United States Patent [19]

Lent

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[54] **APPARATUS FOR CUTTING ARTICLES**

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[73] Assignee: **Del Monte Corporation,** San Francisco, Calif.

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[52] **U.S. Cl.** **99/643,** 99/645,

[51] **Int. Cl.** **A23n 15/04,** A23p 1/00, A47j/44/00 A47j 21/00

[58] **Field of Search** 99/643, 645

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[57] **ABSTRACT**

Method and apparatus for cutting elongate articles (e.g., asparagus). Articles are collected together, organized into common lengthwise alignment and then supplied to conveyor means for moving them through successive operating zones. In one zone the articles are shifted to bring like ends into contact with a reference datum. In another zone cutting means are provided for cutting the articles into parts at one or more locations spaced predetermined dimensions from the reference datum.

3 Claims, 15 Drawing Figures

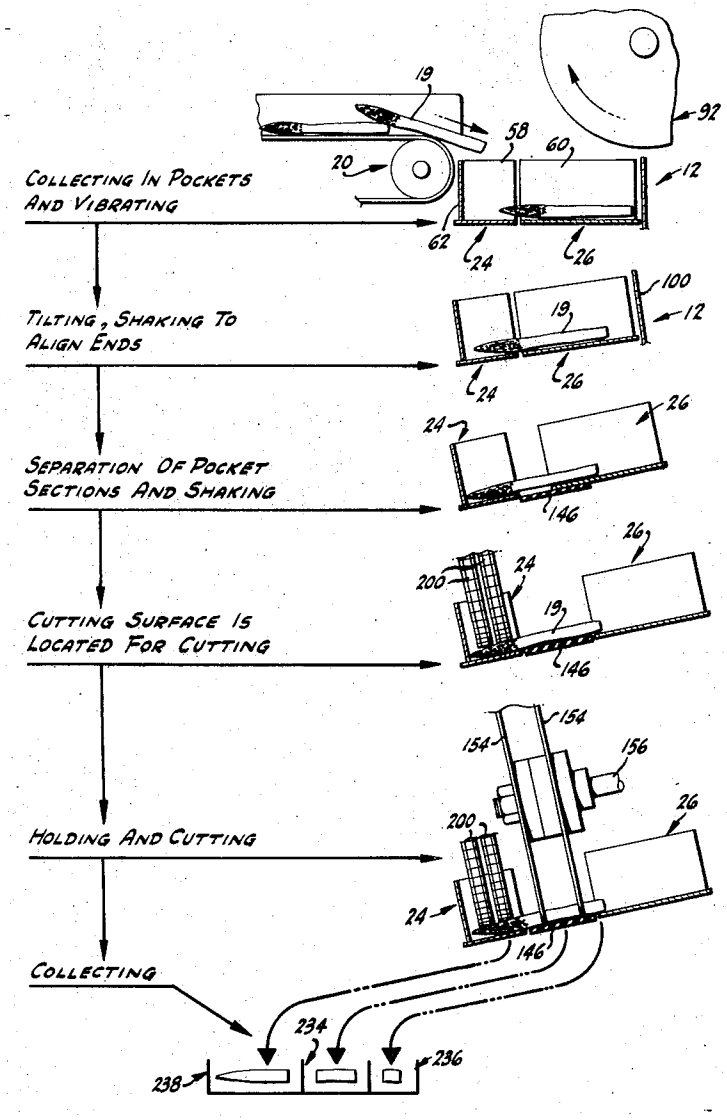
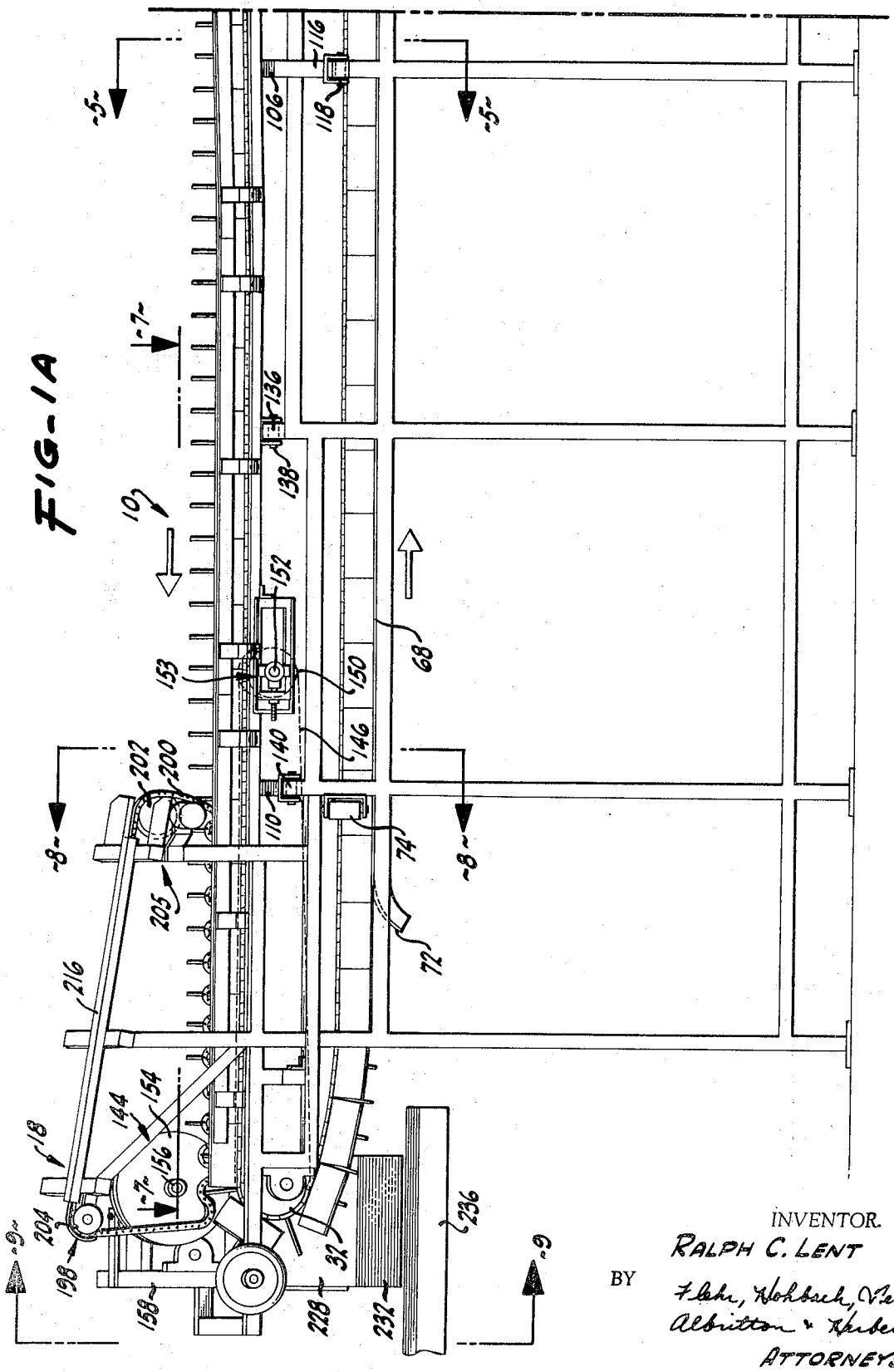


