 89 the carton is pulled from stop 76 while the tabs 78 retain the opposite sides of the midportion of the lowest carton in the chute. Stop 80 and belt 46 insure that the lower edge of this lowest carton is restrained against sliding until the carton is substantially opened.

Referring next to FIG. 5, it is to be noted that carton 44 has been completely pulled from the chute by the continued downward swing of arm 84 as it is moved in a clockwise direction. The carton 44, still held by the vacuum cups 82, has now been pulled so that its lower right face is brought into engagement with a guide 112 which prevents the carton from dropping further. A support bar 113 carries the guide 112 which has its front end contoured to also provide a guide and retaining means for an erected carton as it is advanced to the loading station.

Referring next to FIG. 6, it is to be noted that the apparatus of FIG. 5 has now moved so that the arms 84 are at their maximum limit of downward swing. The carton 44 which is still retained by vacuum cups 82 on the ends of arms 84 has been moved until the carton is against stop 92 and under spring-loaded guide finger 94. This stop causes the carton to be squared as it is drawn against the stop as seen in FIG. 6 and the finger 94 presses the erected carton against frame 110.

The clockwise travel of arm 84 as provided by the rotation of shaft 59 through the movement of rack 109 is stopped when the carton 44 is fully erected as in FIG. 6. The vacuum supplied to the vacuum cups 82 by cylinder 90 is allowed to drop to a point where it is substantially ineffective. This dropping or reducing of the vacuum occurs in the present embodiment through a combined action. A line-bleeding valve to be later-

described in conjunction with the circuit diagram is adjusted so as to limit the amount of vacuum developed by cylinder **90** and through this bleed the vacuum to the cups **82** rapidly drops. A simultaneous action also occurs in that the ability of the cups **82** to seal themselves to a cardboard surface is less than complete. Accordingly, after the carton has been erected for a very short period of time, the ability of cups **82** to retain the erected carton **44** by vacuum ceases and the erected carton is held by finger **94**, stop **92** and frame **110**.

Reference is again made to FIG. **2** wherein it is to be noted that pivotally retained by and movable with the reciprocated frame **110** is a plurality of pusher fingers or stops **114** which are pivotally carried by and on pins **115**. Springs **116** are adapted to urge the upper or distal ends of the fingers above the carton support surfaces provided by a channel frame **118** upon which the erected carton is transported rightwardly.

On the carton-transferring stroke, the power piston **111** moves the reciprocal frame **110** rightwardly as the frame is supported by and is carried on a plurality of rollers **120**. These rollers are carried by frame **118** and permit frame **110** to be moved rightwardly a determined distance, which distance is equal to the distance between sets or pairs of fingers **114**. As the carton identified as I is moved rightwardly by stop **92** it is brought to and under the undersurface of guide bar portion **122** of guide **112**, which bar portion is spaced from surface **118** an amount sufficient to provide a snug sliding fit for an erected carton **44**. A retaining latch **124** is pivotally carried by bar **122** and as the erected carton is brought to an advanced condition indicated as II the latch **124** is first cammed upwardly until the carton passes, after which the latch drops onto the top extent of the carton so that the latch dog portion provided on the left end of said latch **124** engages the upper left corner of the carton. The carton **44** now in position II is ready to receive the bailed containers from the orienting mechanism **28**. At the end of the forward stroke of piston portion **111**, a signal is received by the control circuit and the piston in portion **111** is then moved leftwardly. During the forward transport of the erected carton from position I to position II the shaft **59** and attached arms **84** have been swung counterclockwise from the position of FIG. **6** to the position of FIG. **3**. The slack built into this action by the belt **100** permits a delayed swing of arm **84** to occur. This delay permits the erected carton at position I to be moved a short distance rightwardly before arm **84** starts to move upwardly. This initial movement of the carton insures that the suction cup **82** is disengaged from the carton and does not brush the carton during the counterclockwise upward swing of the arms **84**.

FLAP-CLOSING MECHANISM AS SHOWN IN FIGS. 7 – 10

Referring next to FIGS. **7** through **10**, there is shown the end flap-closing or tucking mechanism which operates in timed relationship to the erecting and carton transporting apparatus as shown in FIGS. **2** through **6**. In the plan view of FIG. **7**, three erected cartons **44** are shown. The left carton, is identified as I and corresponds to the erected carton identified as I in FIG. **2**, which position is where the carton is brought to an erected condition with the carton engaged at stop **92**. As the erected carton **44** is moved from position I to position II by means of stop **92** and the reciprocated frame **110**, the leading or upper right flap **44***a* portion of this carton is brought in way of a turning finger apparatus **130** carried on shaft **131**. This flap or end **44***a* of the carton first engages a finger portion **132** or **133** of mechanism **130** to cause the fold line of this flap and side panel to be broken with the flap **44***a* turned counterclockwise or inwardly. As the carton is moved further rightward, the flap portion **44***a* is engaged by slide guide **134** which engages and causes this flap portion to be turned at right angles to the forward panel or side of the carton **44**.

At the same time flap **44***a* is being folded by slide guide **134**, it is necessary that trailing flap **44***b* of the carton be turned clockwise before the outer or cut end of this trailing flap reaches the slide guide **134**. As the carton **44** is moved rightwardly or forwardly and at a determined location in its advance, shaft **131** is rotated counterclockwise as indicated by the arrow. Finger portion **132** engages the flap **44***b* to break the fold line and turn this trailing flap **44***b* toward the leading flap **44***a*. Continued rotation of shaft **131** causes this finger portion **132** to swing the outer edge of flap **44***b* clockwise sufficiently so that it (the flap) is brought in way of and is caught by the deflecting curved forward edge of slide guide **134** so that this guide retains the flap as the carton passes to the closed condition of position II. At this particular station the flaps **44***c* and **44***d* have not been turned and the near side of the erected carton is open to receive bailed containers as they are delivered into the carton from the orienting mechanism **33**. After the erected carton has been loaded with four containers, the filled carton is moved from position II to position III and as it is moved rightwardly the flaps **44***c* and **44***d* are turned inwardly.

As depicted in FIGS. **7**, **9** and **10**, the carton **44** is moved from position II to position III during which the flap **44***c* is closed by a finger assembly **136** which is the mirror image of assembly **130**. As the carton is moved from position II to position III the carton flap **44***c* engages stop finger **137** which is moved into a desired position by shaft **138** upon which is fixedly mounted the assembly **136**. This forward movement of the carton causes the fold line of the flap **44***c* to be broken and the flap partly turned counterclockwise. Continued forward movement of the carton brings this partly turned flap **44***c* into engagement with a slide guide **140** which cams or displaces this flap into the folded condition of FIG. **10**.

As the carton **44** is transported from position II to position III and at a determined point in this advance the shaft **138** is rotated clockwise to cause finger member **142** to sweep in an arc so that the finger **142** engages and pushes flap **44***d* toward flap **44***c*. As seen in FIG. **10** this flap **44***d* has been turned inwardly nearly to the point where the guiding curved leftward end of slide guide **140** is ready to engage and push the flap into the closed condition at position III as seen in FIG. **7**.

Referring now in particular to FIGS. **7** and **8**, it is to be noted that slide guide **134** is pivotally carried on a support **144** and by means of a slide retaining bar **145** is retained in the condition of FIGS. **7** and **8**. When it is desired to open the carton and flaps **44***a* and **44***b*M the bar **145** is slid to a releasing condition whereat the slide guide **134** and support portions **146** and **147** may be swung from in way of the carton flaps **44***a* and **44***b*. It is also to be noted in FIG. **8** that the slide guide **140** is carried on support members **149** and **150** and by

means of cap screws or bolts **152** the slide guide is adjusted inwardly or outwardly to accommodate the particular size carton being loaded with containers and processed. As seen in FIG. **8** the other end-closing flaps **44***e*, **44***f*, **44***g* and **44***h* are depicted at and in the planes of the upper and lower panel member portions of the container **44**. When the container has been advanced to position III it has received the four bailed containers and flaps **44***a*, *b*, *c* and *d* are now in folded condition which is maintained by the gluing and folding of flaps **44***e*, *f*, *g* and *h* into a closing and pressed condition and maintaining this condition during the time necessary for the glue to set.

