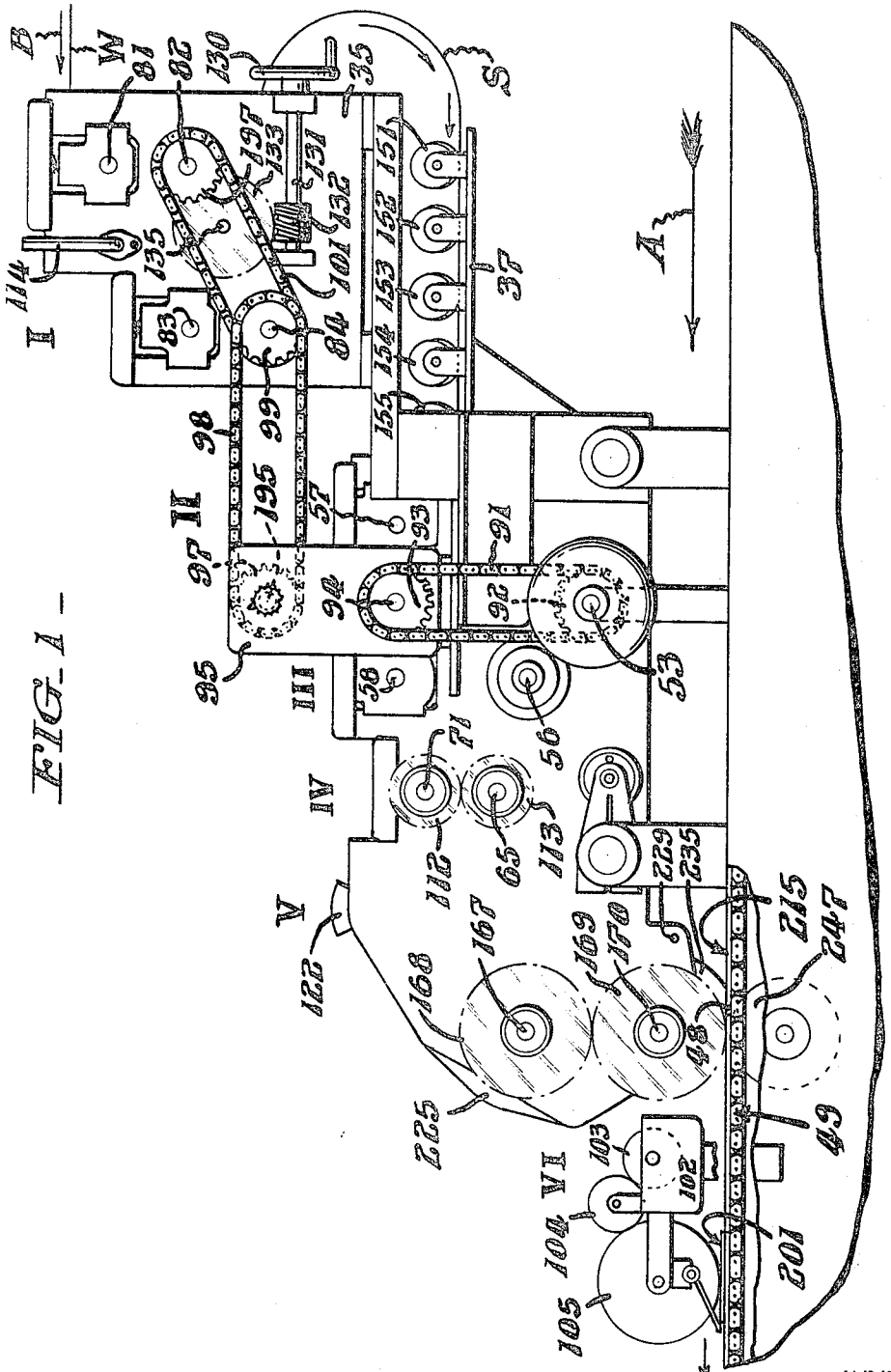
Feb. 25, 1969 E. M. ACKLEY 3,429,235

APPARATUS FOR FORMING AND ATTACHING FULL CELL INSERTS TO BOTTLE CARRIERS

Filed Oct. 7, 1966 Sheet 1 of 8

FIG. 1



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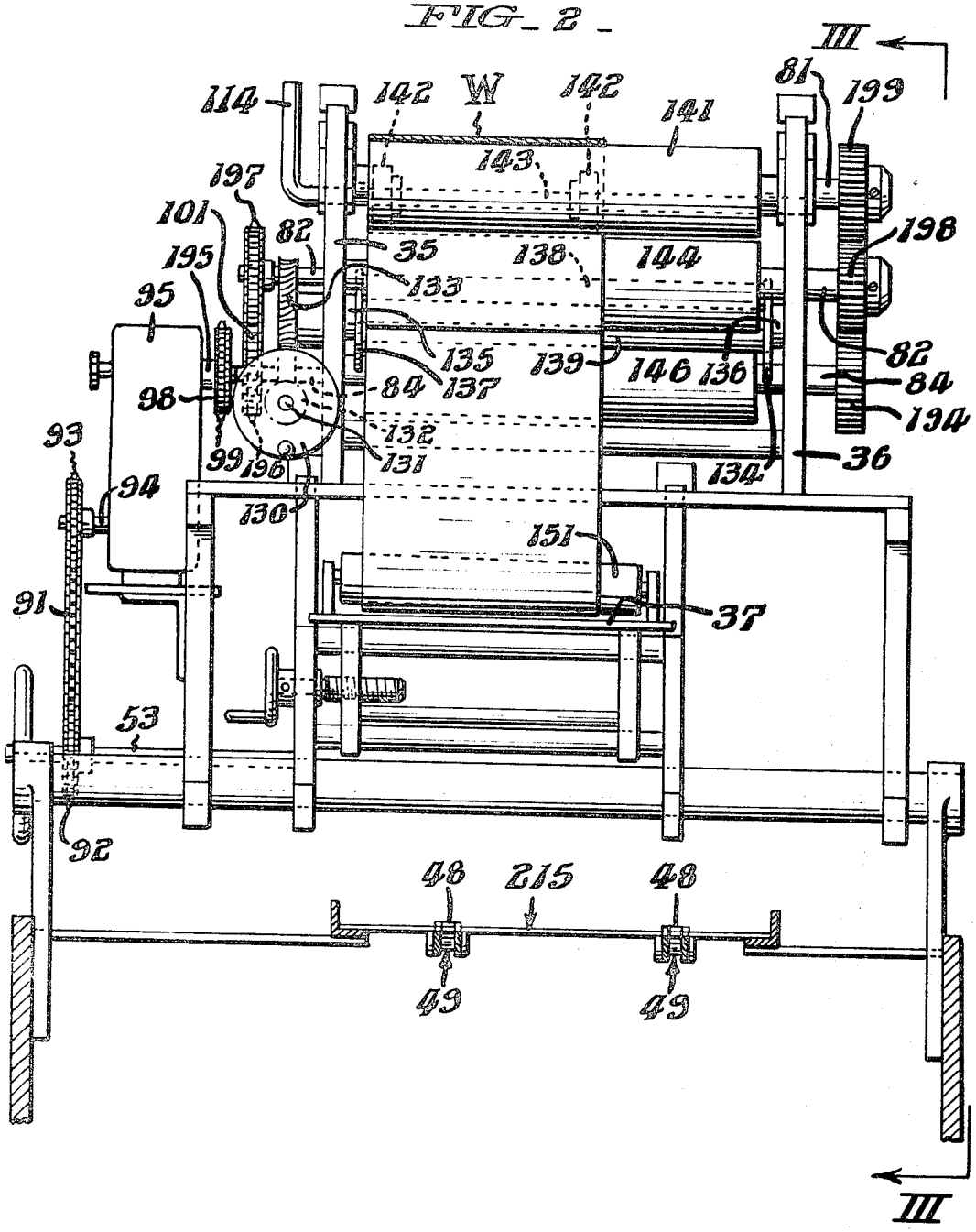
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Filed Oct. 7, 1966