FIG-1A



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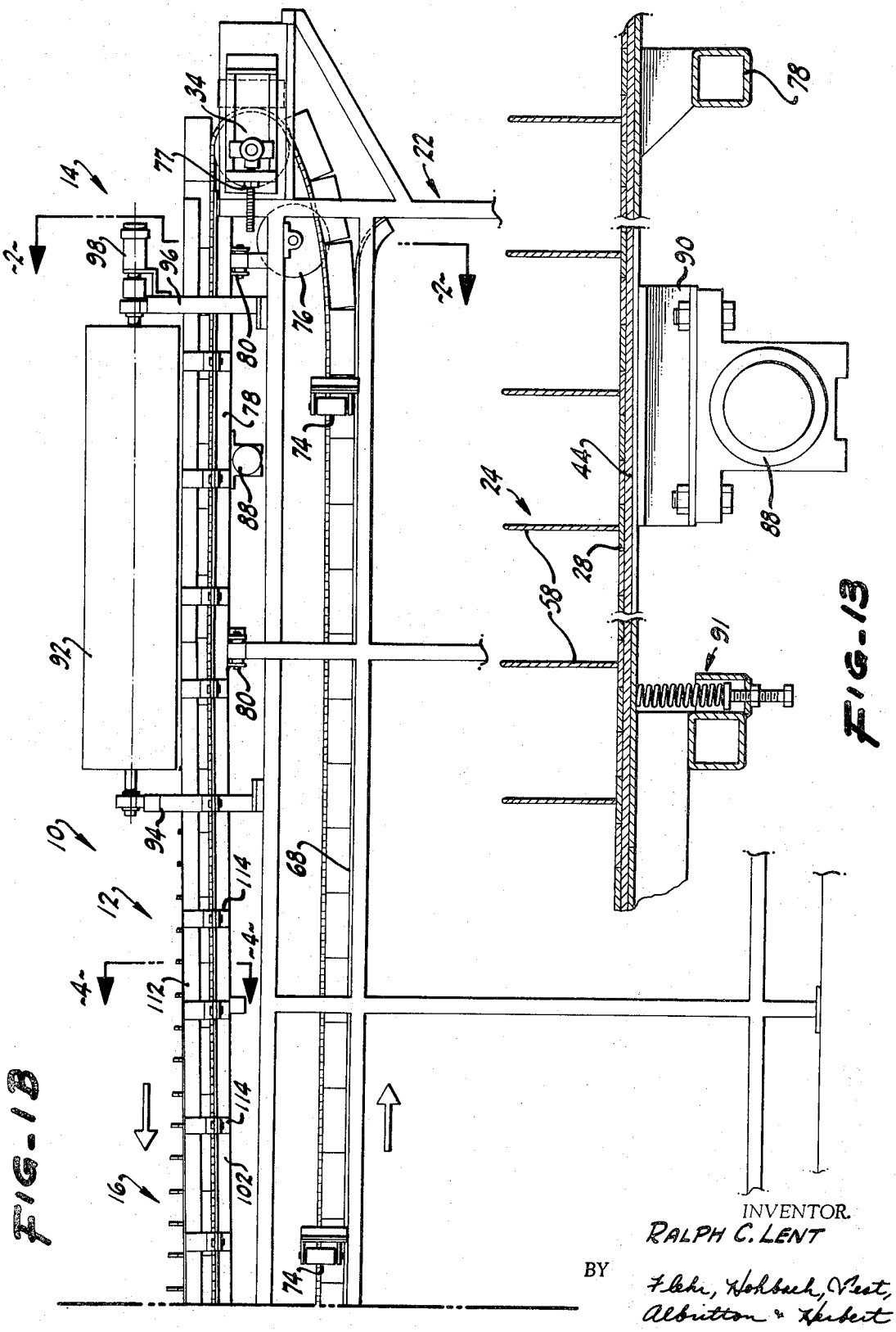

FIG-1B

FIG-1A

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FIG-3

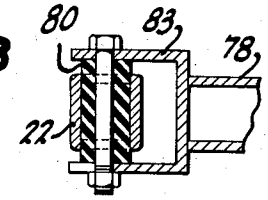

FIG-2

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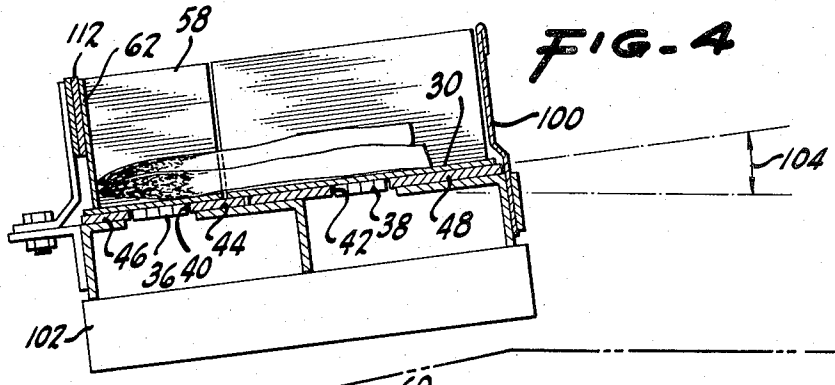
FIG-4