CONTAINER FEEDING AND ORIENTING MECHANISM OF FIG. 11

Referring next to FIG. **11**, there is shown a side view of the feeding and orienting mechanism as adopted to feed the bailed containers **31** on an inclined conveyor **30** to and into an erected carton **44**. It is noted that the conveyor **30** and the channel frame **118** are carried by a base **154** so as to provide a slope of about 25° and establish a gravity feed for the bailed containers. Also shown in its related operating condition at this selected angle is the reciprocated frame **110** as carried by rollers **120**. Pinion **108** engages rack **109** which is carried on the left channel member of frame **110** while a slide member **156** carried by the right channel member of frame **110** engages and slides on an adjustable guide member **158** carried by the channel frame **118**. This slide **156** and guide **158** are adjusted as required so as to accept and carry the mounted side thrust of frame **110**. Power piston **111** is also shown in its mounted condition as carried within the channel frame members **118**.

Carried on the support bar **113** is a flap guide and support **160** which engages and lifts the flap **44***g* so that this flap is positively displaced from the inward travel of the containers **31** into the open side of the erected carton **44**. In a like manner a support plate **162** carried by and secured to the frame of the receiving roller conveyor **30** is adapted to positively displace flap **44***h* to a position below the gravity propelled travel path of these oriented containers while also providing a sliding support for said containers. A conveyor support bracket **164** in addition to supporting the conveyor **30** and the orienting mechanism **33** also has a plurality of ribs **165** whose upper surfaces are contoured to support the flap **44***h* during the transfer of the containers into the erected carton. The orienting mechanism **33** for the bailed containers, to be more fully described hereinafter, is carried by four posts **166** mounted on support bracket **164**.

ORIENTING ARRANGEMENT OF FIG. 12

Referring next to FIG. **12**, there is shown a somewhat diagrammatic plan view of the conveyor **30** and the orienting mechanism wherein the bailed containers **31** are fed along the conveyor with their bails **32** lying on the forward portion of the container. A pair of turning members **168** and **169** is provided with each member carrying a pair of pressure pads, which for the purpose of identification are numbered **170, 171, 172** and **173**. These pressure pads are vertically moved by mechanism, to be later shown and described, so that they are disposed to be successively moved into orienting engagement with the containers **31**. After orientation and positioning the containers are accumulated in pairs just prior to the containers being delivered to and across support plate **162** into the open side of the erected carton **44**. As seen in this FIG. the bails of the four containers are arranged so that each container has its bail disposed into a corner of the carton so as to engage two joined sides. In this arrangement the four containers have the line connecting the ears of the containers arranged at about 45° to the sides of the carton **44**.

ORIENTING ARRANGEMENT OF FIG. 13

Referring next to FIG. **13**, there is shown a somewhat diagrammatic plan view which is substantially identical to the arrangement as shown in FIG. **12** but with the containers **31** having their bails **32** disposed to the rear of the path of travel on conveyor **30**. The turning members **168** and **169** carry the pressure pads **170, 171, 172** and **173** as in FIG. **12** but when the containers are oriented and delivered to and into the carton **44** the bails **32** are turned inwardly toward each other. The line connecting the ears of the container, like the arrangement of FIG. **12**, is also disposed at 45° to the sides of the erected carton. The containers and their bails **32** are grouped so as to nearly engage or engage one another while the side walls of the four containers engage the corner of the erected carton **44**.

ORIENTING APPARATUS OF FIGS. 14 AND 15

Referring next to the orienting apparatus of FIGS. **14** and **15**, it is to be noted that the orienting mechanism **33** is adapted to receive bailed containers **31** as transported at a determined angle downwardly on roller conveyor **30** (FIG. **11**). To accommodate containers whose height may vary because of the separate standards established by the several manufacturers, the present embodiment contemplates a height adjustment means whereby the orienting apparatus may be moved to a determined height above the conveyor to accommodate the containers of a particular manufacturer. At least within the operating practices of the larger can manufacturers, containers, particularly 1-gallon eared containers of a particular style and construction, have a height tolerance of less than one-sixteenth of an inch. From manufacturer to manufacturer the differences in container heights may be an inch or more, hence the adjustment ability of the preferred embodiment.

This adjustment is achieved by moving a main support plate **175** up and down on the four support posts **166** by means of sprockets **177** which are driven by roller chain **178**. Each sprocket is mounted on and is secured to a threaded bushing **180** which is rotatably mounted on the threaded upper ends of the posts **166**. A square drive **181** which, as shown, is made as a hub extension of the lower right-hand sprocket **177** (FIG. **14**) and is adapted to turn this sprocket which, as it is turned, drives chain **178** so all like sprockets **177** are turned at the same time and degree. An idler sprocket **182** is adjustably mounted on plate **175** and insures that the roller chain **178** is maintained at the desired tension. An air motor **184** is mounted and carried on plate **175** and on the downwardly extending shaft of the motor carries a pinion **186** which engages and is in mesh with the toothed periphery of a spur drive gear **188**. This gear is in mesh with and drives a spur drive gear **189** of a like size and having a like number of teeth. Gear **188** is secured to and is carried on shaft **191** while gear **189** is secured to and is carried on shaft **192**.

Each of these shafts is rotatably retained in a housing having a spur gear provided thereon. The combination housing and gear which carries shaft **191** is identified as **194** and the combination housing and gear which carries shaft **192** is identified as **195.** Both housings are secured in place in plate **175** and are moved up and down with the movement of this plate on posts **166.**

It is to be noted that housings **194** and **195** are substantially identical except for the number of teeth on the gear provided thereon. In both housings there is formed a piston bore in which a piston **197** is slidably carried. As seen in the sectioned view of housing **195,** the piston **197** which is secured to shaft **192** is moved upwardly when pressurized air is fed into the lower end of the piston bore through an air passageway **198.** As piston **197** is lifted the turning member **168** is also lifted. The lower portion of the piston bore is closed by means of the hub portion of a spur gear **200** which is secured to housing **195,** and as with housing **195,** also does not rotate. A sleeve bearing **201** carried in the bore of this gear **200** permits shaft **192** to be both rotated and be moved axially vertically therein.

On both turning members **168** and **169** there is provided a pedestal or stanchion. On the spacer of member **168** there is rotatably mounted a gear **202** and pinion **203** which are carried on a stud extending into the pedestal. The gear and pinion are joined or secured together so as to turn together. As seen in FIG. **15** the spur gear **202** in in mesh with the gear **200** while the pinion **203** is in mesh with and drives a spur gear **205.** Spur gear **205** is secured to and drives shaft **206** which is connected to and carries on its lower end a pressure pad. This pad is also seen in FIGS. **12, 13** and **14** where this pad is identified as pad **171.** Shaft **206** is rotatably carried in a ball-bearing assembly **208** carried in a housing **209** secured to turning member **168.** Housing **210** carries a bearing assembly like assembly **208** and this bearing assembly rotatably retains a shaft **212** which carries pressure pad **170.** This pad is rotated by a spur gear **214** mounted on shaft **212.** Gear **214** is in mesh with the gear formed on housing **195.**

FIG. **15,** as to the drive of the pressure pads **172** and **173,** is partly diagrammatic in that the housing and gear **194** and a lower gear **216** are similar to gear **200** but have more teeth. The near pressure pad **172,** like pad **171,** is carried in a bearing and housing and on a shaft or spindle like the spindle **206,** bearing **208** and housing **209** as shown for the rotatable support for pad **171.** Like pad **171,** however, the gear train for pad **172** is at a different ratio beginning with gear **216.** As seen in dotted outline in FIG. **14,** the spur gear **216** is carried by gear housing **194** and meshes and drives gear **218** and pinion **219** mounted on a common stud carried on a stanchion supported on turning member **169.** Pinion **219** meshes and drives gear **221** which rotates pressure pad **172.** Pressure pad **173** is driven by gear **222** and the gear portion of gear housing **194.**