Sheet 2 of 8

FIG. 2



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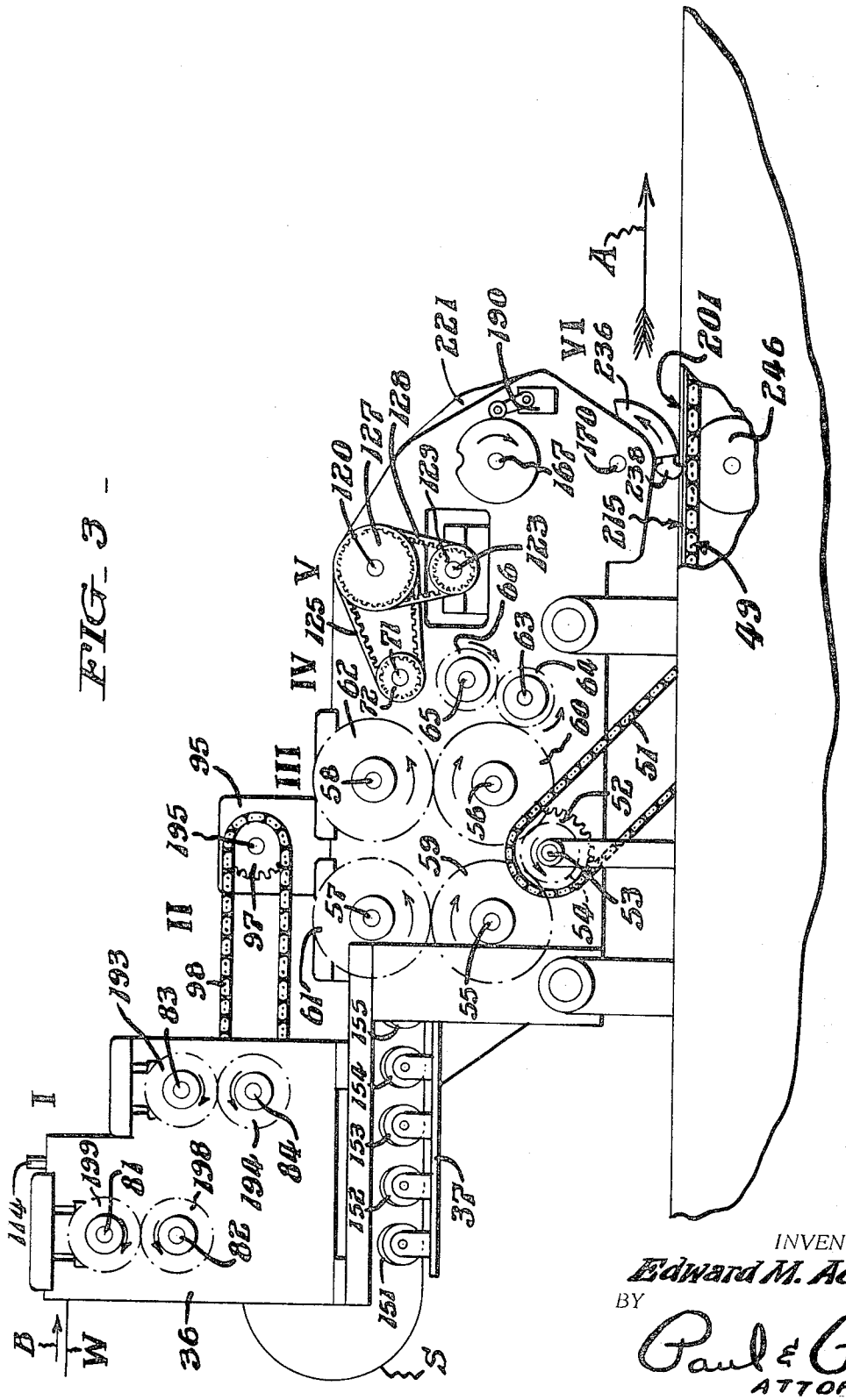
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APPARATUS FOR FORMING AND ATTACHING FULL CELL INSERTS TO BOTTLE CARRIERS