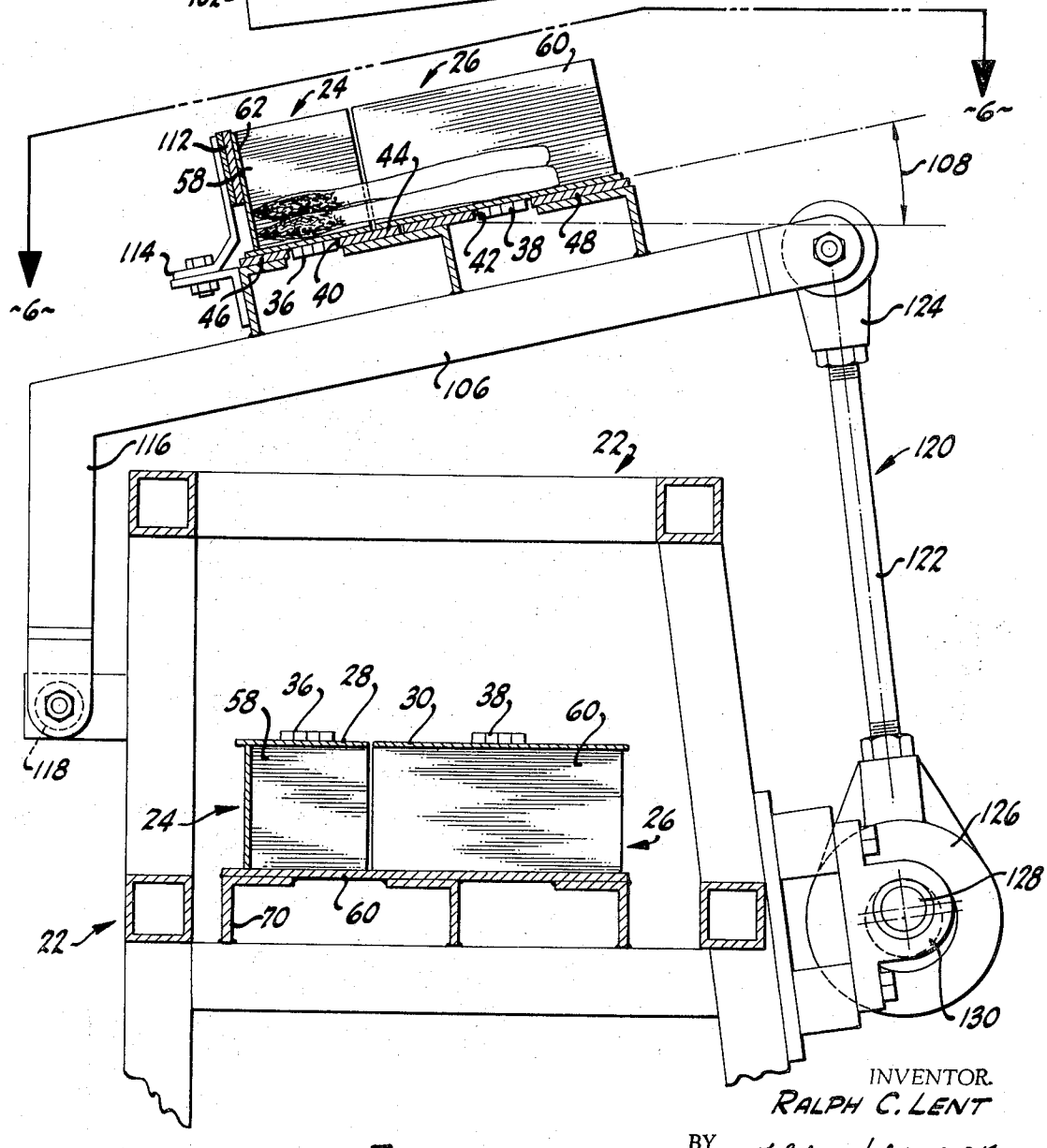


FIG-5

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FIG. 7

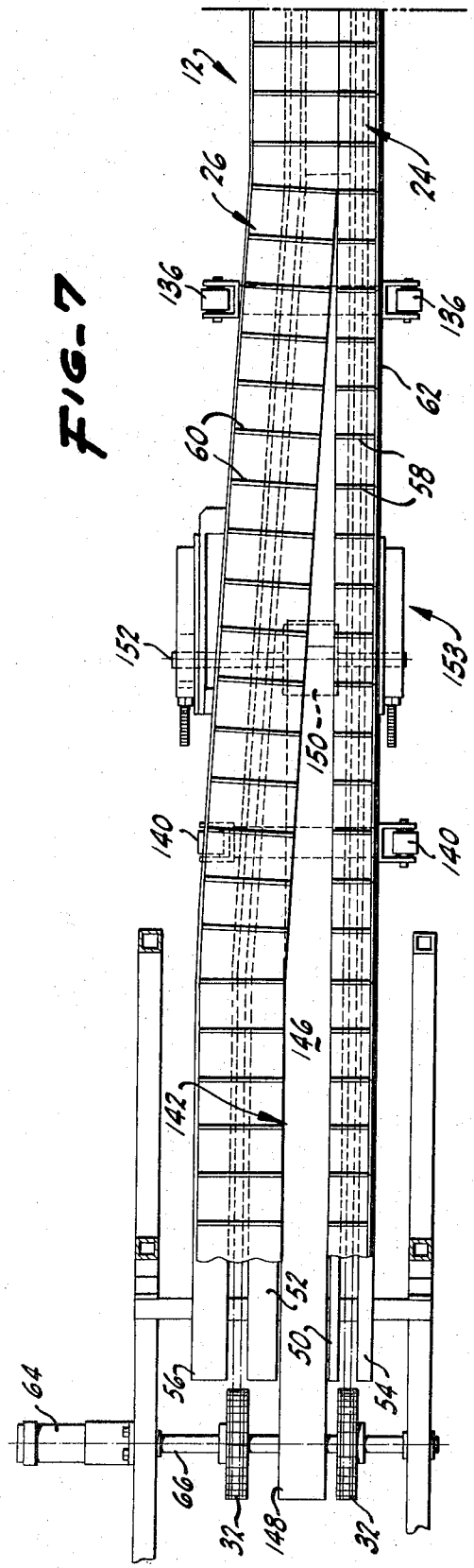
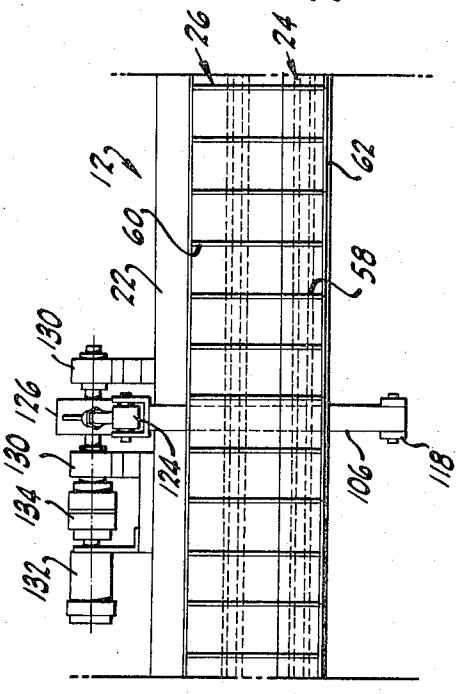


FIG. 6



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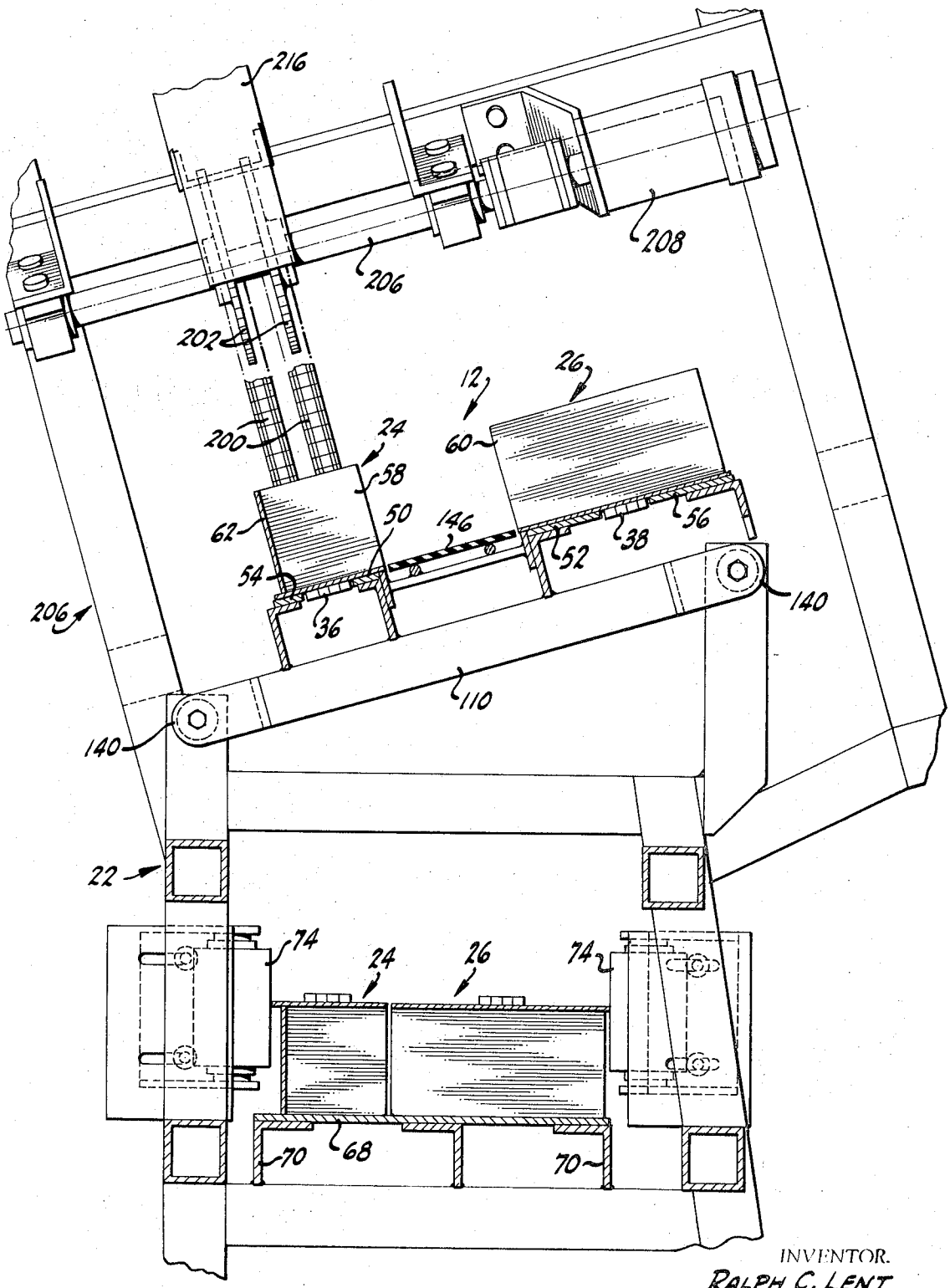