Referring again to FIG. **14,** there is seen that the drive and driven gears **188** and **189** each contain a pair of diametrically opposed upwardly extending actuation pins identified as **223, 224, 225** and **226.** These pins are arranged to extend sufficiently upwardly to engage limit switches to be further identified. The pair of pins identified as **223** and **224** is mounted and carried on drive gear **188.** Each pin on its upwardly extending portion is disposed to engage limit switches **228** and **229** preferably adjustably carried on the support plate **175.** Pins **223** and **224** are made of sufficient length to also extend below gear **188** for a determined extent sufficient to provide a camming member. The other pair of pins **225** and **226** is mounted and carried on driven gear **189** and each pin is disposed to engage limit switches **231** and **232** also preferably adjustably carried on the support plate **175.** A pair of downwardly extending pins **234** and **235** disposed or oriented at about ninety degrees to the pins **223** and **224** are carried on and extend below the gear **188** similar to the downward extent of pins **223** and **224.** These four pins are disposed to actuate limit switch **237** carried by and adjustably mounted on support plate **175.** Pin **226** on gear **189** in addition to extending upwardly is made sufficiently long to extend below the gear a short distance. If the downward extent is not desired, another pin near pin **226** may be provided so as to engage and actuate limit switches **239** and **240** carried by and adjustably mounted on the support plate **175.**

In operation, the turning of the air motor **184** on and off is performed by limit switches **237** and **240.** The limit switch **228** is actuated to cause arm **169** to be lowered to pail-engaging condition while switch **229** is actuated to cause the arm **169** to be lifted to a disengaged condition. Switch **231** is engaged and actuated to cause arm **168** to be lifted while switch **232** is actuated to cause the arm **168** to be lowered to container-engaging condition. The sequence of operations will be discussed more completely in conjunction with the circuit diagram of FIGS. **27A** and B. It is to be noted that the limit switch **240** provides a safety stop for the air motor so that the air motor cannot be actuated for releasing, feeding and orienting a container until a loaded carton has been advanced and an empty carton is in place. Switch **239** also is a sequence switch in that it prevents an actuation of the arm **168** unless the second pail and fourth pail of a group of four have passed through the orienting apparatus in the desired actuating sequence.

ORIENTING OF CONTAINERS AS IN FIGS. 16A, B, C AND D

Referring next to the orienting sequence as depicted in FIGS. **16A,** B, C and D it is to be seen that as delivered on conveyor **30** the bailed container **31** has its ears disposed at right angles to the longitudinal axis of the conveyor. Pressure pad **172** has been lowered to engage the top of a first container identified as I. As the arm is swung in a clockwise manner for about ninety degrees while the container is to be rotated about 45° it is necessary that compensation for this difference in rotation be made. The gear train of gears **216, 218, 219** and **221** cause pad **172** to turn counterclockwise and for a determined degree, which is about 45°. The progress of the first container is shown in FIG. **16A** with the container I brought from the single conveyor **30** to the right rail of the broader gravity conveyor extent **30***a*.

In FIG. **16B** is depicted the second container which is identified as II and like container I is also presented with the axis of its ears normal to the flow of the containers on the conveyor **30.** Pressure pad **171** has been lowered onto the top of this second container and the arm **168** is swung in a counterclockwise direction for about 90°. As this second container is to be turned only about 45°, this requires that the turning action of the arm be modified as for the first container. Container II is turned on its axis in a clockwise direction by the gear train beginning with spur gear **200,** gear **202,** pinion

203 and gear 205. The progress of the second container is shown in FIG. 16B with the container II brought from conveyor 30 to the left rail of the broader gravity conveyor extent 30*a*.

In FIG. 16C is depicted the third container which is identified as III and like container I and II is presented with the axis of its ears normal to the path of the containers on conveyor 30. Pressure pad 173 has been lowered onto the top of this third container and the arm 169 is swung in a clockwise direction for about 90°. It is also determined that the container III needs be turned an additional 45° so this amount of turn is calculated and is imparted by means of the gear on gear housing 194 and the gear 222 to cause the container to turn clockwise. The progress of this third container, as it is turned, is shown in FIG. 16C as the container is moved from the single conveyor 30 to the right rail of the broader conveyor 30*a*.

In FIG. 16D is depicted the fourth container which is identified as IV and like the previous first three containers this container also is presented with the axis of its ears normal to the flow of the containers on conveyor 30. Pressure pad 170 has been lowered onto the top of this fourth container and as the arm 168 is swung in a counterclockwise direction for about 90° the container IV is also turned that amount. This is not enough as it is desired that the container be turned another 45°. This additional amount of turn is calculated and by means of the gear on housing 195 and the gear 214, this additional turning is imparted to the counterclockwise rotation of the container. The progress of this fourth container, as it is turned, is shown in FIG. 16D wherein the container is moved from the single conveyor 30 to the left rail of the broader conveyor 30*a*.

ORIENTING SEQUENCE OF FIGS. 17A, B, C, D AND E

Referring next to FIGS. 17A through 17E, there is shown the sequence of feeding four oriented containers in a determined array into an open carton 44. As seen in FIG. 17A the roller conveyor 30 is changed from a single line conveyor whose side rails provide the guides for the bailed containers 31 until they are passed through the orienting apparatus to a broader roller conveyor 30*a* whose side rails are spaced to act as guides with the increased width being slightly less than two adjacent containers. In FIG. 17A, the leading or rightward container identified as I has been engaged by pressure pad 172 (FIG. 14) and, as shown by the arrow, has been turned counterclockwise for about 45°. The container is stopped in its forward progress downwardly along the rollers of conveyor 30A by a stop pin 239 reciprocably projectable through support plate 162. After container I has been oriented by the pressure pad 172 the pressure pad 171 is lowered onto the next container 31, identified as II, and this container is turned about 45° clockwise until this container is stopped by the left side rail of conveyor 30*a* and the container 31 identified as I.

Referring next to FIG. 17B, it is to be noted that the stop pin 239 has been lowered and the now released containers I and II, as urged by gravity, are moving rightwardly by a sliding action into the open carton 44 and they continue to slide forwardly until they strike the right or closed end of the carton as in FIG. 17C. When these containers I and II are stopped by the end of the carton they are displaced outwardly into the corners as established by the sides and end of the carton. The partly forwardly offset condition of the containers I and II as seen in FIGS. 17A and B is eliminated by the wider carton which is sized to easily accommodate the two oriented containers 31 in a side-by-side relationship.

Referring next to FIG. 17C, it is to be noted that stop pin 239 has again been raised to the container arrest condition. The third container 31, identified as III, has been rotated clockwise as indicated by the arrow and has been turned about 45° more than the swing of the arm 169 by the rotation of pressure pad 173 and when this container reaches pin 239 it is stopped. The following container 31, identified as IV, has also been rotated counterclockwise about 45° as indicated by the arrow. This rotation is produced by the rotation of pressure pad 170 in addition to the swing of arm 168. The forward progress of container IV has been stopped by the container identified as III, and the left side rail of the conveyor 30*a*.

Referring next to FIG. 17D, this view represents the forward movement of the containers III, and IV after stop pin 239 has been lowered from a container-arrest condition to permit these containers to move downwardly and forwardly over support plate 162 and onto the angled bottom of the carton 44. After proceeding as far forward as the containers III and IV can slide, they are stopped by the already placed and stopped containers I and II and the four containers then are positioned in the carton 44 as seen in FIG. 17E.

As seen in FIG. 17E, the view represents the oriented containers 31 identified as I, II, III and IV now placed in the carton 44 and with the carton now ready to be moved from the loading station.

Stop pin 239 is again in the container-arrest condition and the orienting apparatus is in condition to receive and orient the next four succeeding containers 31. Whether the containers are fed along the conveyor 30 with their bails displaced forwardly or trailing is a matter to be determined by the customer in the placement of the containers and their bails in the carton. For example, when the containers 31 have their bails leading as in FIG. 12, the oriented bailed containers, as shown, have their bails 32 arranged to face the adjacent corner. When the containers 31 have their bails trailing as in FIG. 13 the oriented bailed containers, as shown, have their bails 32 arranged to face each diagonally arranged container with the bails disposed toward the center of the carton.