Filed Oct. 7, 1966

Sheet 3 of 8

FIG. 3



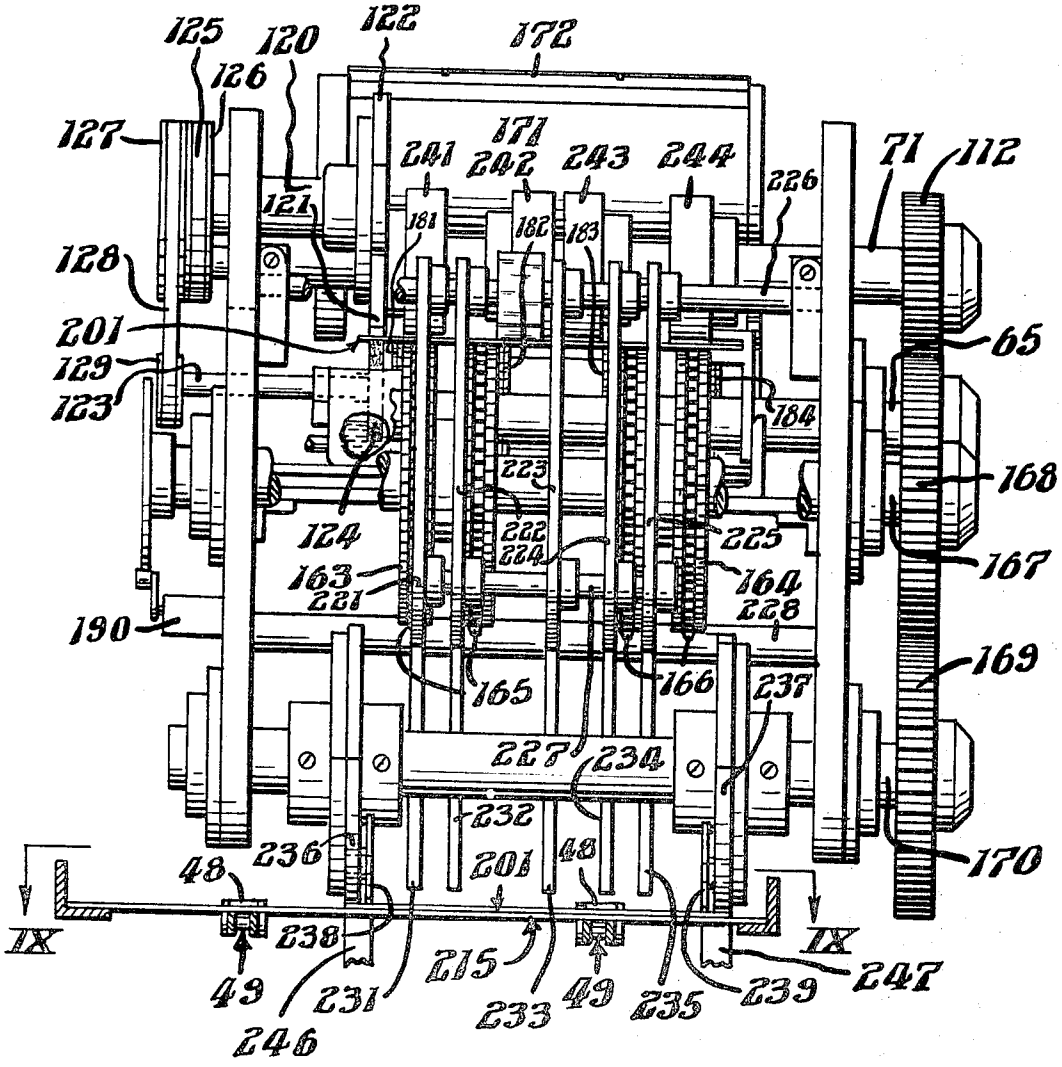
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APPARATUS FOR FORMING AND ATTACHING FULL CELL INSERTS TO BOTTLE CARRIERS

Filed Oct. 7, 1966 Sheet 4 of 8

FIG. 4



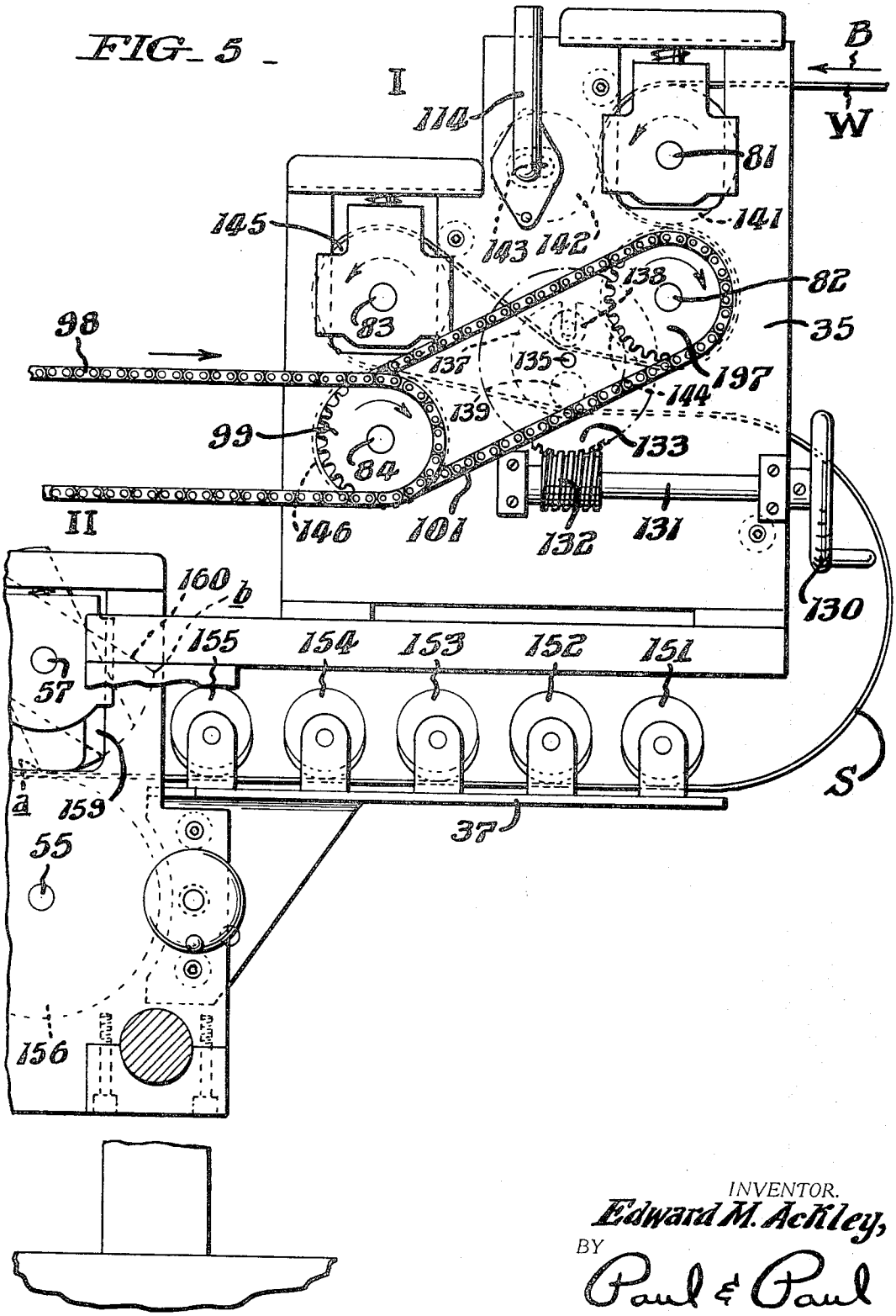
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APPARATUS FOR FORMING AND ATTACHING FULL CELL INSERTS TO BOTTLE CARRIERS

Filed Oct. 7, 1966 Sheet 5 of 8

FIG. 5



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Feb. 25, 1969 E. M. ACKLEY 3,429,235