FIG-8

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FIG-9

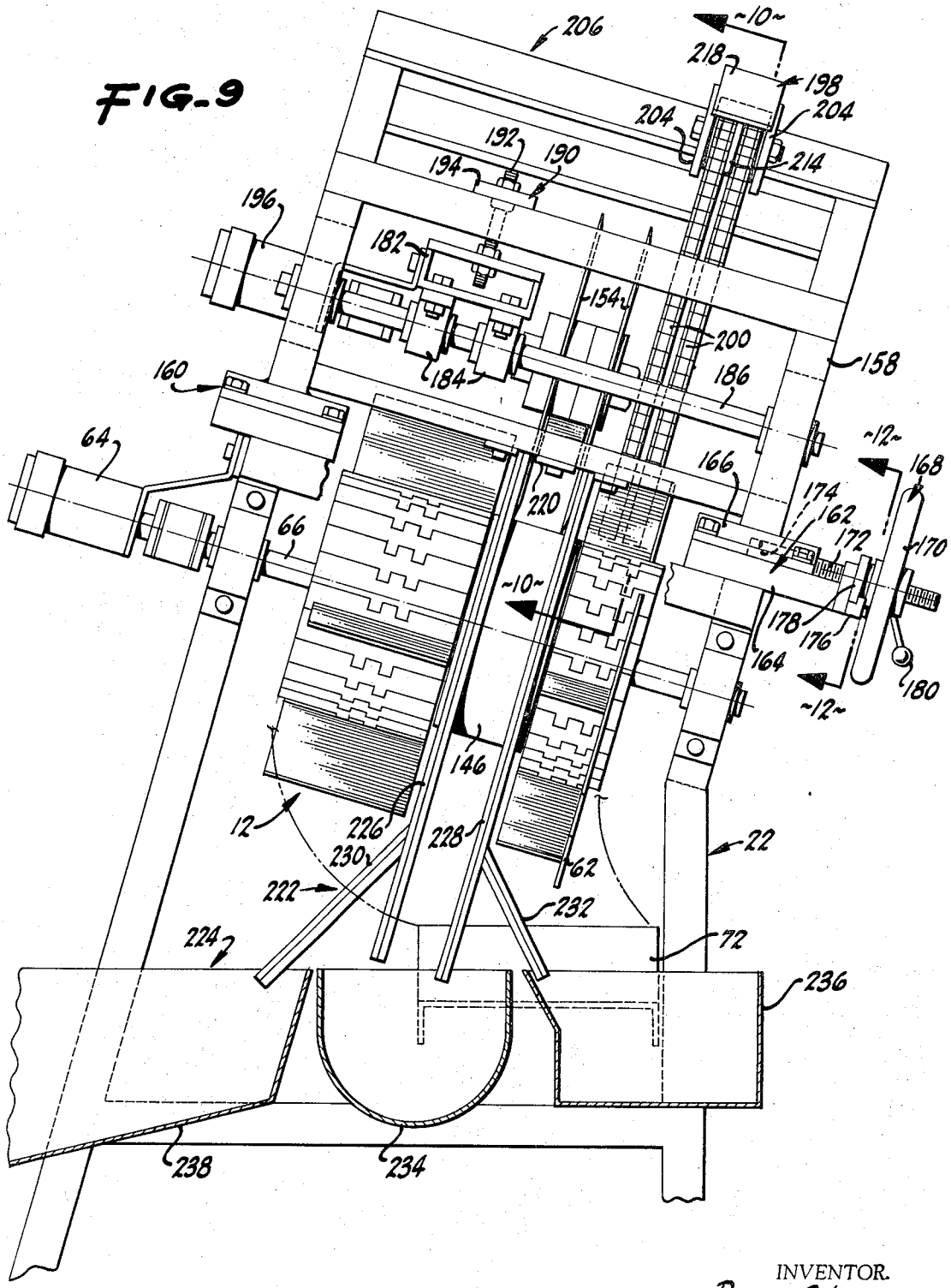

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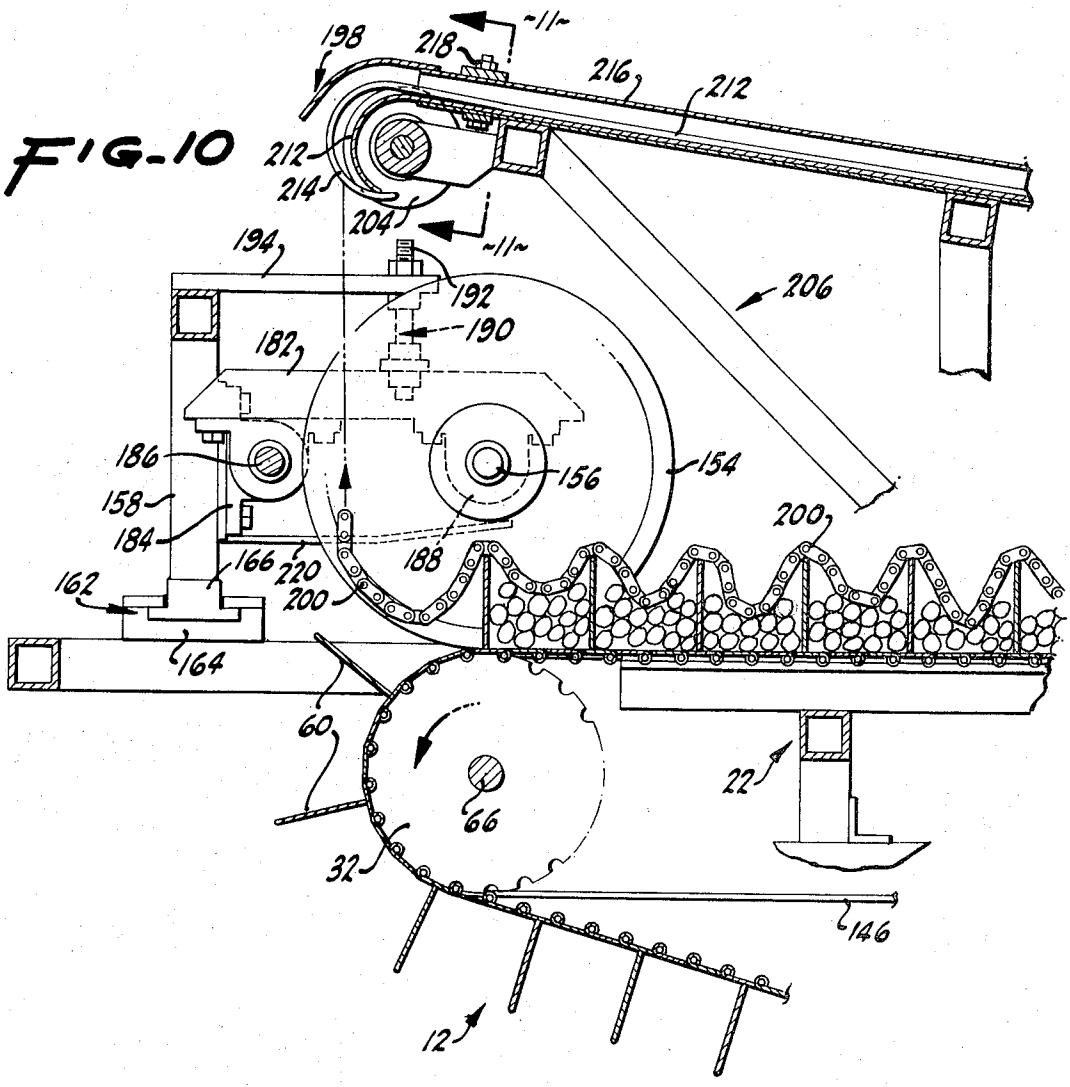
FIG-10