ORIENTING AND SPACING OF CONTAINERS AS SEEN IN FIGS. 12 AND 13

As seen in both FIGS. 12 and 13, it is to be noted that on both the turning members 168 and 169 are carried spacing rollers disposed to insure that the following container 31 does not bump or otherwise engage the container being turned and moved from the single line conveyor 30 to the sides of the enlarged or widened conveyor 30*a*. For example, as shown in FIG. 12, the container 31 which is engaged by pressure pad 170 is the container IV of the sequence as seen in FIGS. 16A, B, C and D and also in FIGS. 17A, B, C, D and E. A roller stop 241 carried by turning member 169 engages a portion of the forward surface of the container I to prevent this container I from engaging and distrubing the orienting procedure for the immediately proceeding container IV. As the container identified as I is

brought to and under pressure pad **172**, a roller stop **242** carried by turning member **168** is brought in way of the next succeeding container **31** identified as II and prevents this container II from engaging and disturbing the container I as it is moved forwardly and turned by the pressure pad **172**. To space and prevent the next succeeding container III from engaging container II there is provided a roller stop **243** on turning member **169**. To space and prevent the next succeeding container IV from engaging container III there is provided a roller stop **244** on turning member **168**. These same roller stops are used to precisely space containers where the feeding and orienting are according to the arrangement depicted in FIG. **13**.

METHOD OF ORIENTING FOUR CONTAINERS

Referring to the orienting sequences as seen in FIGS. **12** through **17**, the container **31** is fed on the conveyor **30** with its ears transverse to the center line of the conveyor. The pressure pad **172**, as carried by turning member **169**, is lowered by piston **197** so as to be brought into driving engagement with the top of the first container I. Stop pin **239**, after container I is engaged, is brought to an up condition and turning member **169** is turned clockwise by the action of the air motor **184**. The gear **216**, which is a fixed gear, engages gear **218** which is carried on a pedestal and shaft extending upwardly from member **169**. As member **169** is moving clockwise the gear **218** is also caused to be rotated clockwise. The pinion **219** connected and rotated with gear **218** also turns clockwise so that gear **221** which drives the shaft connected to pressure pad **172** is caused to be rotated counterclockwise. This gear train is calculated to produce the desired rotative counterclockwise movement of the pressure pad **172** as it moves the container sideways and forwardly as seen in FIG. **16A**. The gear train provides a rotation of the container I of about 45° with the drive action on the container being terminated prior to the container being brought to the rightward side of conveyor **30***a*. The rotational force which has been induced into the container is permitted to dissipate as and after the pressure pad **172** is lifted from the container. Preferably, the limit switches **228** and **229** which control the lifting and lowering of the turning member **169** are adjustably mounted so as to permit the engagement and disengagement of the pressure pad from the container so that the period and extent of engagement may be adjusted for the degree of slope of the conveyor. This slope and the desired speed of feeding the container into the carton **44** influences the anticipation of engagement and disengagement of the pressure pad and the container. In an operation wherein the container **31** is a one-gallon metal container filled with a water base paint, the disengagement of the pressure pad is completed about one-half inch from the edge of the conveyor **30***a*.

The mechanism for rotating and advancing the container II uses turning member **168** which has been rotated so that pressure pad **171** is positioned centrally over and in engagement with this container. When the pad is positioned and engaged, the gear **200**, which is a fixed gear, causes the spur gear **202**, as carried by the counterclockwise turning member **168**, to turn counterclockwise. The pinion **203** fastened to and turned with the gear **202** causes the driven gear **205** and the connected pressure pad **171** to turn clockwise. As with the mechanism for orienting the container identified as I this mechanism as raised and lowered by switches **231** and **232** is also adjustably mounted to permit the turning container to be disengaged from the pressure pad **171** before this container reaches the side of the conveyor **30**. The rotative motion imparted to the container **31** is about 45°, as seen in FIG. **16B**.

Referring next to the mechanism for rotating and advancing the container identified as III, it is noted that turning member **169** has been rotated one hundred eighty degrees from the condition of FIG. **16A**. Pressure pad **173** has been centered over the container **31** and the turning member **169** lowered to cause pressure pad **173** to be brought into turning engagement with the top of the container. The gear on the fixed gear housing **194** is in mesh with spur gear **222** which is fixedly mounted on the shaft which carries pad **173**. As member **169** is rotated clockwise the gear **222** and shaft which carry it are caused to be turned clockwise. As with the containers I and II, the switches **231** and **232** are selectively adjusted to engage and release the container III at a determined distance from the side of the conveyor **30**. The turning action on the container is about 135°, as seen in FIG. **16C**.

The mechanism for rotating and advancing the container identified as IV requires that turning member **168** be rotated 180° to the condition of FIG. **14**. The pressure pad **170** is now centered over the container and the turning member **168** has been lowered to cause pad **170** to be in driving engagement with the top of the container. The gear on the fixed gear housing **195** in in mesh with gear **214** fixedly carried on shaft **212** which carries pad **170**. As member **168** is rotated counterclockwise the gear **214** and shaft **212** are also caused to be turned counterclockwise. As with the containers I, II and III the control apparatus for this pressure pad is selectively adjusted for the engagement and release of the container a determined distance from the side of conveyor **30***a*. Switches **231** and **232** control the vertical motion of the pressure pad **170** as it rotates the container IV about 135°, as shown in FIG. **16D**.

FLAP CONTROL OF FIG. 18

Referring next to FIGS. **18** and **19**, there is shown a plan view and transverse view which represent an extension of FIG. **7** of the advancement of the container from the loading station to the elevating mechanism whereat the glued flaps are closed and are pressed for a sufficient time to insure the glue setting. With the end flaps **44***a*, *b c* and *d* retained by slide guides **134** and **140** the carton is advanced by power piston **111** to the elevator delivery station **38**. It is desirable and necessary that the flaps **44***e f*, *g* and *h* be turned partly inward as the container is moved from Station III (FIG. **7**) to the sealing elevating station. As the filled carton is moved from in way of slide guides **134** and **140** the flaps **44***a*, *b*, *c* and *d* need be retained in their folded condition to maintain the containers in the carton. There are provided immediately to the right of guides **134** and **140**, four deflector rods **246**, **247**, **248** and **249** which rods are disposed to engage and move the flaps **44***e*, *f*, *g* and *h* towards each other at an angle of about 45° from the top and bottom panels of the carton. With the flaps at this angle the carton is advanced to the glue application station.

GLUE APPLICATION

Referring next to FIGS. **20** and **21**, there is shown a diagrammatic representation of a pair of glue applicator nozzles **250**. One applicator nozzle is disposed on each side of the advancing carton to direct selected streams of hot-melt glue to and onto the folded flaps as the carton in advanced. These flaps **44***a*, *b*, *c* and *d* are sprayed, at least in part, by hot-melt glue from the mechanism **36**. The discharge of the glue is automatically controlled by the presence of a carton and by the advancement of the frame **110**. As and after the carton is moved into the elevating mechanism **38** the carton flaps **44***e*, *f*, *g* and *h* are folded and pressed against the flaps **44***a*, *b*, *c* and *d* and the glue thereon.