APPARATUS FOR FORMING AND ATTACHING FULL CELL INSERTS TO BOTTLE CARRIERS

Filed Oct. 7, 1966 Sheet 6 of 8

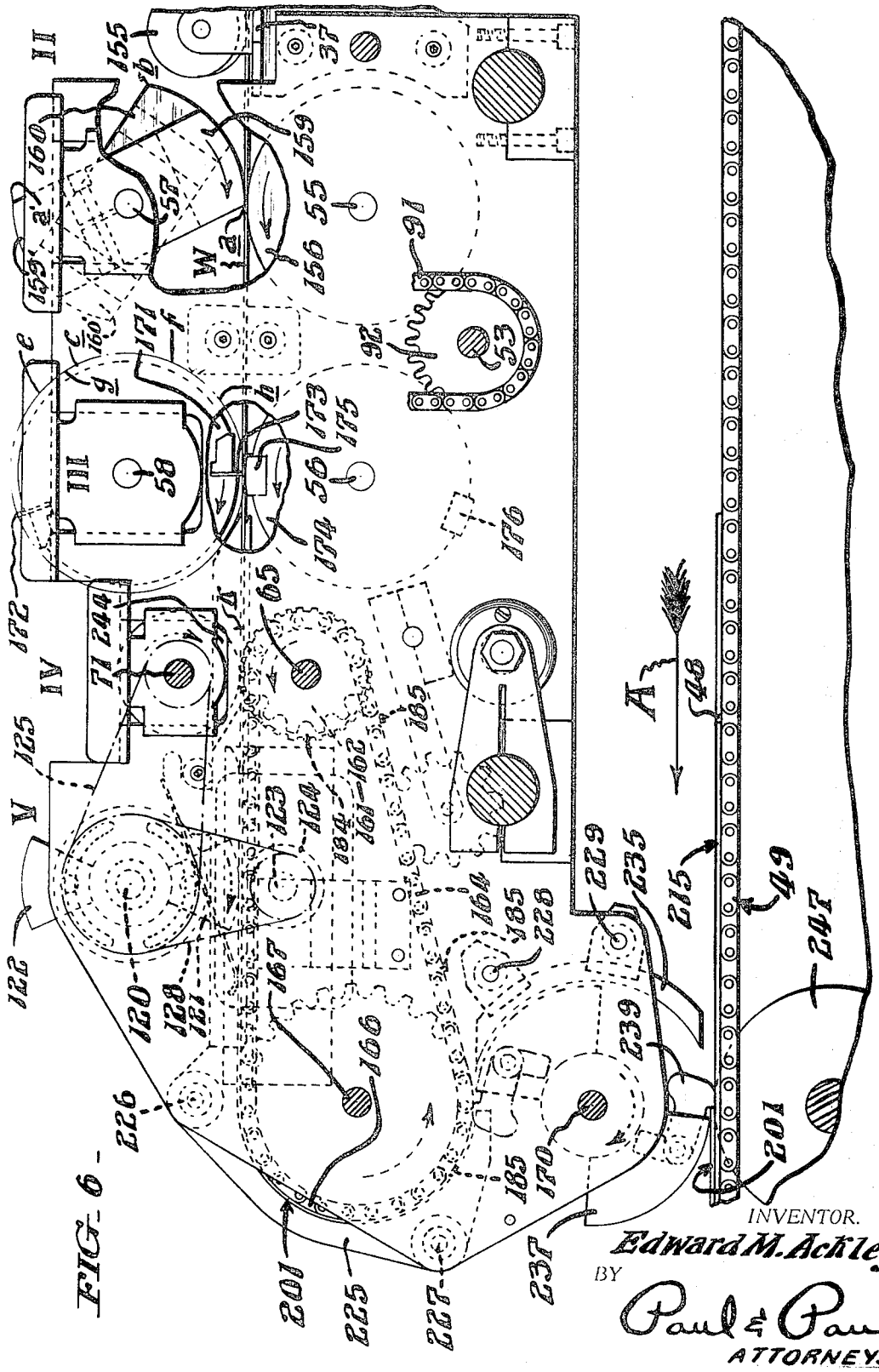


FIG. 6

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APPARATUS FOR FORMING AND ATTACHING FULL CELL INSERTS TO BOTTLE CARRIERS

Filed Oct. 7, 1966 Sheet 7 of 8

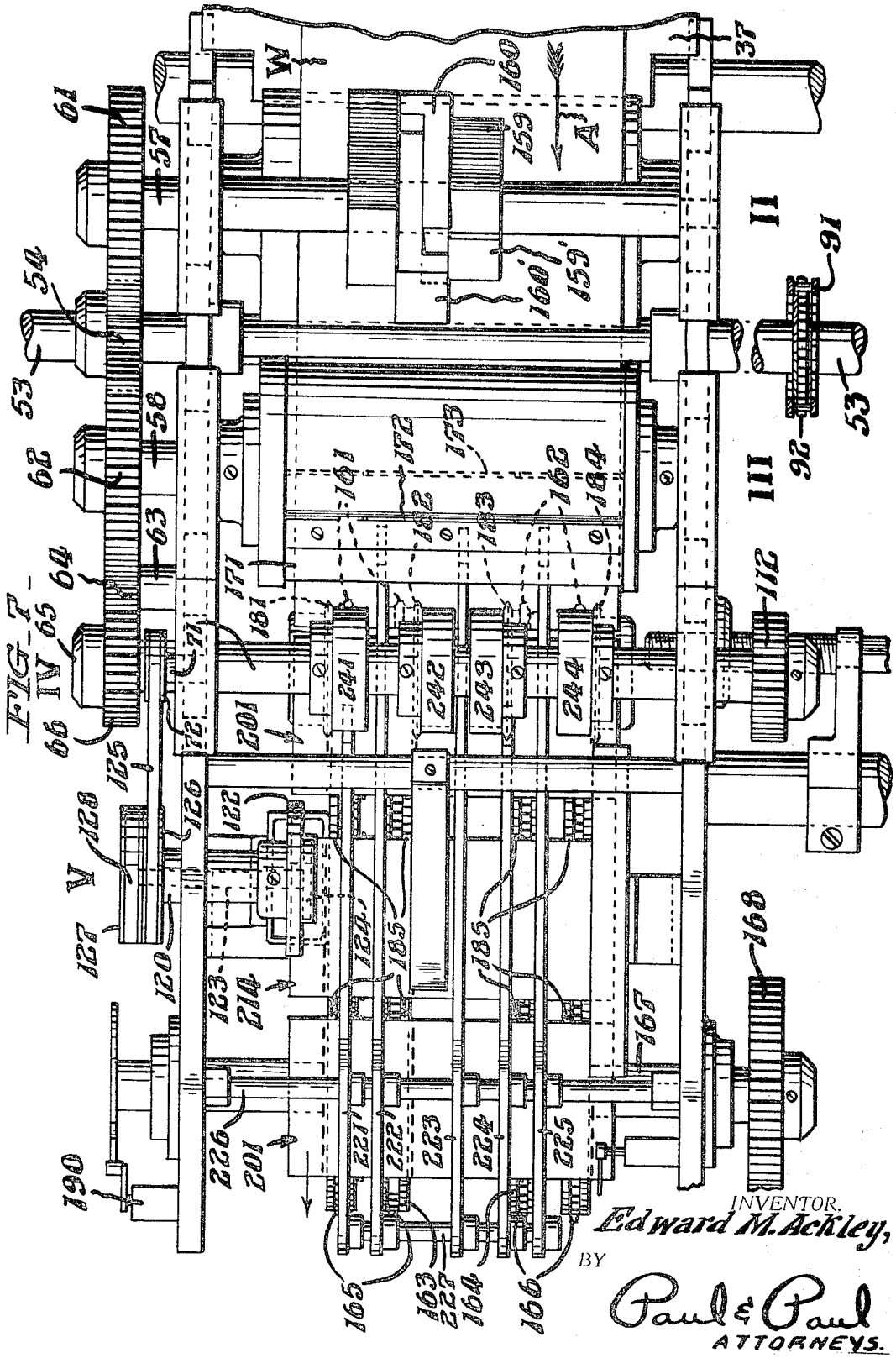


FIG. 7

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APPARATUS FOR FORMING AND ATTACHING FULL CELL INSERTS TO BOTTLE CARRIERS

Filed Oct. 7, 1966 Sheet 8 of 8

FIG. 8.