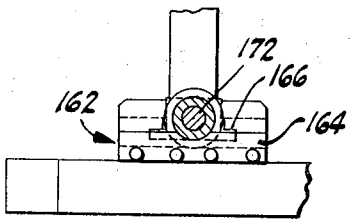


FIG-12

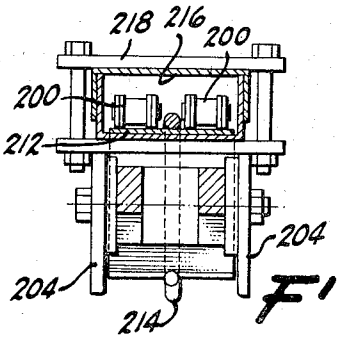


FIG-11

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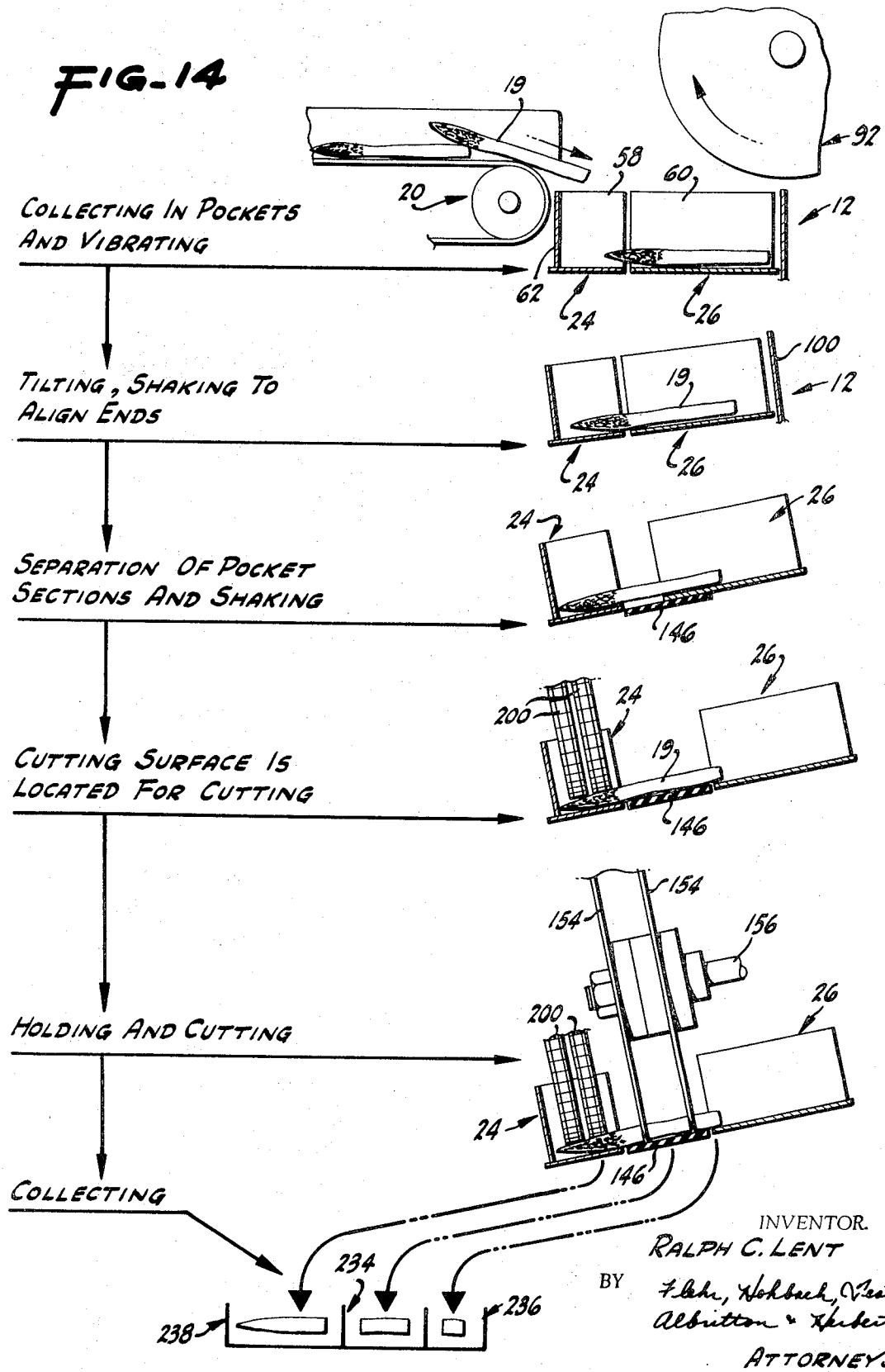
FIG. 14



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APPARATUS FOR CUTTING ARTICLES

CROSS REFERENCE TO RELATED APPLICATIONS

Reference is made to U.S. Pat. Nos. 3,682,291 and 3,682,301, and Ser. No. 150,442, filed June 7, 1971.

BACKGROUND OF THE INVENTION

This invention relates generally to methods and apparatus for cutting elongated articles. More particularly the invention relates to methods and apparatus for cutting elongated articles such as agricultural products, including asparagus or carrots and the like.

The processing of agricultural products such as asparagus for canning or freezing involves a number of steps to properly orient, align and cut the articles to a desired length. In the aforementioned three copending applications there are disclosed methods and apparatus for handling articles such as agricultural products to effect lengthwise orientation and/or grading as to size or orientation. Following these operations it is desirable in many food processing operations (e.g., for processing asparagus) that the oriented and graded articles be cut to the proper length preparatory to subsequent canning or freezing steps. Asparagus spears, for example are commonly cut into several lengths including a tip-end part of a certain dimension, one or two center cuts of accurate length and a butt-end part which may vary in length according to the length range of the spears being cut. In order to assure a high product recovery it is desirable to cut the spears into parts having highly accurate length dimensions so that parts of the same length can be collected together for insertion into cans or packages. Accordingly, there is a need for a method and apparatus which will efficiently collect and organize elongate articles and cut the same into parts of accurately dimensioned lengths.

SUMMARY OF THE INVENTION AND OBJECTS

It is an object of the invention to provide a method and apparatus for cutting elongate articles into parts, at least some of which have accurately dimensioned lengths.