ELEVATING STATION OF FIG. 22

Referring next to FIG. **22**, there is seen an end view, partly diagrammatic, of one embodiment of an elevating station and mechanism **38**. Flaps **44***e*, *f*, *g* and *h* have been moved into a partially closed condition by deflector guide rods **246**, **247**, **248** and **249** to prevent unwanted opening of the carton and unwanted engagement with frame upright members **252** and **253** and to prepare for the folding of the flaps. A hydraulic cylinder **255** has its piston rod adapted to carry a pusher platform **257** having closing fingers **258** and **259** fixed at each end thereof and movable with this platform. As the platform moves upwardly towards the bottom of carton **44** as supported by frame **110**, these fingers **258** and **259** push flaps **44***h* and **44***e* against the carton and to a closed condition. As the cylinder **255** pushes platform **257** further upwardly, the flaps **44***g* and **44***f* are brought in way of the downwardly and outwardly curved ends of shoes **260** and **261**. These shoes in this view and as seen in FIG. **1**, are arranged as pairs pivotally carried on like arms **262** which have their outer ends pivotally retained and carried by rods **263**. An adjustable stop screw **264** carried in shaft **265** is disposed to limit the downward travel of shoe **260** while a like screw **266** carried in a shaft **267** is disposed to limit the downward travel of shoe **261**. A back slide plate **269** has its upper end fixedly attached to the pair of upright frame members **253** and its lower end has cutouts formed therein to accommodate the shoes **261**. This lower end of slide plate **269** is supported by brace **270** carried on shaft **271**. The upper end of frame member **253** carries an attached slide plate **272** upon which the upwardly displaced and sealed carton **44** slides rightwardly and downwardly to a conveyor **273** or similar carton-accumulating device.

OPERATION OF ELEVATOR MECHANISM

After the forward delivery of the glue carton **44** to a position above platform **257** has been achieved, the cylinder **255** is actuated to cause the platform **257** to move upwardly. Fingers **258** and **259** engage and further turn flaps **44***h* and **44***e* against the ends of the carton. As the carton moves upwardly, as now carried by platform **257**, the flaps **44***g* and **44***f* are brought in way of the curved lower ends of the pairs of shoes **260** and **261**. These shoes push or cam these upper flaps towards and to the side of the carton and also the lower flaps **44***h* and *e* as they are brought in way of the shoes **260** and **261**. The faces of these shoes preferably have a rubber facing which may be ribbed or corrugated to provide a friction means tending to discourage the slippage of the carton when gripped therebetween. When the lowermost carton has been moved from position A to position B, the cylinder **255** is reversed or lowered so as to bring platform **257** into the carton-receiving condition of FIG. **22**. As the cylinder and platform are lowered, the shoes **260** and **261** are permitted to move downwardly and inwardly to grip and press the flaps **44***e*, *f*, *g* and *h* against flaps **44***a*, *b*, *c* and *d* of the carton. The glue is set during the time the carton is at position B and/or C. Every time a carton is moved from position A to position B, the pairs of shoes **260** and **261** are lifted upwardly sufficiently to swing them from a gripping to a passing condition. With every upward lift stroke of the cylinder **255**, the cartons in the stack are displaced upwardly the distance of one carton so that each carton successively occupies the position of A, B, C, D, etc. When a carton reaches the level of slide plate **272**, it slides rightwardly to and on conveyor **273**, as indicated by the arrows, to a stacking or other apparatus, not shown.

ALTERNATE EMBODIMENT OF FIGS. 23 AND 24

Referring next to FIGS. **23** and **24**, there is shown an alternate embodiment to the elevating mechanism of FIG. **22**. In this embodiment the right frame upright members **253** of FIG. **22** are shortened to accommodate only the two cartons B and C normally gripped and retained by shoes **260** and **261**. These right upright members are identified as **274** and, except for their overall height, are substantially identical to said uprights **253**. The uprights **252** and the support and action of shoes **260** and **261** are like those shown and described with respect to the embodiment of FIG. **22**. At the top of uprights **274** there is provided a support plate **275** which is adapted to let the now sealed cartons slide rightwardly from the apparatus to an accumulating means, not shown. Hydraulic cylinder **276** is similar to the cylinder **255** of FIG. **22** except that it is a telescoping cylinder which is adapted, when desired, to lift the lower carton **44A** to the plane of slide plate **275** where it is discharged.

OPERATION OF THE EMBODIMENT OF 23 and 24

In the normal course of operation of this elevating station the carton **44** is lifted from position A to position B so that the ends of the carton are pressed to each other whereby they are retained in a glue setting condition. As the cartons are processed they are sequentially moved from position B to position C and then to position D whereat they are discharged. When the production line is shut down it is often desirable that the glued cartons at positions B and C be removed from this elevating station. When this situation occurs the operator then causes the telescoping sections **276***b* and **276***c* of the cylinder **276** to be extended. When this occurs the pusher plate end **257***b* which is recessed in platform **257** is caused to engage the lower portion of the carton **44B** to lift it to the height of condition D where it is guided onto slide plate **275** and the carton-accumulating apparatus.

ALTERNATING ELEVATING STATION OF FIGS. 25 AND 26

Referring next to the elevating station as shown in FIGS. **25** and **26**, there is depicted an alternate method and apparatus for elevating the cartons after they have had the infolded flaps **44***a*, *b*, *c* and *d* sprayed with hot-

melt glue from nozzles **250** and with the carton **44A** delivered to channel frame **118.** Attached to and extending upwardly from these channels are pairs of side members **280** and **281.** A pair of like endless rubber faced belts **283** is arranged to operate and move as mirror images of each other. These belts are carried on and over like head and tail pulleys **285** and **286** carried on rotatable shaft **288** and **289.** These shafts are carried in bearings (not shown) and attached to the side members. A tensioning idler roller **291** is carried on an adjustable arm assembly **292** adapted to be moved to a determined position and to retain the belt **283** in a determined and desired degree of tension. A series of idler rollers **293,** each carried by a shaft **294,** is disposed along the underside of the inner extent or guide path of each of the belts **283** so as to establish and maintain the desired inner travel path of the belt.

A hydraulic cylinder **296** is carried by a cross or header member **297** attached to and extending between side members **280** and **281.** The piston rod **298** of the cylinder is attached to a latch-lift platform member **300,** which platform is moved by the actuation of the cylinder **296** from a position below the carton **44A** to a position where the carton is now positioned at carton **44B.** Platform **300** has fingers, not shown, which are similar to those of fingers **258** and **250** of platform **257** of FIG. **22.** On the shafts **288** and **289,** as carried by frame **281,** are mounted sprockets **302** and **303.** Around these sprockets and a pair of idler and tensioning sprockets **305** and **306** is carried a roller chain **308.** This roller chain, as seen in enlarged detail in FIG. **26,** has pins **310** which pass through and extend beyond the side plates of the links at certain pin connections and on a determined spacing of the chain. This spacing is equal to the desired lift of the platform **300** form its receiving position shown to the position where the carton **44** is at position B.

Carried on the lift platform member **300** is a spring latch **312** which is pivotally retained on its upper end and on its lower end has a hook portion adapted to engage and retain the pins **310** of chain **308.** A cam surface formed on the lower end of this hook is adapted to urge the latch inwardly against the bias of a spring **314** when the latch **312** is lowered to and past pin **310.** A like latch **316** is pivotally carried on header **297** and provides a stop for the downward movement of the chain **308.** A spring **318** urges the latch **316** counterclockwise around the support pin.

OPERATION OF THE ELEVATOR OF FIGS. 25 AND 26

In operation, this elevator mechanism is much like the above-described mechanisms of FIGS. **22, 23** and **24.** The carton with glue applied is advanced to a position above platform **300.** The cylinder **296** is then actuated to cause this platform to engage and lift the carton **44** from position A to position B. The fingers on this platform engage the lower flaps **44***e* and **44***h* to press them to the already closed flaps **44***a, b, c* and *d.* As the carton **44** moves upwardly the flaps **44***f* and **44***g* come in way of the belts **283** and are likewise pushed against the already closed flaps. The cylinder **296,** as it is actuated, pulls the carton A upwardly until it reaches a point a little above that shown as **44B.** As the carton is moved upwardly between the belts **283,** these belts engage the ends of the carton **44** as it is moved upwardly past the lower pairs of rollers **293.** The friction provided by the rubber faced belts is such that there is an appreciable drive to the belts as provided by the upward movement of the carton; this movement, however, is not necessarily a positive means of moving the belt a precise distance. In addition, as the cartons and their contents often total a considerable weight, it is essential that the cartons do not travel downwardly. The latch **312** engages the extending ends of a pin **310** of roller chain **308** so that as the platform **300** is lifted a determined amount the roller chain **308** is also moved upwardly a like amount. When the piston in cylinder **296** has reached a determined upper limit and is ready to return, the latch **316** by means of spring **318** is so positioned as to be moved into latched condition with another of the extending pins **310.** This prevents a reverse or downward movement of this chain and the coupled righthand belt **283.** With one side of the containers **44** held at a determined height by this righthand belt **283** and with the other side of the container in pressing engagement as urged by the lefthand belt, the container is prevented from sliding downwardly by the series of rollers **293** which prevent either of the belts from bowing or moving away from the carton. Each carton **44** is moved upwardly a determined like amount with every carton elevating actuation of piston **296.** When a carton reaches the top at **44I** it is discharged sideways from the apparatus on a slide **320.**