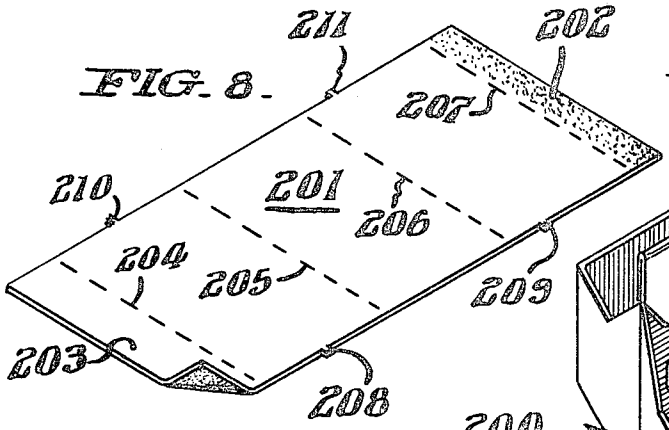


FIG. 10.

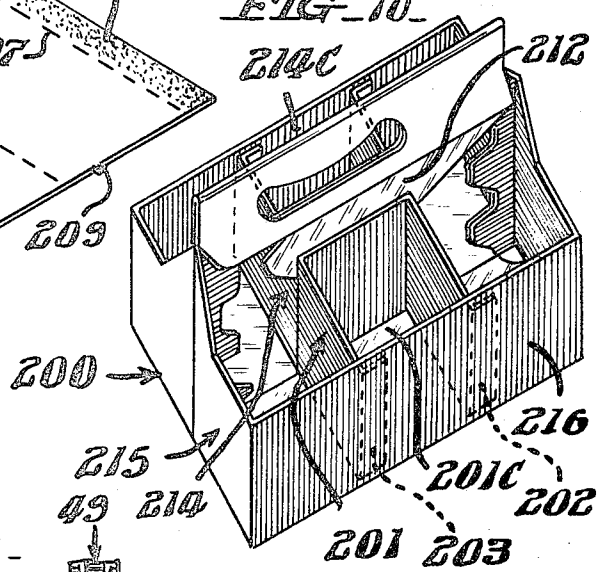
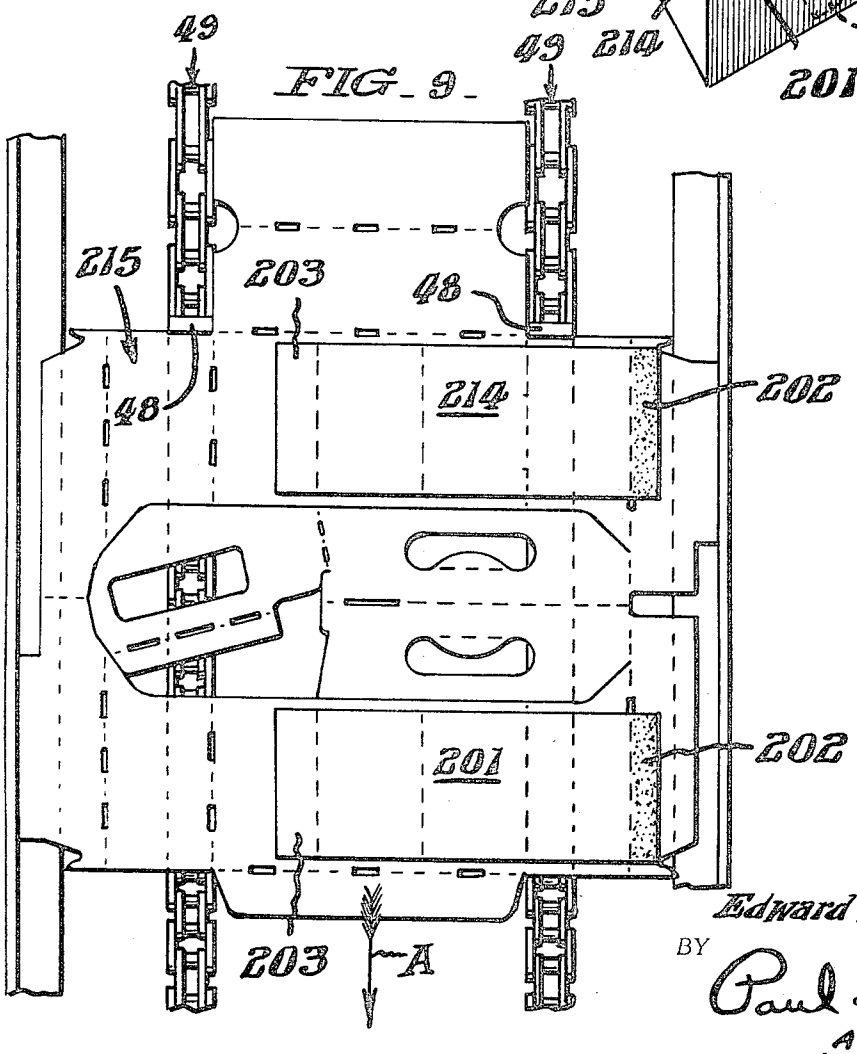


FIG. 9.



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United States Patent Office 3,429,235
Patented Feb. 25, 1969

3,429,235

APPARATUS FOR FORMING AND ATTACHING FULL CELL INSERTS TO BOTTLE CARRIERS

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Filed Oct. 7, 1966, Ser. No. 585,723
U.S. Cl. 93—37 7 Claims
Int. Cl. B31b 1/18, 1/62

ABSTRACT OF THE DISCLOSURE

Auxiliary apparatus is disclosed for attachment to a known form of right angle gluer (or other known form of bottle-carrier erecting machine) for forming and adding to the flat main carton blank, as it moves through the right angle gluer, a pair of full-cell partition inserts.

This invention relates to the production of multicell bottle carriers. Such carriers are ordinarily made of paperboard or other appropriate sheet material.

The invention relates particularly to the production of bottle carriers which have full center cells formed by partition inserts secured by glue or other suitable adhesive to the main paperboard blank.

Apparatus is available commercially for erecting a bottle carrier from a formed paperboard blank. A typical machine commercially available for this purpose is known as a right angle gluer.

An object of the present invention is to provide auxiliary apparatus attachable to a known form of right angle gluer (or to other known form of bottle carrier erecting machine) for forming and adding to the main carton blank, as it moves through the right angle gluer, a pair of full-cell partition inserts.

The invention will be clearly understood from a consideration of the following detail description of a preferred form of the invention selected for illustration in the drawings in which:

FIG. 1 is a side view of the left side of the apparatus of the present invention as attached to a known form of right angle gluer in which the conveyor is moving from right to left in the direction of the arrow A;

FIG. 2 is a front view looking in at the right end of FIG. 1, in the direction in which the conveyor is moving;

FIG. 3 is a side view of the right side of the apparatus, looking along the line III—III of FIG. 2 in the direction of the arrows. In FIG. 3, the conveyor is moving from left to right, in the direction of the arrow A;

FIG. 4 is a rear view looking in at the right end of FIG. 3. In FIG. 4, the conveyor is moving toward the viewer;

FIG. 5 is an enlarged view of a portion of the left side of the apparatus;

FIG. 6 is an enlarged view of another portion of the left side of the apparatus. The arrow A indicates the direction of movement of the conveyor;

FIG. 7 is a top plan view of FIG. 6;

FIG. 8 is a perspective view of one of the inserts;

FIG. 9 is a top plan view, generally indicated by the lines and arrows IX—IX in FIG. 4, showing the main carton blank with the pair of inserts attached; and

FIG. 10 is a perspective view of a fully erected carton of the full cell type produced by the apparatus of the present invention.

Reference will first be made to FIGURES 8, 9 and 10. FIGURE 10 shows the type of six-cell bottle carrier **200** which is produced by apparatus of the present invention. This type of bottle carrier is referred to as a full-cell carton since the center cell **201C**, **214C**, on each side of the

center partition **212** is a full cell, as distinguished from merely straps which characterize some forms of six-cell bottle carriers. The center cells **201C**, **214C**, of the carton of FIG. 10 are formed by adding to the main carton blank **215** a pair of similar rectangular inserts **201**, **214**, one of which, insert **201**, is illustrated in FIG. 8. Insert **201** of FIG. 8, when folded along the fold lines **204**, **205**, **206**, and **207**, forms the three walls of the full cell compartment **201C**, and when glued to the center partition **212**, and to the side wall **216** of the main carton blank **215** at the edge portions **202** and **203** of the insert, the full cell **201C** is formed.

FIGURE 9 shows the main carton blank **215** in flat form moving on the chain conveyor **49** in the direction of the arrow A after it has passed through the apparatus of the present invention. The under edge portion **203** of each insert is glued to the side wall portion of the main blank **215**. Later, the entire blank is folded and the upper edge portion **202** of each insert is also glued to the sidewall of the main blank.

As indicated above, the present invention provides a mechanism which is adapted to be added as an attachment to a known commercial form of right angle gluer, and which is operative to cut, score, glue and attach a pair of full-cell inserts to each main carton blank as it passes along the conveyor of the right angle gluer or other main erecting apparatus.

Referring next to FIG. 1, the inserts, such as insert **201** and **214**, are produced from a continuous web W of paperboard which is supplied from a roll not shown and delivered in the direction of the arrow B, shown at the upper right corner of FIG. 1, to a pull-in zone I. From zone I, the web W is fed to an intermittent feed zone II with slack being formed in the web W in the region S between the zones I and II during the periods in which the intermittent feed mechanism is not feeding. The intermittent feed mechanism of zone II delivers the web W of paperboard to a cutting zone III in which the web W is substantially severed transversely. The substantially severed insert blank is then delivered to a perforating zone IV in which a series of longitudinal dash-line perforations are formed in the insert. These perforations are shown in FIG. 8 identified as **204**, **205**, **206** and **207**. The insert blank then passes through a gluer zone V in which glue is applied to the undersurface edge portion **203** of the insert. The insert blanks are then discharged at zone VI to the main carton blanks which are being transported along the chain conveyor **49** beneath the insert-forming apparatus.

The mechanisms in each of the zones I to VI referred to above, and which perform in series the function of web pull-in, intermittent feed, severing, perforating, gluing, and discharging, will be described in detail hereinafter. First, it may be helpful to describe the drive means which drive the various mechanisms.

The drive means

Reference is now made to FIG. 3 which shows the right side of the machine, with the conveyor **49** moving from left to right in the direction of the arrow A. The apparatus provided by the present invention is driven by a main drive chain **51** which is driven by a sprocket (not shown) on the main right angle gluer machine. The main drive chain **51** drives a sprocket **52** fixed on shaft **53**. Also fixed on shaft **53** is a pinion **54** (see also FIG. 7) which meshes with and drives gears **59** and **60** mounted on shafts **55** and **56**, respectively. Gear **59** drives a gear **61** mounted on a shaft **57**, and gear **60** drives a gear **62** mounted on a shaft **58**. These gears and shafts are seen in FIGS. 3 and 7. Gear **60** also meshes with an idler **64** on shaft **63** (FIG. 3) and idler **64** drives a pinion

66 mounted on shaft 65, the right end of which is visible in FIG. 7. Shaft 65 (obscured by shaft 71 in FIG. 7), extends transversely across the machine and at its left end is fixed a gear 113, seen in FIG. 6, which meshes with and drives a gear 112 mounted on shaft 71. Shaft 71, which also extends across the machine, has fixed thereto at its right end, a pulley 72, seen in FIGS. 7 and 3, which drives belt 125 (FIGS. 3, 6, 7). Belt 125 drives pulley 126 which is mounted on shaft 120. Also mounted on shaft 120 is a pulley 127 which drives a belt 128 which in turn drives a pulley 129 on shaft 123 to which is fixed the glue wheel 124.

Shaft 53, the right end of which is seen in FIG. 3, extends across the machine, and at its left end, as seen in FIGS. 1 and 6, a sprocket 92 is fixed which drives chain 91 which in turn drives sprocket 93 fixed to shaft 94. Shaft 94 is the input shaft to a variable-speed gear-reduction unit 95 (FIGS. 1 and 2) having an output shaft 195, on which is mounted a sprocket 97 which drives a chain 98 which drives sprocket 99 fixed on shaft 84.

Also fixed to shaft 84 is a sprocket 196 which drives a chain 101 which in turn drives a sprocket 197 fixed on shaft 82. Gear 198, fixed to the opposite or right end of shaft 82, meshes with gear 199 fixed to shaft 81, and in this manner shaft 81 is driven.

Referring again to FIGS. 1, 3, 4 and 6, fixed to shaft 65 are two double sprockets 161–162 which drive two double chains 163–164 which in turn drive two larger double sprockets 165–166 fixed to shaft 167. Fixed to the left end of shaft 167 is a gear 168 which drives a gear 169 fixed to shaft 170.

The pull-in mechanism—zone I

Fixed on shaft 81 for rotation therewith is a roller 141 (FIG. 5) the surface of which is adapted to be engaged by a pair of rollers 142 (FIG. 2) mounted on a shaft 143 the position of which is movable to and away from roller 141, as by the web-release handle 114, to engage or disengage the surfaces of rollers 141 and 142. Fixed to shafts 82, 83 and 84 (FIG. 5) for rotation therewith are rollers 144, 145 and 146, respectively. A gear 194 at the right end of shaft 84 meshes with and drives gear 193 fixed to the right end of shaft 83 (FIG. 3).

The continuous web W of paperboard from the supply roll is threaded over roller 141 (FIG. 5), down between rollers 141 and 142, then around the front surface of roller 144, up over and around roller 145, then down through the nips of rollers 145 and 146, and then rearwardly into the slack region S.

Referring now to FIGS. 2 and 5, mounted for rotation in supports 35 and 36 at opposite sides of the frame are trunnions 135 and 136. Trunnion 135 carries at its outer end a worm gear 133, adapted to be rotatad by worm 132 fixed to worm shaft 131, and adapted to be rotated by handwheel 130. Fixed to the inward end of trunnion 135 is a disc 137, and fixed to the inward end of trunnion 136 is a disc 134. Supported between the two discs 137 and 134, are two parallel leveling rollers 138 and 139, the orientation of which is adjustable by rotation of the discs 137, 134, in response to rotation of the handwheel 130. As the worm gear 133 and discs 137, 134 are moved counter-clockwise, as viewed in FIG. 5, the upper roller 138 bears downward, and the lower roller 139 bears upward on the web W of continuous paperboard.

From the slack region S, the web W of paperboard is passed beneath a series of five rollers 151 to 155 mounted above and supported by the platform 37. The rollers 151–155 are inclined downwardly from left to right, as viewed in FIG. 2, for the purpose of maintaining the web W biased toward the left side of the apparatus. After leaving the last of the rollers 151–155, the web passes into the intermittent feed zone II. Intermittent rather than continuous feed is desired so that the web W is stationary during the transverse severing operation,

The intermitten feed mechanism—zone II

Intermittent feed of the web W is accomplished by a pair of feed cam sectors 159 and 160 fixed to shaft 57 for rotation therewith (FIGS. 6 and 7). The cam sectors 159 and 160 are mounted in side-by-side relation on shaft 57, and their angular orientation with respect to each other is adjustable. By increasing the angle between feed cam sectors, the feed may be increased, and, conversely, by decreasing the angle between the cam sectors, the feed may be decreased. The combined arcuate length of the two cams, from points *a* to *b* in FIG. 6, determines the distance between transverse cuts of the web, and hence determines the height of the center-cell inserts 201, 214.

As the shaft 57 is driven rotationally, the cam sectors 159 and 160 come into intermittent engagement with the roller 156 mounted for rotation on shaft 55. During the intervals that the feed cam sectors 159 and 160 are in engagement relation with roller 156, the web W of paperboard is pushed forwardly at a speed greater than that at which it is being pulled through the pull-in zone I, and, accordingly, the slack in slack region S (FIG. 1) is substantially taken up. During the period that the feed cam sectors 159 and 160 are not in engagement relation with the web W, slack builds up in the region S.

The cutter mechanism—zone III

The web of paperboard which is pushed forwardly intermittently by the intermittent feed mechanism 159, 160 is fed into the cutter mechanism. This mechanism comprises a rotary cutter 171 fixed to and mounted for rotation on shaft 58. The cutter comprises two knives 172 and 173 mounted transversely of the web W, and spaced approximately 180° apart on the cutting circle *c*. The cutting edges of the knives 172 and 173 are mutilated or nicked at two places so that the web W is almost but not quite completely severed. Below the cutter 171 is a rotary anvil 174 having two anvil surfaces 175 and 176 which are so spaced apart on the anvil circle as to cooperate with the cutting knives 172 and 173.

The small areas of paperboard material which are not cut by the knives 172 and 173 form connecting strips which are later torn apart as the web W is pulled forward by the perforating knives, as will be described. These connecting strips, after having been torn, are indicated in FIG. 8 by the reference numerals 208, 209, 210 and 211.

Cutting of the web W by the knives 172 and 173 is accomplished during the time interval that the web of paperboard is stationary. That is to say, the intermittent feed cam sectors 159 and 160 and the cutter 171 are rotated in such time relationship that the knives 172 and 173 are out of engagement with the web of paperboard during the time interval that the intermittent feed cam sectors 159 and 160 are in engagement with the web and pushing it forward.

It was indicated above that the knives 172, 173 are "approximately" 180° apart on the cutter circle *c*. They need not be exactly 180° apart, and are not so shown in FIG. 6. As a matter of fact, the distance on the cutter circle *c* from knife 172 to knife 173 is shown to be greater than the distance from 173 to 172. The requirement to be met is merely that the distance between the knives 172 and 173 on the cutter circle *c* be greater than the distance on the intermittent feed circle between the leading edge *a* and the trailing edge *b* of the cam 159, 160. This assumes that the shafts 58 and 57 are rotating at the same speeds, and that the diameters of the cutter circle and intermittent feed circle are equal.

The fact that the knives 172, 173 need not be equally spaced may be more clearly understood by considering the following:

Assume that knife 173 has just passed through the cutting position and is rising up the cutter circle *c*. The leading edge *a* of the feed cams now engages the web W and starts to push the web forward. This continues until the

trailing edge *b* is reached. The web W is therefore pushed forward by a length equal to the arcuate distance between *a* and *b* on the feed cams **159, 160**. The forward movement of the web then ceases. During the period that the web W is being pushed forward, as just described, the knife **172** is moving around the cutter circle from approximately point *e* to point *f*. The web now remains motionless awaiting cutting by the knife **172** as it moves from point *f* to the cutting position at the bottom of the cutter circle. In the case of knife **173**, the knife will move from approximately point *g* to point *h* on the cutter circle during the period that the web W is being pushed forward. Thus, the web remains motionless for a shorter period of time awaiting severing by knife **173** than it does for knife **172**, but this is of no consequence.

The perforator mechanism—zone IV

When the web W is severed, or, more accurately, almost severed, by one of the nicked cutter knives, **172** or **173**, the forward edge of the almost-severed section of paperboard (which is to become one of the inserts such as **201** of FIG. 8) has not yet reached the perforating knives, described hereinbelow, being just short thereof, at about point *k* in FIG. 6. The almost-severed section stays in this position until the leading edge *a'* of the other cam sector **159'** arrives at the nip point of roller **156** and starts pushing the web W forward. When this occurs, the leading edge of the almost-severed section moves from point *k* forward on to the conveyor formed by the two double chains **163** and **164** and into the paths of the four rotary perforating cutters or knives **181–184** fixed to shaft **65** and rotating therewith (FIGS. 6 and 7). These four perforating knives are disposed below the path of the inserts on the conveyor **163–164**.

Fixed to shaft **71** for rotation therewith, and located above the conveyor **163–164** and above the knives **181–184**, are four pressure rolls **241–244** (FIGS. 6 and 7) which bear down on the inserts at regions adjacent the perforations **204–207** (FIG. 8) being made by the perforating cutters **181–184** on the underside of the insert. When the rearward edge of the almost-severed insert arrives at point *k*, the forward push theretofore being exerted by the intermittent feed cams **159'–160'** ceases, and the insert under the perforating knives is no longer pushed forward by the next following insert section. However, the rotating perforating knives **181–184** now exert a forward force on the almost-severed insert which is sufficient to tear apart the narrow connecting strips, such as at **208, 209** (FIG. 8) and the insert is torn free. Lugs **185** on the conveyor chains **163–164** now engage the rearward edge of the fully severed insert and push it forwardly so that it maintains its position on the forwardly moving conveyor **163–164**.

The gluing mechanism—zone V

As the perforated insert moves along on the conveyor **163–164**, it enters the gluing zone. Here, the left edge portion of the underside of the insert comes into contact with a narrow glue wheel **124** disposed below the conveyor and fixed to shaft **123** for rotation therewith. Mounted on shaft **120** above the glue wheel **124** is a pressure device having oppositely disposed arcuate pressure sectors **121** and **122** which engage and press downwardly upon the left edge of the upper side of the insert at the time the undersurface of the insert is being contacted by the glue wheel **124**. In this manner, the left edge portion **203** (FIG. 8) of the undersurface of the insert has glue applied thereto.

The discharge mechanism—zone VI

As the insert continues on beyond the glue zone V, the insert is carried on the double chain conveyor down and around the discharge end of the mechanism being described. During this movement, the inserts are confined to the moving chain conveyor by five upper confining guides **221, 222, 223, 224** and **225** (FIGS. 4, 6 and 7). These confining guides **221–225**, which are elongated and generally J-shaped, extend forwardly from between the perforating and gluing zones and down and around the discharge end of the apparatus, terminating at a point located below the shaft **167**. The guides are supported on support cross members **226** and **227**.

Supported on cross members **228** and **229** below the upper confining guides **221–225** are five lower confining guides **231–235** (FIGS. 4 and 6). These lower confining guides are curved or arcuate, their concave surfaces facing forwardly, rather than rearwardly as in the case of the hook-portions of the upper J-shaped confining guides **221–225**.

Fixed to shaft **170** for rotation therewith are two arcuate sectors **236** and **237** mounted at opposite end portions of shaft **170** just outside the area occupied by the lower confining guides **231–235** (FIG. 4). Pivotally secured to each sector is a pusher **238, 239**. These pushers are adapted to engage the rearward edge of each insert as it is discharged from the upper-confining-guide portion of the double-chain conveyor **163–164**, and to push it down and around the region spanned by the lower confining guides **231–235**. In this manner the inserts are discharged at regular intervals on to the main bottle carrier blanks **215** moving along the main conveyor **49**. The main blanks **215** on the main conveyor are pusher along at regular spacings by pusher lugs **48**.

The discharged inserts are pressed onto the main blanks **215** by the sectors **236, 237**. A pair of back-up rollers **246, 247** provide the necessary back-up support. In this manner, the inserts **201** and **214** (FIG. 9) are deposited on and glued to the main bottle carrier blank **215**.

The blank then passes through a gluing stage (FIG. 1) where glue is applied to the upper right edge portions **202** of the inserts. This gluing stage is shown in FIG. 1 and includes the glue supply tank **102**, the pick-up roller **103**, the transfer roller **104**, and the application roller **105**.

Subsequently, the carton blank **215** with inserts **201** and **214** affixed is erected and glued automatically by the prior-art right-angle gluing apparatus to form the bottle carrier **200** of FIG. 10.

In the foregoing description of the apparatus of the present invention little mention has been made of the necessary supporting frame and supporting members. Such supporting frame and members are readily identifiable in the drawings. Also no mention has been made of the cam operated electrical switch **190** (FIGS. 3, 4 and 7), nor of certain other switches and adjusting devices whose inclusion is not a necessary part of the apparatus to be claimed.

While the preferred embodiment of this invention has been described in some detail, it will be obvious to one skilled in the art that various modifications may be made without departing from the invention as hereinafter claimed.

Having described my invention, I claim:

1. In paperboard bottle-carrier forming apparatus having main conveyor means for transporting a succession of bottle-carrier blanks in flat form along on said main conveyor, the improvement which comprises the provision of auxiliary apparatus attached to said bottle-carrier forming apparatus for producing cell-forming inserts and for securing said inserts to bottle-carrier blanks, while said blanks are being transported along said main conveyor, said auxiliary apparatus comprising:

(a) supply means for supplying a continuous web of paperboard;

(b) pull-in feed means for pulling said web continuously from said supply means to provide a slack supply;

(c) cam feed means for feeding intermittently at regular intervals from said slack supply a predetermined fixed length of web;

(d) mutilated cutter means transverse of said web downstream from said cam feed means and operating in timed relation therewith for almost severing the

leading portion of said web during stationary intervals thereof to form said inserts;

(e) perforating cutter means lengthwise of said almost severed inserts, said cam feed means at intermittent intervals pushing said almost-severed inserts downstream into said perforating cutter means;

(f) said perforating cutter means being effective during stationary intervals of said web to tear said almost-severed inserts loose from said web;

(g) secondary conveyor means for receiving and carrying the torn-away inserts, said secondary conveyor means having pusher means;

(h) gluing means adjacent said secondary conveyor means for applying an adhesive coating to the undersurface of said insert along one edge thereof;

(i) discharge means for delivering said inserts from said secondary conveyor means on to the flat bottle-carrier blanks in timed coordination with their transportation along said main conveyor; and

(j) means at said main conveyor beyond said delivery point for applying adhesive coating to the upper surface of said inserts along the other edge thereof;

2. Apparatus as claimed in claim 1 characterized in that said cam feed means comprises cam sectors mounted on an axis transversely disposed relative to said web and adapted to be adjusted into different degrees of overlapping relation for controlling the length of web fed at intermittent intervals to said transverse cutter means.

3. Apparatus as claimed in claim 2 further characterized in that said transverse cutter means is rotary about an axis transversely disposed relative to said web and that the timing relation between said rotary transverse cutter means and said intermittent cam-feed means is such that said cutter engages said web to almost sever the same during the periods that said cam-feed means is not pushing said web forward.

4. Apparatus as claimed in claim 3 further characterized in that said secondary conveyor means is provided with stationary guide means for confining said completely severed inserts relative to said secondary conveyor means.

5. Apparatus as claimed in claim 4 further characterized in that said discharge means is provided with stationary guide means for confining said completely severed inserts relative to said discharge means.

6. Apparatus as claimed in claim 5 further characterized in that said secondary conveyor means is equipped with pusher lugs for pushing said completely severed inserts along.

7. Apparatus as claimed in claim 6 further characterized in that said discharge means is equipped with pusher lugs for pushing said completely severed inserts along.

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U.S. Cl. X.R.

53—263