Another object is to provide a method and apparatus of the above type which will collect elongate articles into common lengthwise alignment, organize the collected articles with a common end thereof aligned against a reference datum, and cause the articles to be cut at one or more locations which are spaced at predetermined dimensions from the reference datum.

Another object is to provide a method and apparatus of the above type which provides relatively high capacity, which cuts the elongate articles into two or more parts having accurately dimensioned lengths, which is automatic in operation, and which does not cause injury to articles like asparagus.

The method of the present invention collects the articles received from an in-feed supply in common lengthwise alignment. In the case of asparagus the spears are received and collected in common lengthwise orientation. The collected articles while being conveyed toward a cutting zone are tilted and caused to shift sideways if the conveyor to align their lowermost ends against a reference datum. In the cutting zone the aligned articles are then cut at one or more locations spaced predetermined dimensions from the reference datum. The parts cut from the articles are then discharged into segregated collection zones for further processing. The apparatus includes conveying means having pocket portions in which the articles are received and means associated with the pocket portions for forming a common reference surface. Means are provided for tilting the pocket portions while moving toward a cutting zone whereby the lowermost ends of the articles are brought into abutting engagement with the reference surface. In the cutting zone cutting means serves to cut the articles into pieces of desired dimensions. The conveying means and each of the pockets are formed in two sections, with means for tilting and separating the sections before cutting.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. 1A and 1B comprise a side elevation view illustrating the apparatus of the invention;

FIG. 2 is a sectional elevation view taken along the line 2—2 of FIG. 1B;

FIG. 3 is a sectional view taken along the line 3—3 of FIG. 2;

FIG. 4 is a cross-sectional elevation view taken along the line 4—4 of FIG. 1B;

FIG. 5 is a cross-sectional elevation view taken along the line 5—5 of FIG. 1A;

FIG. 6 is a fragmentary top plan view taken along the line 6—6 of FIG. 5;

FIG. 7 is a fragmentary top plan view taken along the line 7—7 of FIG. 1A;

FIG. 8 is a cross-sectional elevation view taken along the line 8—8 of FIG. 1A;

FIG. 9 is an end elevation view taken along the line 9—9 of FIG. 1A;

FIG. 10 is a fragmentary sectional view taken along the line 10—10 of FIG. 9;

FIG. 11 is a fragmentary sectional view taken along the line 11—11 of FIG. 10;

FIG. 12 is a fragmentary sectional view taken along the line 12—12 of FIG. 9;

FIG. 13 is a sectional elevation view taken along the line 13—13 of FIG. 2; and

FIG. 14 is a flow diagram illustrating the method of operation of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In the drawings FIGS. 1A and 1B illustrate generally at 10 apparatus for cutting elongate articles in accordance with the method of the invention. While apparatus 10 is described in the preferred embodiment as specially adapted for cutting asparagus, it is understood that the principles of the invention find application in cutting other elongate articles such as various types of agricultural products, for example carrots.

Apparatus 10 broadly comprises means forming a conveyor 12 receiving in-feed articles in a collecting zone 14 for conveyance through a tip reference and aligning zone 16 (i.e., a repositioning zone) and a cutting zone 18. The in-feed articles, in the case of the illustrated asparagus spears 19, are received in butt-first orientation from a suitable orienting apparatus which may be of the type disclosed in said aforementioned copending applications. The asparagus spears are discharged from the orienter apparatus in single-file order along multiple side-by-side lanes of an infeed conveyor 20 having a discharge end disposed immediately above

the upstream end of conveyor 12, as best illustrated in FIG. 2.

Conveyor 12 is mounted upon an elongate main frame 22 of welded box channel construction. The conveyor is formed into two runs or sections 24,26 each defined by flighted table top chains 28,30 trained to run in side-by-side conjoint movement between a pair of drive sprockets 32 and a pair of trail sprockets 34 mounted at opposite ends of the main frame. Each of the chains 28,30 comprises an endless series of plates articulated together at hinges 36,38. The chains are guided along their respective paths by separate chain tracks functioning as means to constrain the two conveyor runs for movement in abutting relationship in the regions of the collecting and aligning zones, and for lateral separation in the cutting zone as explained in detail hereafter. The chain tracks in the regions of the collecting and aligning zones comprise the longitudinally extending slots 40,42 defined between a centered wear plate 44 and outboard wear plates 46,48. The tracks in the region of the cutting zone are defined by the slots formed between the pair of spaced inboard wear plates 50,52 and outboard wear plates 54,56. The hinges of the two chains are adapted to ride in the respective slots defined by the wear plates.

The conveyor means provides a series of aligned pocket portions defined by the plurality of upstanding walls or divider plates 58,60 mounted to respective chains 28,30. Alternate ones of the divider plates 58 are provided with upstanding walls or tip-stop plates 62 which extend longitudinally across the ends of respective adjacent pocket portions and form a T-shape with the plate 58 when viewed from above. The tip-stop plates function as means defining a reference surface against which the common ends of the articles contained in the pockets abut for end-wise alignment. In the case of the illustrated asparagus, the spear tip ends abut the plates 62.

Conveyor 12 is driven by means of an hydraulic drive gear motor 64 coupled with chain drive sprockets 32 by means of drive shaft 66. The drive motor is operated at a suitable speed, e.g., in the range of 11 r.p.m., so that the upper runs of the conveyor sections move at the same speed from right-to-left as viewed in FIG. 1. A gear reducer, not shown, may be coupled with the output of the drive motor to provide increased driving torque. The lower return conveyor runs move from left-to-right along a flat support surface 68 mounted above angle irons 70 secured to the main frame. A downwardly curving ramp surface 72 is provided to guide the returning runs of the conveyor onto support surface 68. A plurality of vertically axised rollers 74 are mounted on the main frame along either side of the conveyor return runs to guide the flights and chains along their return paths. A freely rotating guide disc 76 is mounted on axle 77 and extends between the two tabletop chains 28,30 at the downstream end of the return runs to maintain proper tracking of the chains as they are guided into trail sprockets 34. Suitable chain take-up means 77 is provided at the tail end to adjust conveyor tension.

Means are provided to vibrate the articles within the pocket portions as they are organized in the collecting zone. The upper runs of the tabletop chains are supported by a frame structure which includes, in the region of the collecting zone, an intermediate frame 78. Frame 78 in turn is mounted for vibratory movement having a velocity component lateral of the direction of conveyor movement by means of the pair of opposed resilient shock mounts 80,82 supported through clevis 83 on main frame 22. The four wear plates 44,46,48 upon which the tabletop chains ride are mounted on the top of longitudinally extending angle irons 84,86 secured by means such as welding to intermediate frame 78. A rotating ball air type vibrator motor 88 is mounted to frame 78 through bracket 90 and operated at a suitable frequency within the range of 2,000–3,000 cps with an amplitude on the order of 1/16 inch. The vibration imparted to that part of the conveyor supported in the middle of a beam and by the adjustable support spring 91 vibrates the articles, in this case asparagus spears, which are being collected in the individual pockets to assist their organization into common parallel lengthwise alignment lateral of the direction of conveyor movement.