CIRCUIT DIAGRAM OF FIGS. 27A AND B

Referring finally to the circuit diagram of FIGS. **27A** and B there is shown a preferred means of the electrical and pneumatic operation of the apparatus above-described. Power piston **111** in addition to moving the reciprocated frame **110** also moves the piston in cylinder **90** to provide the vacuum for causing the vacuum cup **82** to grasp container **44.** In addition to gauge **91** a ball valve **350** is provided which is adjusted to bleed the vacuum cups **82** when the mechanism is to be operated without pulling cartons from the stock. A needle valve **352** permits a determined amount of air to enter the cylinder **90** during the vacuum stroke. This air is filtered through filter **353** to prevent fouling the cylinder and reduce wear. On the open side of cylinder **90** a conductor **354** is provided with a filter **353** and a lubricator **356.**

An automatic valve **358** receives sixty pound compressed air through conductor **360** which is also provided with a lubricator **356** and a pressure regulator **361** which reduces the pressurized air line pressure which may be eighty pounds or more. Sixty pounds of pressure to piston **111** in the preferred embodiment provides an ample force for moving the reciprocating frame **110** but this force is such that stalling occurs when a filled carton becomes jammed in the apparatus. A filter **353** prevents dirt, etc., from blocking ports and causing undue wear in the many control members. A three-way lever controlled valve **363** is opened and closed to permit line supplied pressurized air to be fed to the systems. A conductor **364** feeds the filtered line pressure air to a regulator **366** where the air is reduced to eighty psi and then through lubricator **356** is fed to an automatic valve **368** which controls the responsive movement of lift cylinder **255** (or **276** as in FIGS. **23** and **24** or **296** in the embodiment of FIG. **25**).

Speed control valves **370** are provided to regulate the rate of travel for both cylinders **111** and **255.** Mufflers **371** are also provided to reduce the pneumatic exhaust

noise as these cylinders are cycled. The high pressure air going to valve 368 is also fed to air motor 184 whose actuation is controlled by a four way valve 372 which is double piloted. A filter 353 and needle valve 374 is provided to clean the air and to regulate the speed of the motor 184. Line pressure air is fed through conductor 364 to regulator 375, a lubricator 356 then a valve 376 which is actuated and opened by the presence of a carton 44 carried by the reciprocated frame 110. A valve 378 is actuated to feed air to glue guns 250. Valve 378 is cycled by valve 380 which is open and closed in response to the actuation of cams 382 and 383 carried on reciprocating frame 110. Air power for the glue gun system is fed through conductor 364 to regulator 385, a lubricator 356 and to glue unit system 36 which may be a hot-melt glue system made by NORDSON or the like.

Also supplied with pressurized air from the conductor 364 are the lift pistons and cylinders 197 which are used to raise the shafts 191 and 192 of the orienting mechanism. This air is reduced to forty pounds psi by a regulator 386 which then passes through a lubricator 356 to valves 388 and 389 which control the flow to cylinders 197. Control air for actuating these valves is fed from conductor 364 through regulator 390, a lubricator 356 and to manifold conductor 392 from whence it is fed to valves 228, 229, 231 and 232 which are actuated by pins 223, 224, 225 and 226 as carried on gears 188 and 189 as seen in FIG. 14.

Air fed from manifold 392 is fed through conductor 393 to a valve 394 which is cycled by valves 229 and 231 to move cylinder 395 which carried pin 239 to interrupt the flow of containers. Air also fed from the same manifold is carried by conductor 397 to a valve 399 which feeds a signal to switch 400 which is opened when a carton is in the loading station. From this switch a signal is fed through conductor 402 to a switch 404 which senses the presence of a container before air motor 184 is permitted to rotate. From conductor 397 pressurized air is also fed to switch 237 through conductor 406. Switch 237 is actuated by pins 235, 224, 234 and 223 to feed a signal through pulse valve 407 and line 408 to valve 372.

Air is also fed from conductor 406 through conductor 410 to valve 239. Air from conductor 392 is fed to valve 240. Air from regulator 375 is carried by conductor 412 to valve 414 which is actuated by the raising of a lift platform 257. The lowering of the platform 257 actuates a valve 416. A manual valve 418 is provided so that the mechanism can be operated for one transporting stroke without the usual actuating signals. A valve 420 has its spool made responsive to switch 239 as actuated by pin 226. This actuation of valve 420 by switch 239 occurs just prior to the passage of the No. 4 container across proximity valve 428. Air from set valve 420 then flows to the spool of valve 358 to move piston 111. Valve 420 is reset by valve 426 which causes a flow of air to be released by a flow of air released by the opening of valve 426 as it is engaged by the forward limit of travel by the reciprocated frame 110. The valve 400 senses the presence of a carton 44 at carton filling station. A check valve 430 is placed in the return line from the air motor 184 to valve 372 and the output from the valve 372 is fed to and through muffler 432. Valve 424 senses the receipt of the filled and glued carton on the lift platform.

Although the apparatus, above-described, contemplates that said apparatus including the conveyors will preferably be inclined at an angle of about 25° to provide a determined desired movement of the bailed containers on the conveyors, it is of course realized that the rollers in conveyors 30 and 30*a* may be powered to provide the desired propulsive force. Such an arrangement would permit the apparatus and conveyors to be disposed in a normal horizontal and vertical arrangement. Discharge of the sealed cartons from the elevating sections would be by an appropriate pusher means. Such a modification is contemplated to be within the scope of the above described invention and disclosure.

Terms such as "left," "right," "up," "down," "bottom," "top," "front," "back," "in," "out," "clockwise," "counterclockwise" and the like are applicable to the embodiments shown and described in conjunction with the drawings. These terms are merely for the purposes of description and do not necessarily apply to the position in which the automatic case packer may be constructed or used.

While a particular embodiment of the case packer and alternate embodiments of the elevator mechanism have been shown and described it is to be understood the invention is not limited thereto since modifications may be made within the scope of the accompanying claims and protection is sought to the broadest extent the prior art allows.

What is claimed is:

1. Apparatus for receiving bailed containers in a single file array and to orient and deliver the bailed containers in groups of two into an erected carton and after filling said carton to seal the carton, said apparatus including: (a) means for feeding a series of bailed containers in a pre-oriented and like array to an orienting mechanism; (b) means for sequentially receiving and orienting said bailed containers including apparatus providing a programmed and timed engagement with the upper end of each container by one of a plurality of selectively rotatable pressure pads adapted to rotate each container to a determined orientated condition and to arrange said containers in oriented pairs in a side-by-side arrangement on a feeding conveyor; (c) means for feeding at least two of said pairs of oriented containers into the open side of an erected carton until said carton is filled with the desired quantity of oriented containers; (d) means for advancing said filled cartons to a closing and sealing station whereat said carton is closed and sealed, and (e) means for delivering said sealed cartons to accumulating and delivery means.

2. Apparatus for receiving and orienting bailed containers as in claim 1 in which the means for feeding the series of containers is a receiving conveyor upon which the containers are arranged with a theoretical line connecting the bail ears being normal to the flow of the containers on the receiving conveyor.

3. Apparatus for receiving and orienting bailed containers as in claim 2 in which the conveyor is adapted to feed the containers by gravity and in which the orienting means has four pressure pads moved and rotated by apparatus so as to selectively engage the containers in sequential groups of four and to rotate them so that after orienting is complete the line connecting the ears of each of the four containers is disposed at about 45° to the delivery flow of the containers into the erected carton.