Means forming a revolving drum 92 is provided to insure that the relatively fast-moving articles or spears are laid down in proper parallel alignment. Drum 92 is mounted on upwardly extending frames 94,96 for rotation about an axis extending in the direction of conveyor movement. The drum is positioned across from the discharge end of infeed conveyor 20 and is rotated by suitable means such as hydraulic motor 98 to turn clockwise as viewed in FIG. 2 so that its lower margin moves against the direction of the articles discharging into the pockets. The illustrated asparagus spears will discharge with their heavier ends foremost and with a relatively high velocity so that they traject to the extreme side of the conveyor where they hit against and are stopped by an upstanding skirt plate 100 mounted on frame 78. Occasionally certain of the spears will discharge in a manner that they will tend to move or pivot upwardly the tip end in the pockets, which action could result in the spears becoming improperly positioned in the aligned pocket portions. The moving surface of drum 92 acts to engage these latter spears and move them back into the pocket portions where they are laid down and collected in proper alignment.

Conveyor 12 next moves the collected articles to the aligning or repositioning zone where the pockets and contained articles are progressively tilted to the horizontal for end-wise alignment, e.g., to the left as viewed in FIGS. 4, 5 and 8. This is effected through a gradual tilting of the underlying supporting elements for the tabletop chains. Thus, an intermediate frame 102 in the upstream section of the aligning zone is supported above main frame 22 with a lateral inclination such that the surfaces of wear plates 44, 46 and 48 define an angle 104 with the horizontal in the range of 6°, as illustrated in FIG. 4. Lateral tilting of the conveyor increases as the pockets progress along the aligning or repositioning zone. Thus, the intermediate frame 106 of FIG. 5 is mounted about the main frame so that the surfaces of the wear plates which it supports define an angle 108 with the horizontal in the range of 11°. At the end of the aligning zone immediately upstream of the cutting zone the intermediate frame 110 of FIG. 8 is mounted at an inclination so that the wear plates which it supports define an angle with the horizontal in the range of 15°.

A guide plate 112 extends along the length of the conveyor section adjacent the side thereof which is lowermost. The guide plate is supported by a plurality of brackets 114 mounted on the intermediate frame

structure and supports the pocket portions during their movement by forming a smooth, flat surface against which the tip-stop plates **62** slide.

Means are provided to vibrate the articles within the aligned pocket portions as they travel through the tip reference and aligning zone and into the cutting zone. In this zone the intermediate frames **102,106** and **110** which support the tabletop chains are mounted for a vibratory movement having a lateral velocity component to assist the gravital shifting of the contained articles against the tip-stop plates. The upstream end of the intermediate frame structure for the tip reference and aligning zone is supported on the main frame by the previously described resilient shock mounts **80**. The mid-span of the conveyor upper reach in the aligning zone is supported by intermediate frame **106**. An arm **116** extends downwardly from frame **106** and is supported on the main frame **22** by means of resilient shock mount **118**. The upwardly inclined end of frame **106** is supported by vibratory drive means **120** comprising a hanger arm **122** mounted at its upper end through connector head **124** with frame **106** and at its lower end with eccentric **126**. The eccentric is mounted on an eccentric shaft **128** carried by the main frame on a pair of journals **130**, as best illustrated in FIG. **6**. The eccentric shaft is driven by means of the illustrated hydraulic motor **132** through a flexible coupling **134** at a speed within the range of 450 r.p.m. to impart the desired vibratory movement to the intermediate frame structure, the conveyor pocket portions and contained articles. The downstream ends of the intermediate frame structure are also supported for vibratory movement by means of paired resilient shock mounts **136** supporting intermediate frame **138** and paired resilient shock mounts **140** supporting intermediate frame **110**.

As the upper reaches of the two runs of the conveyor sections move to the cutting zone they are caused to progressively separate laterally so that the contained articles are supported by the spaced opposite sections of the conveyor pockets. As best illustrated in FIG. 7 the chain track for the guiding of the uppermost conveyor run **26** as defined by the two wear plates **52,56** diverges forwardly from the chain track guiding the lowermost run **24** until the two pocket portions of the conveyor sections separate a sufficient distance to expose the means forming a cutting surface **142**. The uppermost run of the two separated sections then continues in a direction parallel with the lowermost run throughout the cutting operation performed by cutting means **144**.

The means forming the cutting surface **142** comprises an individual expendable short endless support belt **146** of a suitable material such as multiple-ply rubber belting. Belt **146** is trained between an idler pulley **150** and a drive pulley **148** keyed for rotation with main conveyor drive shaft **66**. Idler pulley **150** is mounted on a take-up shaft **152** which in turn is mounted on an adjustable take-up mechanism **153** adapted to adjust the tension in the belt. Conveyor drive gear motor **64** is operated through the associated gear reducer (where provided) to drive both the main conveyor runs and support belt in conjoint movement to carry the articles into cutting means **144**.

Cutting means **144** comprises one or more cutting elements **154** which preferably are the illustrated pair of disc knives carried on a rotatable knife shaft **156**. The lower margins of the knives project between the separated pocket ends and rotatably engage the surface of belt **146** so that the articles are cut with a combined shear and compression action. The number of cutting elements provided may be varied according to the desired number of parts cut from the articles. For use in cutting the illustrated asparagus, the pair of cutting elements functions to cut a tip-end part, a center-cut part and a butt-end part from each asparagus spear. Where three cutting elements or knives are provided two center-cut parts would be cut from each spear in addition to the tip and butt-end parts.

The cutting elements or disc knives are carried on an adjusting frame **158** which in turn is mounted on a pair of adjusting slides **160,162**, best illustrated in FIGS. **9, 10** and **12**. Adjusting slide **162** is exemplary and comprises a slide base **164** formed with a T-slot for sliding engagement with a corresponding T-slide member **166** secured to adjusting frame **158**. Hand-operated adjusting means **168** is provided to laterally adjust the position of frame **158** with respect to main frame **22**, thereby selectively adjusting the relative dimensions between the cutting elements **154** and the reference surface defined by the tip-stop plates of the conveyor pockets. This adjustment provides means for varying the length of the tip-end part cut from the articles. Adjusting means **168** comprises a hand wheel **170** keyed to a threaded shaft **172** which engages with internally threaded opening **174** in T-slide **166**. A holding bar **176** mounted on base **164** engages a groove **178** formed on the hub of the hand wheel. A hand-wheel lock **180** is provided to lock the wheel and adjustable frame in any selected position.

The cutting elements **154** are carried on adjusting frame **158** by means of a pivoting bracket **182** mounted by means of pillow blocks **184** on a pivot shaft **186** which in turn is mounted to frame **158**. Knife shaft **156** is rotatably carried on pillow blocks **188** mounted at the extended end of bracket **182**. Adjusting means **190** is provided to selectively adjust the vertical registry of the disc knives with respect to support belt **146**. This adjusting means comprises a threaded shaft **192** extending downwardly from a bracket **194** on frame **158** for connection through adjusting lock nuts with pivot bracket **182**. Drive means **196**, preferably comprising an hydraulic motor, is provided to drive shaft **156** and cutting elements **154** clockwise as viewed in FIG. **10** a speed in the range of 22 r.p.m. While individual hydraulic drive motors **64** and **196** are illustrated for respective conveyor and cutting element drives, it is understood that a single motor could be provided with a suitable interconnecting drive train arrangement, not shown, for driving the various shafts at the desired speed ratios.

Hold-down means **198** is provided for holding down the lowermost ends of the articles within the pockets, i.e., the tip-ends of the illustrated asparagus spears, to preclude displacement of the articles as they are cut. Hold-down means **198** comprises a pair of endless chains or series of heavy articulated links **200** trained over a pair of drive sprockets **202**. The drive sprockets are mounted on upwardly extending frame **205** mounted above main frame **22** and are arranged in alignment over the longitudinal axis of conveyor **12**. The lower, return reaches of the chains **200** loosely hang down so that they are adapted to drape into the underlying pocket portions and rest upon the tip ends

of the articles contained therein. The drive sprockets are keyed onto drive shaft **206** which in turn is driven by suitable means such as hydraulic orbit motor **208** mounted on shaft **206,** as best illustrated in FIG. **8.**

At the tail end of the hold-down chains a downwardly curving chain track **210** is provided to guide the incoming chains **200** onto a flat track **212** for return to the drive sprockets. A pair of spaced guide heads **204** together with a centered chain divider **214,** preferably a curved brass rod, are provided to insure tracking of the chains as they move onto the chain tracks. A safety cover **216** is mounted over the return reaches of the hold-down chains, and this cover is clamped in place by means of bracket **218.**

Orbit motor **208** is driven at a suitable speed, e.g., 50 r.p.m. so that the hold-down chains drape into and move at an equal speed with that of the conveyor pocket portions. While an individual orbit motor is illustrated for driving the hold-down chains, it is understood that the chains could be driven from a suitable drive train arrangement, not shown, powered for example by the motor driving the main conveyor **12.**

A knife-stripper bar **220** is adjustably mounted on frame **158** in a manner to project between the two cutting elements **154** for stripping away any cut parts which may cling to the cutter elements.

Discharge means **222** is provided for discharging the cut parts into separate streams for segregated collection in collection zone **224.** Discharge means **222** includes a pair of spaced upper guides **226,228** mounted in registry below the cutting elements and a pair of lower guides **230,232** which laterally diverge to either side. Collecting zone **224** includes a center bin **234** positioned below the discharge end of guides **226,228** to receive all center-cut parts, a bin **236** positioned below guide **232** to receive all tip-end parts, and a bin **238** positioned below **230** to receive all butt-end parts.

In the use and operation of apparatus **10** it will be assumed that the articles handled are the exemplary asparagus spears **19.** In FIG. **14** the method of operation is illustrated in schematic form. The spears are received from a suitable orienting apparatus in butt-first orientation and discharged from conveyor **20** into the adjacent aligned conveyor pocket portions moving along collecting zone **14.** Rotation of drum **92** serves to engage any spears which may bounce or tilt upwardly and push them back for proper lay-down in the pockets. Drive motor **64** is operated to move conveyor **12** from right-to-left as viewed in FIGS. **1A** and **1B** and vibrator motor **88** is operated to vibrate the pocket portions and collected spears to assist in parallel lengthwise alignment of these spears laterally of the direction of conveyor movement. As the conveyor flights enter the region of zone **16** the underlying support surface over which the tabletop chains **28,30** travel progressively tilts downwardly to the left as viewed in FIGS. **4, 5** and **8,** with slidable support for the conveyor pockets being provided by guide plate **112.** Eccentric drive motor **132** is operated to impart a vibrating motion having a lateral velocity component to the pockets and collected spears. This vibrating motion together with the effect of gravity on the inclined spears causes the latter to shift so that the tip ends abut tip-stop plates **62** for common end-wise alignment. As the aligned pocket portions and the collected and aligned spears progress into cutting zone **18** the chain tracks guiding the two tabletop chains diverge apart forwardly so that the opposed end sections of the pockets separate while vibration or shaking continues. The separated pocket end sections then move in conjoint motion on either side of cutting surface **142** defined by endless belt **146.** The pocket portions serve to hold the tip and butt ends of the articles with the article mid-portions resting upon belt **146.** As the pockets and contained articles enter the cutting zone the holddown chains **200** are fed by operation of orbit motor **208** into the advancing lowermost pocket end sections of conveyor run **24.** The weight of the hold-down chains resting upon the tip end portions of the spears prevents displacement of the same during the cutting operation. The pocket portions and spears together with the underlying belt **146** move relative to the cutting elements **154** which are rotated by motor **196.** The combined shear and compression action of the cutting elements against the underlying belt **146** cuts each spear into a tip-end part, a center-cut part and a butt-end part. These parts cascade over the end of the moving conveyor with the tip-end parts being guided into bin **236,** the center-cut parts being guided into bin **234** and the butt-end parts being guided into bin **238.** The different parts are thus collected together in segregated zones for conveyance by suitable means to further processing operations.

Where it is desired to vary the length of the tip-end part, hand wheel **170** is unlocked and turned to laterally adjust frame **158** until the cutting elements **154** are positioned the desired dimension from the reference surface defined by tip-stop plate **162.** The hand wheel is then locked.

While the foregoing embodiment is at present considered to be preferred it will be understood that numerous variations and modifications may be made therein by those skilled in the art and it is intended to cover in the appended claims all such variations and modifications as fall within the true spirit and scope of the invention.

I claim:

1. Apparatus for cutting elongated agricultural articles into pieces of predetermined length, the articles having a tip end and a butt end, means for conveying said articles through successive zones of operation, said zones including a first zone in which the articles are received and collected, a second zone in which the articles are positioned in a predetermined manner, and a third zone in which the articles are cut, the conveying means comprising first and second conveyor sections disposed side by side, article receiving pocket portions on the first conveyor section formed by upright pocket forming walls extending at right angles to the general direction of conveying movement and spaced in the direction of movement to form article receiving spaces, each such pocket portion having an upright reference wall extending parallel to the direction of conveyor movement and between the first named walls and adapted to be engaged by the tip ends of the articles, article receiving pocket portions on the second conveyor section formed by upright pocket forming walls extending at right angles to the general direction of movement of the conveyor and spaced in the general direction of conveyor movement, the spacing of the pocket forming walls on each conveyor section being the same, both pocket portions having lower supporting surfaces for the articles disposed between the upright walls, means for driving said conveyor sections in synchronism whereby the pocket forming walls of the

first and second sections and the pocket portions formed thereby are maintained substantially in alignment, means serving to carry the two conveyor sections whereby in the first article receiving zone the conveyor sections and the pocket portions of the same are disposed generally horizontally in relatively close proximity to form substantially continuous article receiving spaces extending across both conveyor sections, means serving to carry the two conveyor sections in the second zone and to effect conjoint tilting of the conveyor sections and pocket portions with the reference walls disposed lowermost, means for moving the conveyor sections and the pocket parts apart as they progress to the third zone while maintaining the pocket portions substantially in alignment, means for carrying the conveyor sections through the third cutting zone and means for maintaining the two conveyor sections spaced apart by a gap that is substantially less than the length of the articles, means for supplying said articles to the two conveyor sections in the first zone whereby the articles are collected in the spaces formed by the aligned pocket portions with like lengthwise orientation and with the tip ends pointing toward the reference walls, vibrating means acting upon the conveyor sections in the second zone for effecting movement of the articles in a downward direction toward the reference walls and in contact therewith and for retaining such contact as the conveyor sections move apart and into the cutting zone, cutting means acting upon portions of the articles spanning the gap between the conveyor sections in the cutting zone for severing the articles, means for adjusting the cutting means laterally in the gap between the conveyor sections to adjust length of the pieces being cut, and means for retaining the tip end portions of the articles within the pocket portions of the first conveyor section during cutting.

2. Apparatus as in claim 1 in which the cutting means comprises at least two cutting devices, said devices operating on two spaced planes disposed different distances from the reference walls of the first conveyor section whereby the articles are cut into at least three pieces of predetermined lengths.

3. Apparatus as in claim 1 in which the last named retaining means consists of an endless weighted chain having one run of the same draped over each of the pocket forming walls of the first conveyor section whereby portions of the chain depending between successive walls press downwardly upon the tip portions of the articles during cutting.

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