4. Apparatus for receiving and orienting bailed containers as in claim 3 in which the containers are fed through the orienting means apparatus on a gravity conveyor which is inclined at an angle sufficient to enable the oriented containers as they are accumulated in pairs to be released as pairs for gravitational flow into the open side of an erected carton.

5. Apparatus for receiving and orienting bailed containers as in claim 3 in which the pressure pads are carried on a pair of turning members which are in turn carried on shafts rotated by a pair of like meshed gears driven by a motor means, said turning members being selectively raised and lowered so that one of the pressure pads will engage a cover of a container during which the turning member is rotated slightly less than 90°.

6. Apparatus for receiving and orienting bailed containers as in claim 3 in which the first container of a series of four containers is moved by a turning member rotating in a clockwise direction while the container is being simultaneously rotated counterclockwise for about 45° from its start condition, and in which the second container in the series is moved by a turning member rotating in a counterclockwise direction while the container is being simultaneously rotated clockwise for about 45° from its start condition, and in which the third container of said series is moved by a turning member rotating in a clockwise direction while the container is being simultaneously rotated clockwise an additional amount so as to achieve a rotation of the container of about 135° from its start condition, and in which the fourth container of said series is moved by a turning member rotating in a counterclockwise direction while the container is being simultaneously rotated counterclockwise an additional amount so as to achieve a rotation of about 135° from its start condition.

7. Apparatus for feeding and orienting containers as in claim 1 in which the containers are fed with their bail on the forward side of the container and along a conveyor providing the means for feeding the containers, said oriented containers when inserted into the carton having the bails facing into the corners of the carton.

8. Apparatus for feeding and orienting containers as in claim 1 in which the containers are fed with their bails on the trailing side of the container and along a conveyor providing the means for feeding the containers, said oriented containers when inserted into the carton having their bails facing toward the center of the carton.

9. Apparatus for feeding and orienting containers as in claim 1 in which the orienting means has four pressure pads arranged as opposite pairs which are carried on two counterrotating turning members, and with a rotative and a lift mechanism associated with said turning members and providing a sequential orienting of the containers, said members and mechanism being carried on a support plate which is adjustably supported so as to provide and permit a height adjustment to accommodate the orienting means to a desired height of a covered and closed container.

10. Apparatus for feeding and orienting containers as in claim 9 in which there are additionally provided on the turning members a plurality of roller stops disposed to insure that the sequence of containers to and through the orienting means is spaced in a desired manner with a roller stop disposed in way of a succeeding container until the immediately prior container has been desirably orientated and positioned.

11. Apparatus for receiving and orienting bailed containers as in claim 1 in which the apparatus additionally includes an automatic carton erecting mechanism wherein folded cartons are stored in a substantially vertical manner in a chute from which they are delivered to a mostly horizontal carton retaining means and from which the lowermost carton is drawn from the stack by means of a plurality of suction cups conductively associated with a source of vacuum, each of said cups being mounted on and carried by an arm mounted on and swung in an arc by the rotation of a shaft moved in response to a signal demand for cartons which signal is generated by the feeding of a determined sequence of containers to an erected carton.

12. Apparatus for receiving and orienting bailed containers as in claim 11 in which the apparatus for feeding of the cartons from the chute to the carton delivery means includes an endless toothed belt which provides a support for one edge of the folded cartons, said belt being carried on a plurality of pulleys and advanced in an intermittent manner in response to the rotative motion of the shaft which carries the suction arms and cups.

13. Apparatus for receiving and orienting bailed containers as in claim 12 in which the apparatus providing the intermittent feed of the tooth belt includes a cam actuated tightening pulley carried on a pivoted arm and with a cam being carried on and rotated by the shaft which carries the suction arms.

14. Apparatus for receiving and orienting bailed containers as in claim 12 in which the erected carton is carried on a reciprocated frame moved by a hydraulic cylinder, the movement of said frame also causing a drive shaft to be rotated, said drive shaft and the shaft carrying the suction arms being connected by a belt drive arranged in a manner so as to provide a determined lost motion to insure a delay in the movement of the suction cups and arms to the lowermost folded carton in the stack and in the movement of the cups from the erected carton.

15. Apparatus for receiving and orienting bailed containers as in claim 14 in which the reciprocating frame is disposed to bring an erected carton from an erecting station to a loading station, said carton being brought in way of and past a turning finger assembly whereat a forward end flap of the rear of said carton is turned to a partly closed condition and as the carton proceeds toward the station whereat the oriented bailed containers are fed into the carton said rear forward flap is brought in way of a closing slide guide, and during the same carton advancing movement the turning finger assembly rotates so as to turn a trailing flap member of the rear of the carton, said trailing flap being turned forwardly and inwardly toward a closing condition and finally in way of said closing slide guide wherewith the end flaps of the rear portion of the carton are retained in a closed condition at and during the carton filling operation.

16. Apparatus for receiving and orienting bailed containers as in claim 15 in which the reciprocated frame is disposed to bring the erected and filled carton from the loading station to a front flap closed condition, Said frame as it moves the carton forwardly one station from the loading station causing the end flaps of the front of the carton to be brought in way of and past a partially rotated turning finger assembly whereat a forward end

flap of the front of said carton is turned to a partly closed condition and as the carton proceeds forward toward the closed condition station said front forward flap is brought in way of a closing slide guide which is substantially parallel to the slide guide still retaining the rear flaps in a closed condition, and during this same carton advancing movement the turning finger assembly disposed to close the front flaps is rotated so as to turn a front trailing flap member, said flap being turned forwardly and inwardly toward a closing condition and finally in way of said forward closing slide guide wherewith the end flaps of the forward portion of the carton are brought to a full closed condition.

17. Apparatus for receiving and orienting bailed containers as in claim **16** in which the reciprocated frame is disposed to bring the filled carton with its closed end flaps in way of a gluing means and after the glue has been applied to bring the carton to a sealing and delivery station.

18. Apparatus for receiving and orienting bailed containers as in claim **1** in which the closing and sealing station includes a support frame disposed at a determined incline, a lift platform and means for lifting said platform from a carton receiving condition to a position slightly greater than the thickness of the filled carton, and at least two shoes pivotally mounted in a face-to-face relationship and disposed to be moved inwardly toward each other by gravity so as to engage, grip and press the outer end flaps of the carton against the closed inner flap portions of the carton and in an engaged condition to retain a carton when brought between the shoes, said shoes being further movable from said gripping condition to an outwardly condition to permit the carton to be moved upwardly between the opposed pair of shoes.

19. Apparatus for receiving and orienting bailed containers as in claim **18** in which the shoes are of sufficient length to grip and simultaneously retain two contiguously stacked containers.

20. Apparatus for receiving and orienting bailed containers as in claim **18** in which the means for lifting the lift platform is a telescoping hydraulic cylinder disposed to selectively lift the platform and auxiliary parts thereof to both a determined carton retaining height between the shoes and if desired to further lift the carton to a position above the opposed shoes so as to permit ready removal of a sealed carton from the closing and delivery station.

21. Apparatus for receiving and orienting bailed containers as in claim **18** in which the lift platform is provided with finger members disposed to engage and press the carton's outer lower flaps toward and against the folded inner flaps and in which the shoes have their lower ends contoured so as to provide camming means to engage and press the cartons outer upper flaps toward and against said folded inner flaps.

22. Apparatus for receiving and orienting bailed containers as in claim **21** in which the lift apparatus is provided with an associated gravity actuated discharge conveying means.

23. Apparatus for receiving and orienting bailed containers as in claim **16** in which the closing and sealing station includes a lift platform and means for lifting a carton from a receiving condition to an elevated position slightly greater than a filled carton, and at least one pair of opposed endless belts having their inwardly facing extents spaced substantially parallel to each other at a determined distance so as to grip the ends of the carton when brought therebetween, and means for permitting upward travel of the belts while limiting a reverse travel of the belt so that the upward travel is at a determined increment substantially equal to the thickness of a filled and sealed carton.

24. Apparatus for receiving and orienting bailed containers as in claim **23** in which the means for permitting upward travel of the belt while limiting the reverse travel is a roller chain moved with the travel of the facing belts, said chain having a plurality of like spaced cooperating means disposed to be engaged by a spring biased latch mechanism at the desired intervals of upward travel of the belt.

25. A method for receiving bailed containers in a single file array and to orient and deliver said bailed containers in groups of two into an erected carton and after filling said carton to seal said carton, said method including: (a) feeding a series of bailed containers in a pre-oriented like array to an orienting means; (b) sequentially receiving said bailed containers at an orienting station; (c) engaging the upper end of each container by one of a plurality of rotatable pressure pads to rotate and move said container to a determined orientation and position on a delivery conveyor; (d) accumulating the oriented containers as pairs and delivering a determined number of pairs to and into the open end of an erected carton to provide a filled carton; (e) advancing a filled carton to a closing and sealing means, and (f) delivering a sealed carton to accumulating and delivery means.

26. The method for receiving and orienting bailed containers as in claim **25** in which the feeding of the series of containers includes arranging said containers on a conveyor with a theoretical line connecting the bail ears being normal to the flow of the containers on the conveyor.

27. The method for receiving and orienting bailed containers as in claim **26** in which the feeding of the containers is on a gravity conveyor in which the step of orienting includes moving and rotating four pressure pads so as to selectively engage the containers in sequential groups of four and to rotate them so that the theoretical line connecting the ears of each of the four containers is disposed at about 45° to the delivery flow of the containers into an erected carton.

28. The method for receiving and orienting bailed containers as in claim **27** in which the step of orienting and transporting the containers on a gravity conveyor includes accumulating the containers in pairs and releasing the containers as said pairs for gravitational flow into the open side of an erected carton.

29. The method for receiving and orienting bailed containers as in claim **27** in which the orienting of the containers by the rotation of pressure pads includes carrying the pads on turning members carried on shafts rotated by a pair of like meshed gears and driving these gears by a motor means, and selectively raising and lowering the turning members so that a pressure pad will engage a cover of a container during the orienting step and during this engagement the turning member is rotated slightly less than 90°.

30. The method for receiving and orienting bailed containers as in claim **25** in which the step of orienting includes feeding the first container of a series of four containers to container engaging apparatus carried by a turning member, rotating said turning member in a

clockwise direction while simultaneously rotating the container counterclockwise so that the resulting rotation of the container is about 45° clockwise from its start condition; and in which the second container in said series is engaged by apparatus carried by a turning member, rotating this turning member counterclockwise and while the turning member is being rotated, simultaneously rotating the second container clockwise so that the resulting rotation of the container is about 45° counterclockwise from its start condition; and in which the third container of said series is engaged by apparatus carried by a turning member, rotating this turning member in a clockwise direction and while the turning member is being rotated, simultaneously engaging and rotating the container clockwise an additional amount so as to achieve a total rotation of about 135° clockwise from its start condition; and in which the fourth container of said series is engaged by apparatus carried by a turning member, rotating this turning member in a counterclockwise direction and while the turning member is being rotated, simultaneously engaging and rotating the container counterclockwise an additional amount so as to achieve a total rotation of about 135° counterclockwise from its start condition.

31. The method for feeding and orienting containers as in claim **25** in which the step of orienting the containers includes feeding the containers with their bails on the forward side of the container and along a conveyor and in which the engaging means for rotating the containers arranges the containers with their bails so that when inserted the oriented containers have their bails facing into the corners of the carton.

32. The method for feeding and orienting containers as in claim **25** in which the step of orienting the containers includes feeding the containers with their bails on the trailing side of the container and along a conveyor and in which the engaging means for rotating the containers arranges the containers with their bails so that when inserted the oriented containers have their bails facing toward the center of the carton.

33. The method for receiving and orienting bailed containers as in claim **25** in which there is additionally included the step of erecting a folded carton drawn from a mostly horizontal carton retaining means; drawing the lowermost carton from the stack by means of a plurality of suction cups conductively associated with a source of vacuum, said cups being mounted on and carried by arms mounted on a shaft, and swinging the arms by rotating said shaft in response to a signal demand for cartons generated by the feeding of a determined sequence of containers to an erected carton.

34. The method for receiving and orienting bailed containers as in claim **33** in which the feeding of the cartons includes moving a toothed belt disposed to provide a support for one edge of the folded cartons and in which said belt is advanced in an intermittent manner in response to the rotative motion of the shaft carrying the suction arms and cups.

35. The method for receiving and orienting bailed containers as in claim **33** in which the advancing of the erected carton is by moving a reciprocated frame by means of a hydraulic cylinder, the movement of said frame also causing a drive shaft to be rotated, and connecting said drive shaft and the shaft carrying the suction arms by a drive belt having a determined slack so that a determined lost motion is provided to cause the delivering and erecting of the carton to include the step of delaying the movement of the suction cups and arms to the lowermost folded carton in the stack and delaying the movement of the cups and arms from the erected carton to again engage the lowermost carton in the stack.

36. The method for receiving and orienting bailed containers as in claim **25** in which there is provided the additional steps of moving a reciprocated frame so as to bring an erected carton from an erecting station to a loading station and during this moving step, closing the rear end flaps by bringing said flaps in way of a turning finger assembly which is selectively rotated to cause the flaps to be turned toward each other and then bringing these partly closed rear end flaps in way of a slide guide to fully close and retain the flaps in a closed condition during loading of the carton; and in which is included the step of moving the reciprocated frame to bring the erected and filled carton from the loading station to a front end flaps closed condition station, closing said front end flaps by bringing these flaps in way of a second turning finger assembly which is selectively rotated to cause the flaps to be turned toward each other and then with the frame still moving forwardly, bringing these partly closed front end flaps in way of a slide guide to fully close and retain the flaps in a closed condition prior to fully closing and sealing the carton.

37. The method for receiving and orienting bailed containers as in claim **36** in which the step of closing and sealing includes the step of bringing the ends of the filled carton in way of a glue applying apparatus and applying glue to selected portions of the closed end flaps.

38. The method for receiving and orienting bailed containers as in claim **37** in which the step of delivering a sealed carton includes the steps of moving the outer flaps of the carton into a tight engagement with the glue conditioned inner flaps and then pressing the flaps into a determined sealing engagement.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,740,919 **Dated** June 26th, 1973

Inventor(s) Raymond A. Heisler

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Abstract:

line 4, "twos" should read -- two --;

5, insert comma after "filling";

14, change "from" to read -- after --.

Col. 1, line 58, delete "the" second occurrence.

Col. 3, line 17, delete "of".

Col. 8, line 22, delete "As" and change "to" to read -- To --;

lines 33 and 34, delete "is begun" and insert -- begins --.

Col. 10, line 62, delete "M" and insert comma after "44b".

Col. 12, line 4, after "FIG." insert -- 12 --.

Col. 13, line 29, delete "in" first occurrence and insert

-- is --.

Col. 14, line 52, delete "and" second occurrence;

14, line 53, delete "degree" and insert -- arc --.

PO-1050
(5/69)

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,740,919 Dated June 26th, 1973

Inventor(s) Raymond A. Heisler

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Col. 16, line 65, change "distrubing" to read -- disturbing --.

Col. 18, line 32, delete "in" first occurrence and insert -- is --.

Col. 21, line 8, "shaft" should read -- shafts --;

line 26, delete "those of";

line 26, change "250" to read -- 259 --;

line 35, "form" should read -- from --.

Col. 22, line 46, change "pound" to read -- pounds --.

Col. 23, line 33, change "carried" to read -- carries --;

line 59, delete "released by a flow of air".

Col. 24, line 5, put commas around "of course".

Col. 25, line 39, change "bail" to read -- bails --.

Col. 26, line 28, change "tooth" to read -- toothed --;

line 63, change "Said" to read -- said --.

Col. 27, line 33, change "outwardly" to read -- outward --.

Signed and sealed this 12th day of November 1974.

(SEAL)
Attest:

McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents