Aug. 16, 1960 L. E. LA BOMBARD 2,949,066

METHOD AND APPARATUS FOR CREASING BLANKS

Filed Jan. 20, 1958 9 Sheets-Sheet 1

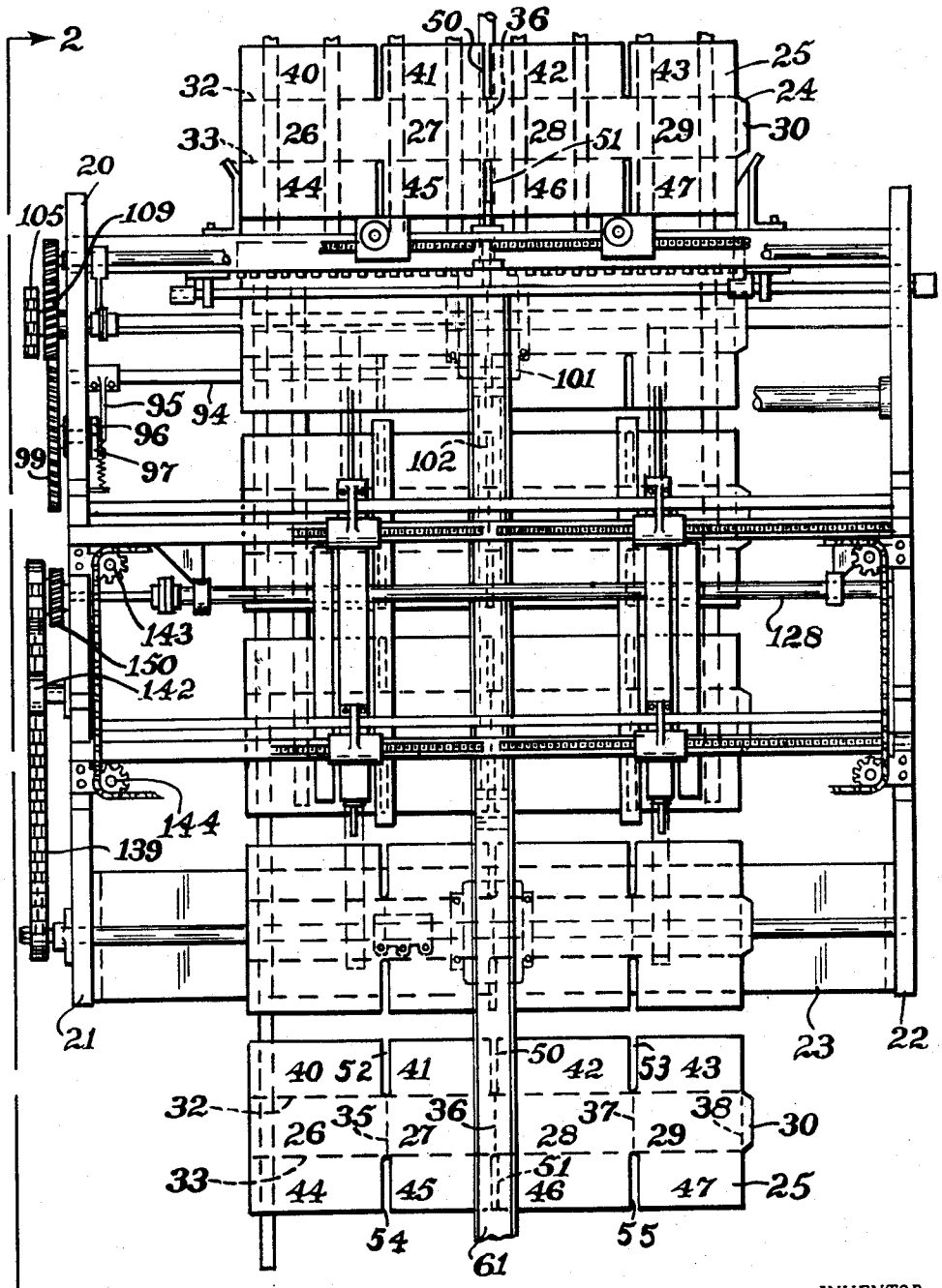

Fig. 1.

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METHOD AND APPARATUS FOR CREASING BLANKS

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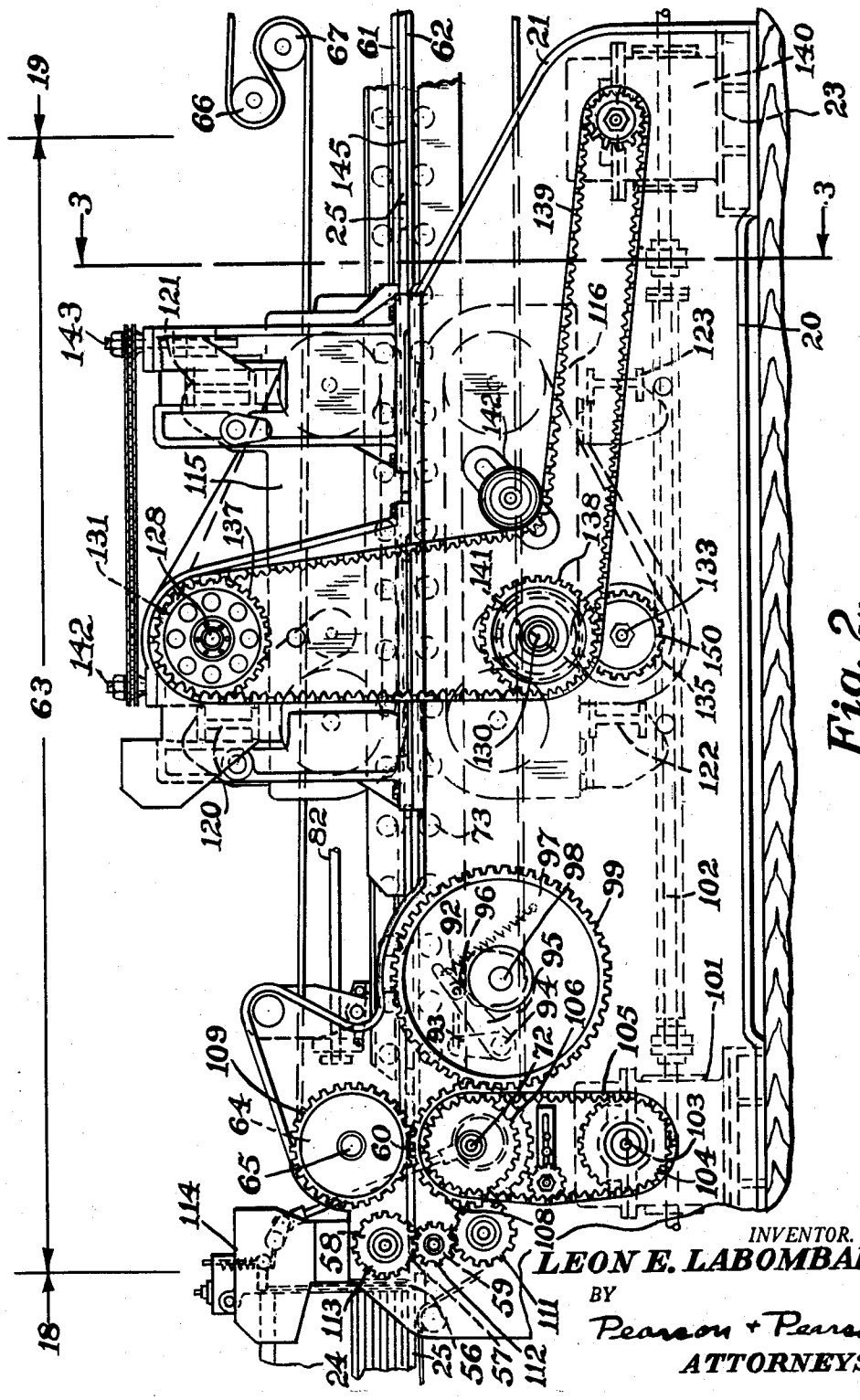

Fig. 2.

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METHOD AND APPARATUS FOR CREASING BLANKS

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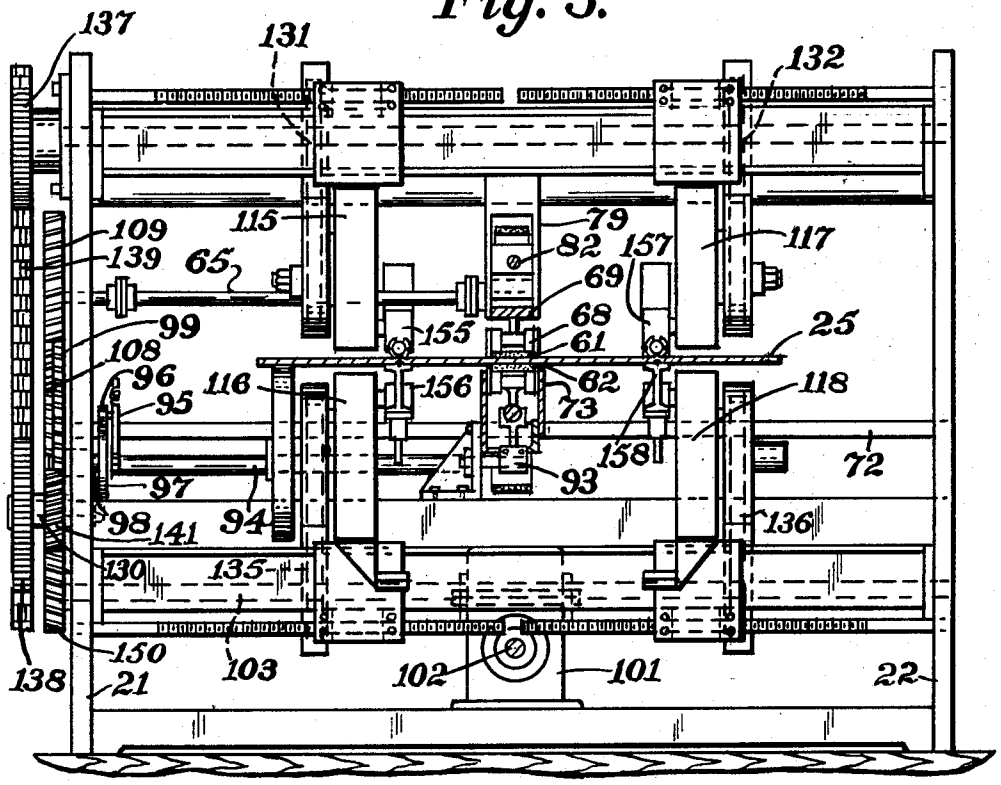
Fig. 3.



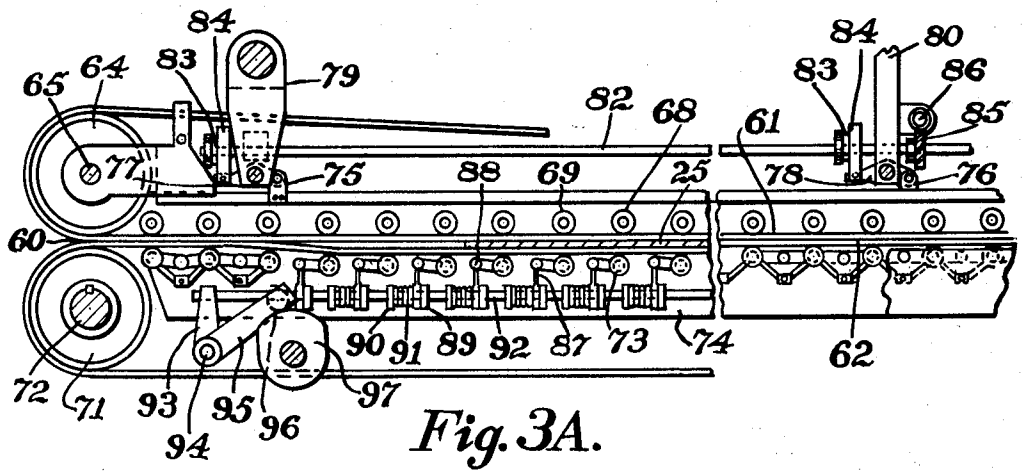


Fig. 3A.

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METHOD AND APPARATUS FOR CREASING BLANKS

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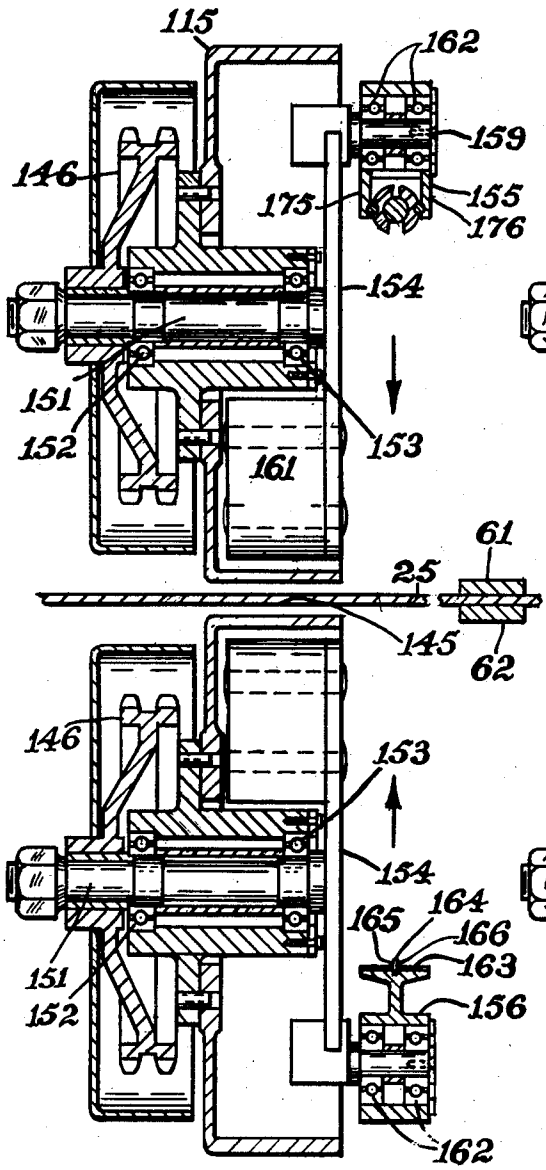

Fig. 4.

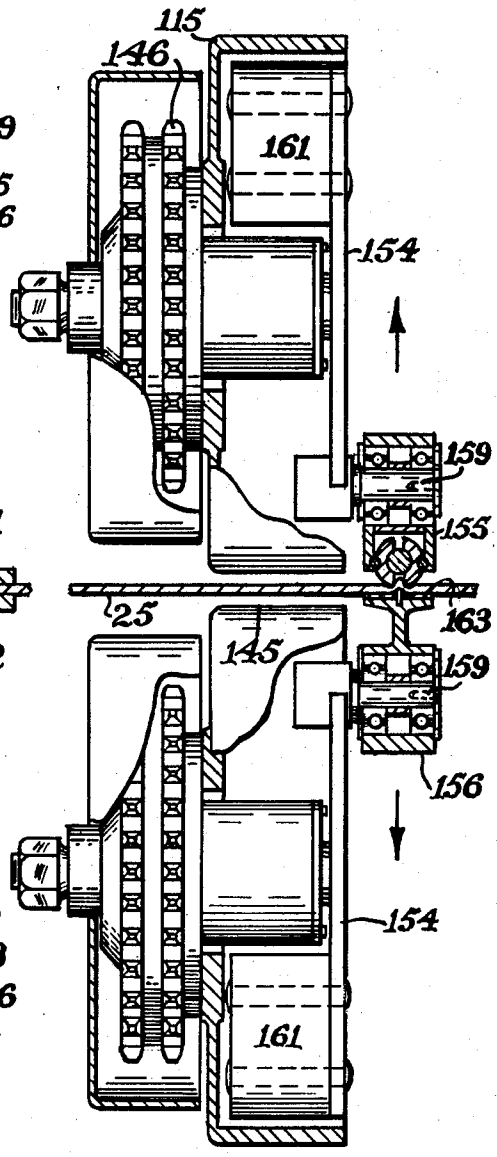

Fig. 5.

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METHOD AND APPARATUS FOR CREASING BLANKS

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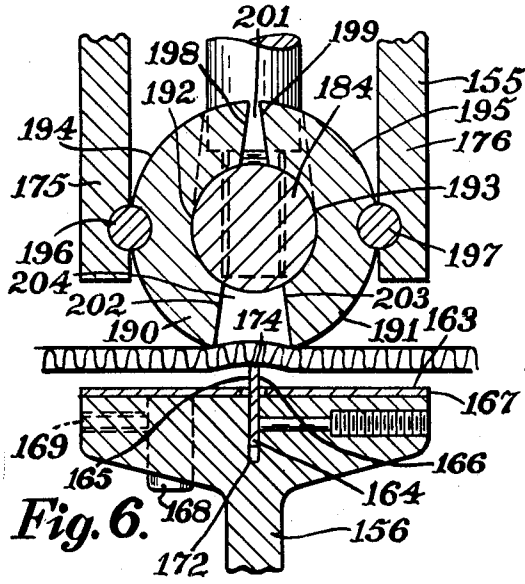

Fig. 6.

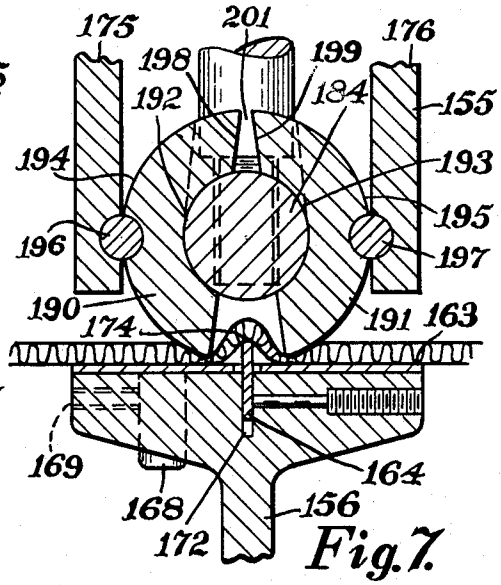

Fig. 7.

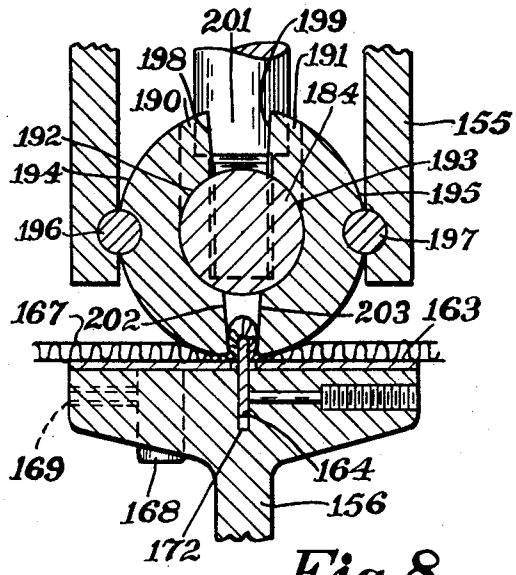

Fig. 8.

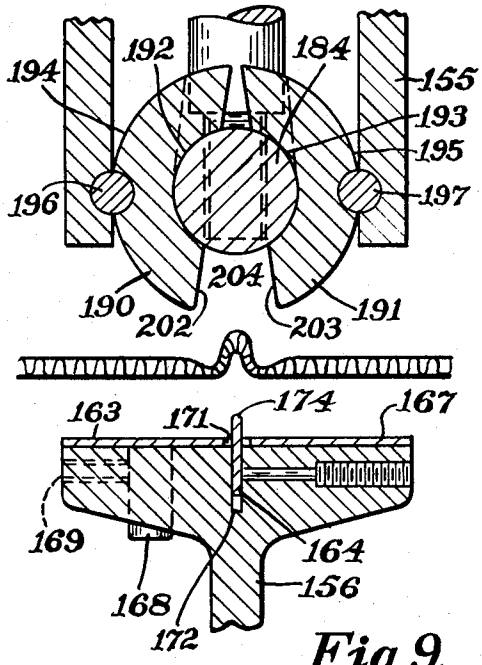

Fig. 9.

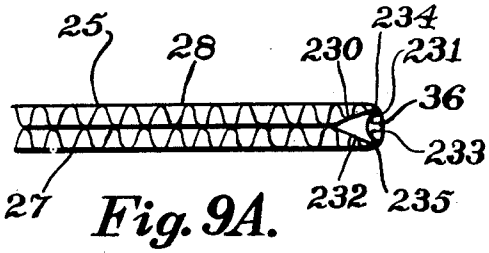

Fig. 9A.

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METHOD AND APPARATUS FOR CREASING BLANKS

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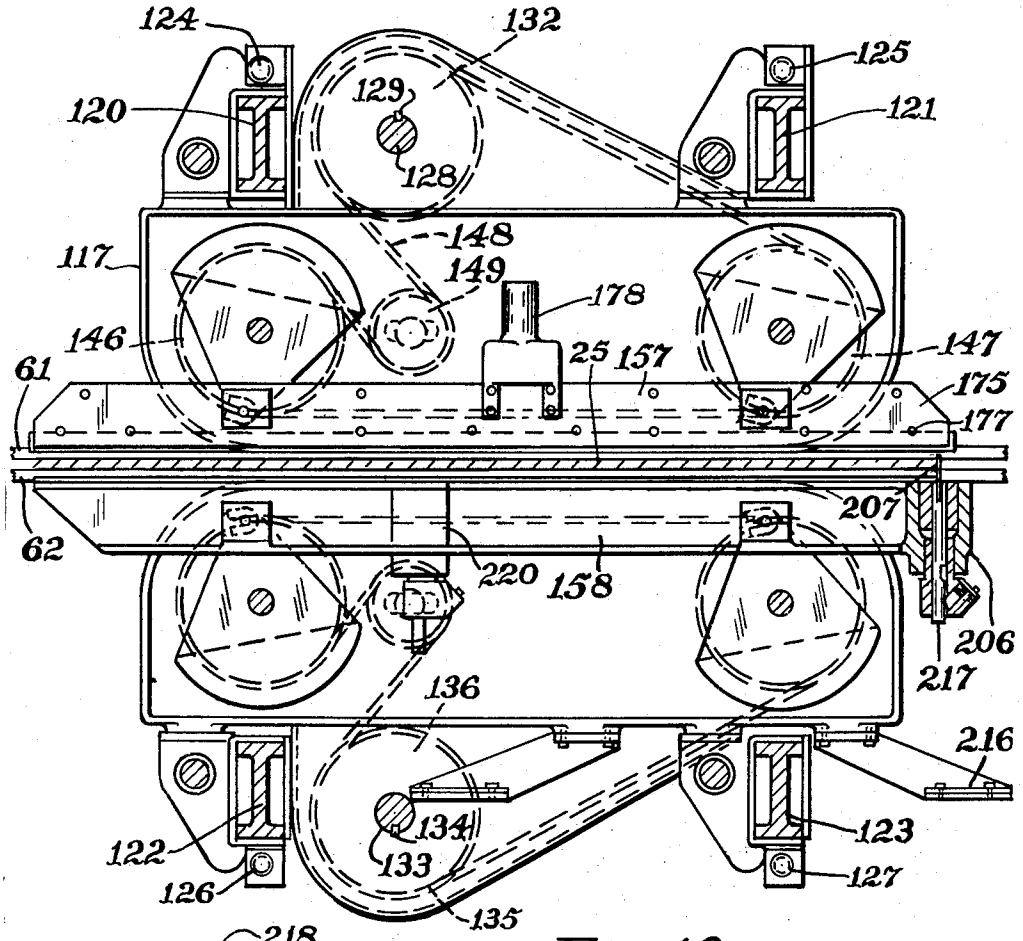

Fig. 10.

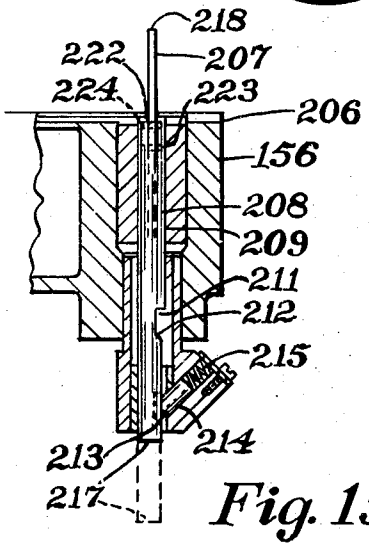

Fig. 15.

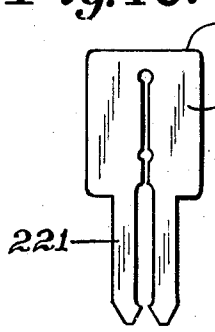

Fig. 15A.

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METHOD AND APPARATUS FOR CREASING BLANKS

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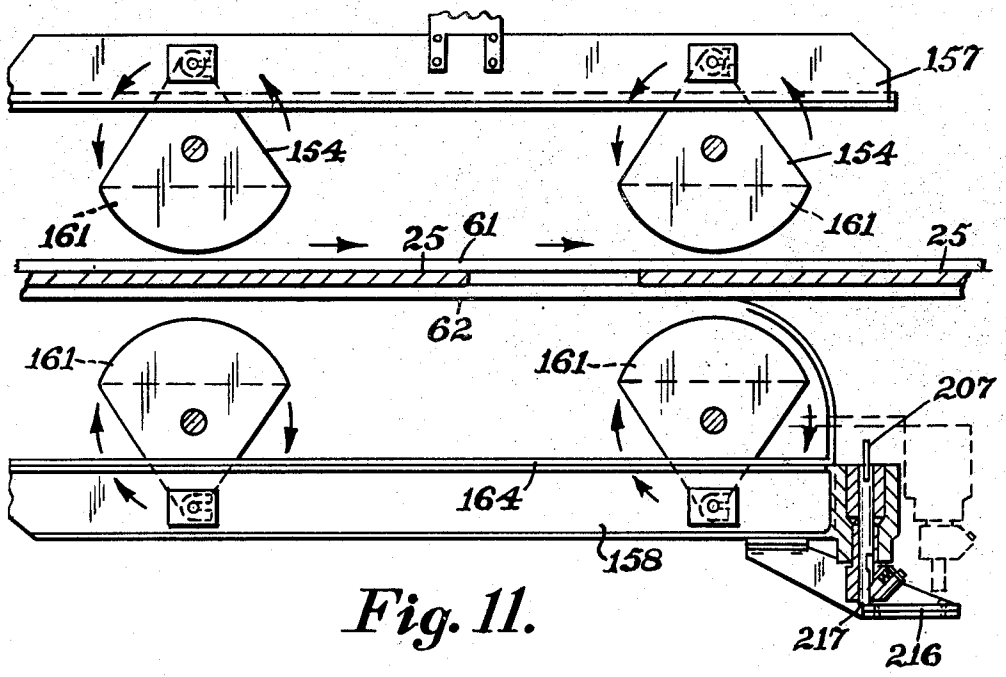

Fig. 11.

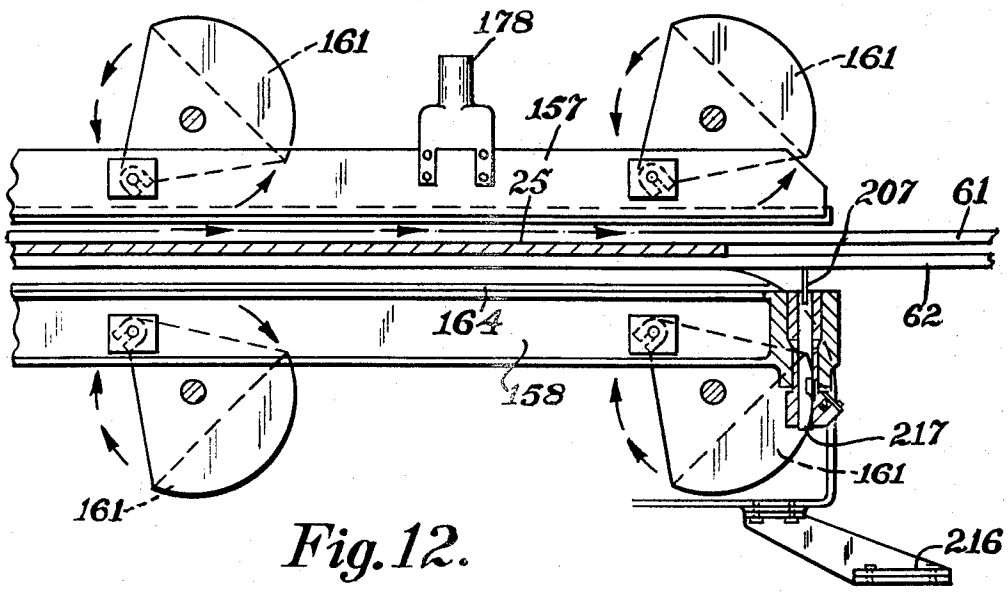

Fig. 12.

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METHOD AND APPARATUS FOR CREASING BLANKS

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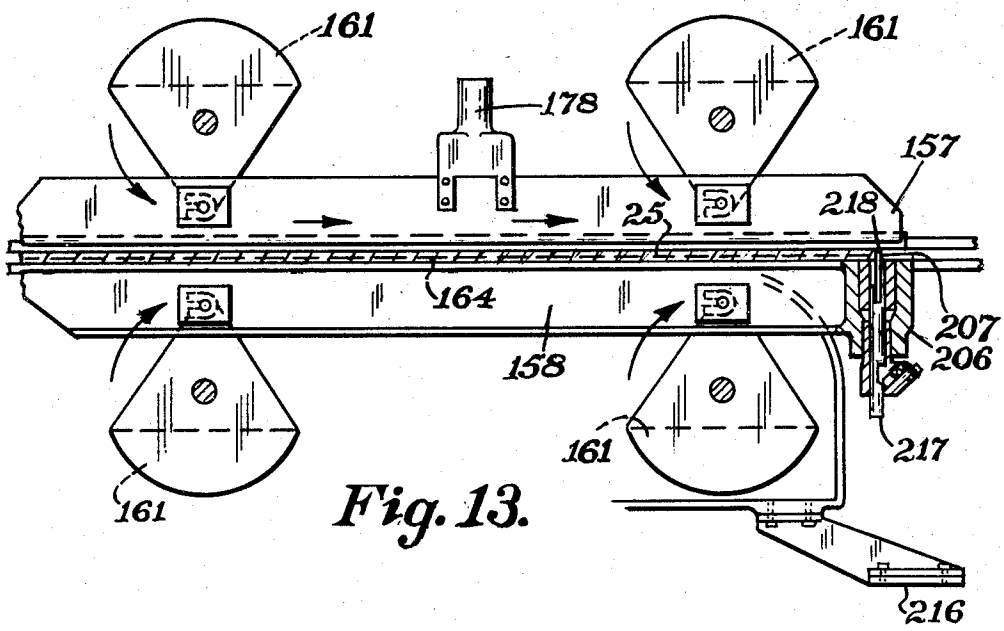

Fig. 13.

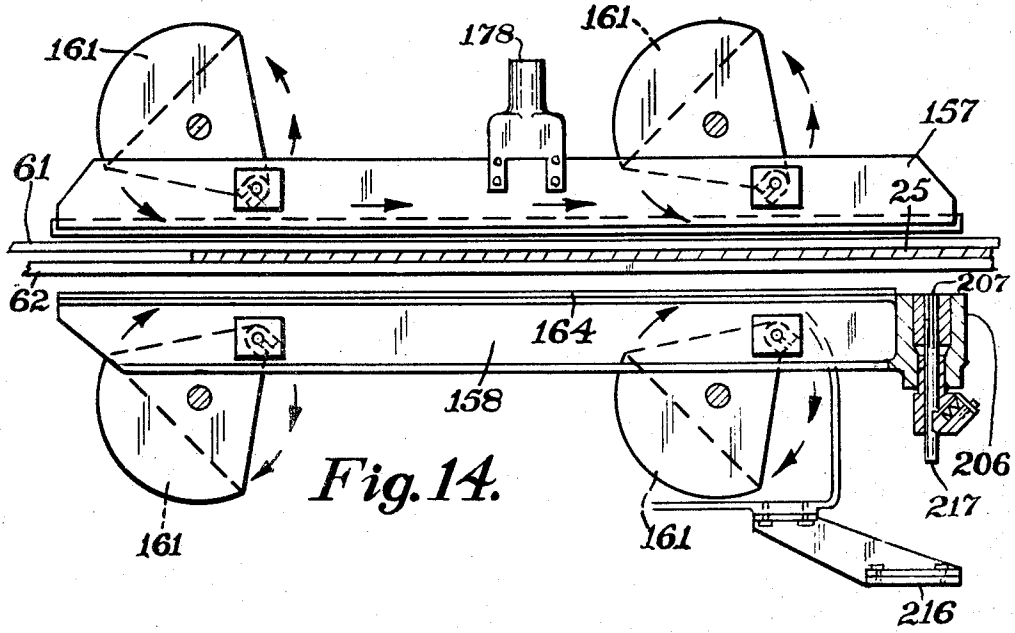

Fig. 14.

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METHOD AND APPARATUS FOR CREASING BLANKS

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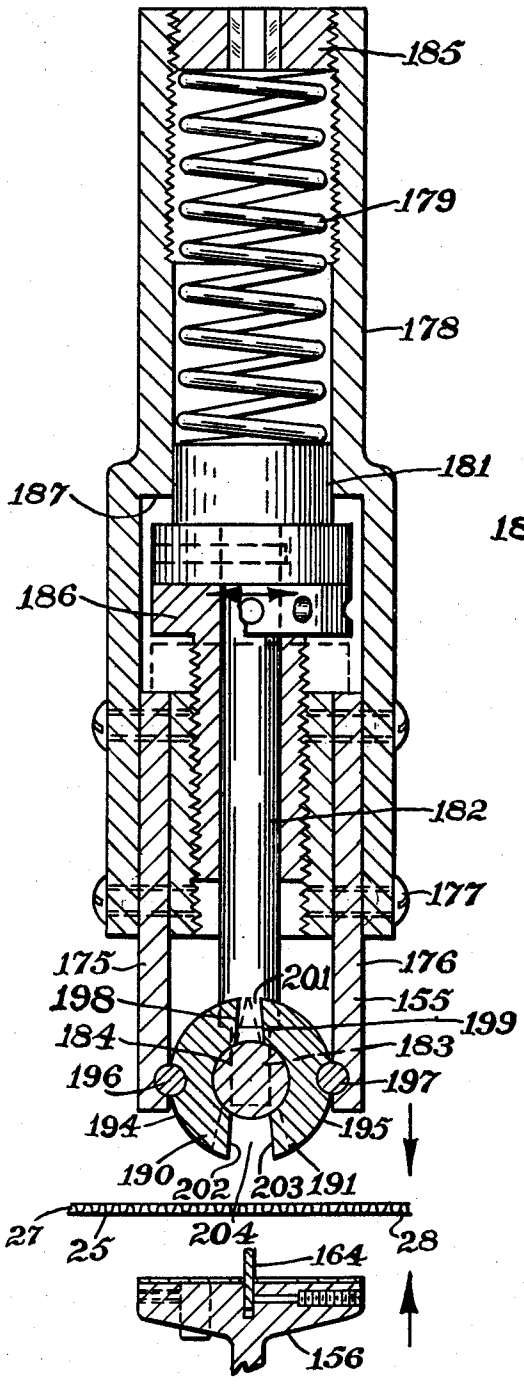
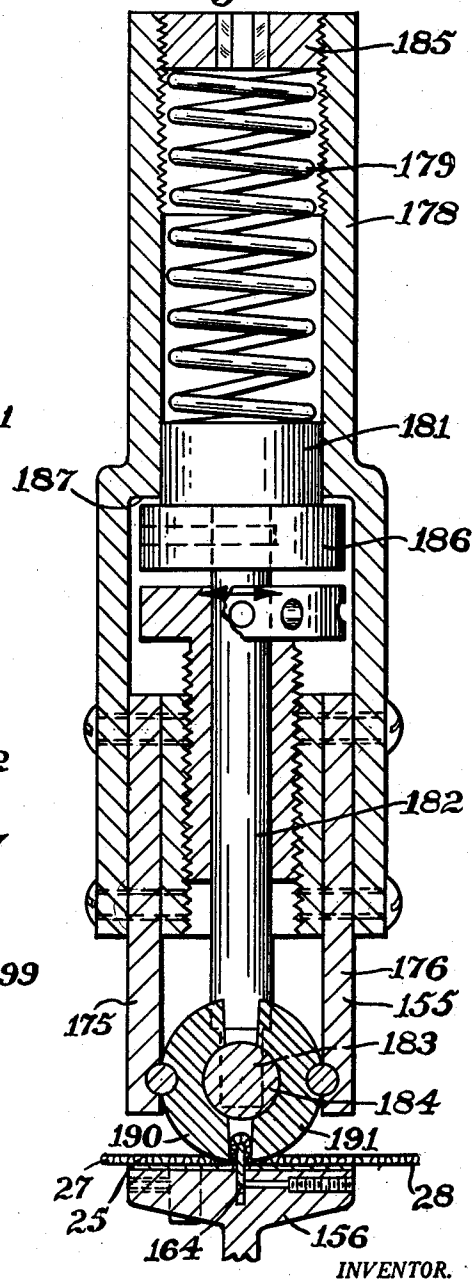


Fig. 16.

Fig. 17.



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United States Patent Office 2,949,066 Patented Aug. 16, 1960

2,949,066

METHOD AND APPARATUS FOR CREASING BLANKS

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Filed Jan. 20, 1958, Ser. No. 709,977

15 Claims. (Cl. 93—58.3)

This invention relates to an improved method and apparatus for accurately creasing corrugated paperboard in the making of folding corrugated paper boxes.

In the prior art it has been proposed to crease card board or corrugated board by means of pairs of opposed creaser bars of rigid material rotating or oscillating in parallelism along the path of advancing box blanks. In U.S. Patent 1,772,785 to Smith of August 12, 1930, such creaser bars are proposed for applying both lateral and longitudinal creases to a continuous web of card board or to abutting blanks of card board. To avoid undesirable lateral strains on the web or blanks, or other difficulties, the longitudinal crease lines are applied along parallel longitudinal lines but alternately rather than simutaneously. The surface speed of the creaser bars is the same as the speed of advance of the card board, or abutting blanks, so that the creasing may be performed without any, or any appreciable, slipping or other harmful effect upon the blank.

In U.S. patent to Unger of October 11, 1932, such creaser bars are proposed for use on corrugated board, rather than ordinary card board, and for use with longitudinally spaced box blanks rather than with a continuous web of material. Registration chains, having spaced lugs, are provided for advancing the blanks positively and the creaser bars, blanks and registration lugs advance at a uniform speed during creasing with no slippage of the blanks.

The creasing method and apparatus of this invention departs from the teaching of the prior art in advancing spaced, corrugated box blanks by friction belt carriers traveling at a predetermined speed while securing accurate registration of each successive blank by inducing slippage thereof relative to the carrier belts. Thus the carriers travel at a uniform speed but the blanks are temporarily retarded to the slower surface speed of the creaser bars and then released from the creaser bars to resume the speed of the carriers.

The principal object of the invention is to provide a creasing method, and a creasing apparatus, which successfully pinch, crimp, or bead creases spaced blanks of corrugated paperboard while such blanks are advancing in untimed, relation at relatively high speed between friction belt carriers.

Another object of the invention is to temporarily register each successive blank just before it is creased even though the blanks continue advancing along a path through the creasing zone of the machine. Such re-registration squares the carton blank just prior to creasing to insure absolute accuracy.

Another object of the invention is to provide high speed, rotary pinch bar creasers which instantaneously and simultaneously crease parallel longitudinal lines in advancing blanks with the blanks at zero velocity relative to the creaser bars thereby eliminating scuffing or abrading which weaken the blank.

A further object of the invention is to provide registration means on a pair of rotating creaser bars which

accurately locates each successive blank on the bars regardless of their spacing and then retracts out of the way of the blanks after creasing.

Still another object of the invention is to provide pinch creasing mechanism on a pair of rotating creaser bars which creates an inverted U-shaped rib crease in corrugated paper stock without fracturing, scarring or cutting the liners or flutes thereof.

A still further object of the invention is to provide a method and apparatus for creasing corrugated paperboard wherein parallel longitudinal creases are applied simultaneously with no lateral strain on the stock and wherein slippage of the blanks relative to the blank carriers produces beneficial, rather than harmful, effects.

Other objects and advantages of the invention will be apparent from the claims, the description of the drawings and from the drawings in which:

Fig. 1 is a plan view of creasing apparatus in accordance with the invention.

Fig. 2 is a side elevation of the device in section on line 2—2 of Fig. 1.

Fig. 3 is an end elevation on line 3—3 of Fig. 2.

Fig. 3A is a somewhat diagrammatic side elevation of the variable pressure mechanism on the carrier belts in the creasing zone of the invention.

Figs. 4 and 5 are enlarged, fragmentary, detail views of the creaser bar mechanism of the invention in creasing and non-creasing position.

Figs. 6–9 are further enlarged detail views of the improved pinch creaser mechanism carried by the creaser bars in various stages of operation.

Fig. 9A is an enlarged diagrammatic view of the crease achieved by the creaser means of the invention.

Fig. 10 is an enlarged fragmentary side elevation of the creaser bar mechanism.

Figs. 11–14 are somewhat diagrammatic views similar to Fig. 10 showing the cycle of operation of the creaser bars.

Fig. 15 is an enlarged detail view, in section, showing the registration means carried by one of the creaser bars, and

Fig. 15A is a front elevation of one of the removable barrier members of the registration means of the invention.

Figs. 16 and 17 are enlarged views similar to Figs. 6–9 showing the adjustment mechanism for the pincer blades of the creaser bars.

In the drawings only the creasing zone **63** of a machine for making folding corrugated boxes is illustrated in detail, the feeding zone **18** and the folding zone **19** being shown only fragmentarily since they are not essential to an understanding of the invention.

The creasing apparatus of the invention is mounted on the frame **20** of the machine and frame **20** includes side frame pieces **21** and **22** connected by transverse frame members such as at **23**. At the left of Fig. 2 a portion of the feed zone is illustrated including a stack **24** of identical box blanks of corrugated paperboard such as **25**.

Each blank such as **25**, as best shown in Fig. 1, includes side wall panels **26**, **27**, **28** and **29** and a glue flap **30** all defined by the lateral fold lines **32** and **33** and the longitudinal fold lines **35**, **36**, **37** and **38**. Box bottom flaps **40**, **41**, **42** and **43** and box cover flaps **44**, **45**, **46** and **47** are defined by the central slits **50** and **51** and the outer slits **52**, **53**, **54** and **55**. The blanks **24**, to be creased by the apparatus of this invention, may be preformed, as shown, with the crease or fold lines at **35** and **37**, or with lines **35** and **37** uncreased, but in any case, the apparatus is designed to form an accurate, straight, longitudinal crease along lines **35** and **37** to assure the accurate folding of the blank into a collapsed tubular box along these lines.

It will be understood that corrugated paperboard, unlike ordinary card board or paperboard, is fluted and of substantial thickness. It is also used principally for large size containers whereby the blanks may be five or six feet or more in width although sometimes only one or two feet in longitudinal dimension. For example, in the blank **25**, the fold lines **35** and **37** are formed in a relatively narrow web of the material and when the panels **40**, **26** and **44** and the panels **43**, **29** and **47** are overfolded inwardly to form a box, at high speed, misaligned corrugated flutes, air resistance or the twist effect of folder belts may tend to misalign the fold on lines **35** and **37** unless that fold is on a well defined crease line. The ordinary crease produced by conventional creaser rolls is not satisfactory for the purpose but the method and apparatus of this invention has proved to successfully apply a well defined, linear, longitudinal crease simultaneously to the lines **35** and **37** of successive, spaced blanks upon which the panels may be folded inwardly in unusually accurate alignment.

As shown in Fig. 2 the flat blanks such as **25** are advanced individually and successively, in longitudinally spaced apart relation, from the bottom of stack **24** under the adjustable gate **56** and into the nip **57** of opposed feed rolls **58** and **59**. The spaced blanks are then advanced into the nip **60** of a pair of upper and lower endless belt carriers **61** and **62** for frictional advance thereby along a path through the creasing zone **63** of the machine.

The upper carrier belt **61** is trained around the pulley **64**, on a lateral shaft **65**, and thence around suitable idler and tension pulleys such as **66** and **67** and under spaced pressure rolls **68** carried by an elongated roll supporting member **69**. Similarly the lower carrier belt **62** is trained around the pulley **71**, on a lateral shaft **72** and thence over spaced pressure rolls **73** carried by an elongated roll supporting member **74**. The carrier belts **61** and **62** extend the full length of the machine through the creasing zone **63** and thence through the succeeding glueing, folding, or other treatment zones not shown, and the carrier belts are located in the central, vertical, longitudinal plane of the machine in alignment with the central slits **50** and **51**. Because of the unusually well defined creases simultaneously applied along lines **35** and **37** by the creaser apparatus of this invention, it is possible to fold the blanks into boxes while being carried only by a single set of central upper and lower belts without the blanks twisting out of longitudinal alignment during the folding operation.

The upper roll supporting member **69** is coextensive longitudinally with the upper carrier belt **61** and is supported by lugs such as **75** and **76** pivotally connected to levers such as **77** and **78** pivoted to depending frame pieces such as **79** and **80**. A rotatable shaft **82** is coextensive with belt **61** and includes eccentrics such as **83**, turnable in cages such as **84** and arranged to raise and lower levers **77** and **78** when the shaft is turned by a worm gear connection **85** and lateral shaft **86**. Thus the upper presser rolls **68** may be raised or lowered in the creasing zone and, in fact, along the full length of the machine, simultaneously to accommodate blanks of various thickness and to positively and unyieldably exert the desired downward pressure on the upper carrier belt **61**.

The lower roll supporting member **74** is also coextensive longitudinally with the carrier belts **61** and **62** but the individual pressure rolls such as **73** in the creasing zone are mounted on bell crank levers such as **87** centrally pivoted as at **88** to member **74**. The lower ends of each bell crank lever **87** are bifurcated to straddle a longitudinally extending rod **92** mounted to slide forwardly and rearwardly parallel to the paper line.

A collar **89** is fixed to rod **92** on one side of each lever **87** and a collar **90** is fixed on the opposite side thereof with a spring **91** between the collar and the lever. Thus when the rod **92** actuates the levers **87** to increase pressure of the carrier belts the resulting pressure is uniform and in accordance with the predetermined constant pressure of the coil springs **91**.

As best shown in Fig. 2 and Fig. 3A, rod **92** is actuated by a short crank arm **93** on lateral shaft **94**, shaft **94** being actuated by a long spring loaded crank arm **95** having a roller cam follower **96** thereon. Follower **96** is actuated by cam **97** on shaft **98** and stub shaft **98** is rotated by the gear **99**.

The pressure applied by the pivoted lower presser rolls **73** in the creasing zone is thus alternately increased and decreased in synchronism with the operation of the creaser apparatus to be described hereafter and with the speed of the carrier belt apparatus. As shown in Fig. 2, the gear reducer **101**, powered by the longitudinal drive shaft **102**, in turn powers lateral shaft **103** carrying sprocket **104**. Sprocket **104** through chain **105** drives sprocket **106** on lateral shaft **72**, the shaft **72** carrying lower carrier belt pulley **71** and a gear **108**. Gear **108** is enmeshed with a gear **109** on the lateral shaft **65** which carries the upper carrier belt pulley **64**. Gear **108** is also enmeshed with the gear **99** of the presser roll mechanism and with gear **111** which drives gears **112** and **113** of the feed rolls **58** and **59**. The mechanism indicated at **114** is part of the feed mechanism of the machine and is described in detail in my co-pending application thereon, Serial No. 698,868 filed November 25, 1957, now U.S. Patent No. 2,912,239.

The creaser means of the invention includes a pair of upper and lower creaser sub frames **115** and **116** on one side of the central carrier belts **61** and **62** and another pair of upper and lower creaser sub frames **117** and **118** on the other side of the central carrier belts **61** and **62**. The sub frames **115**, **116**, **117** and **118** are laterally slideable on transverse tracks **120**, **121**, **122** and **123** (Fig. 10) and are movable thereon by threaded rods such as **124**, **125**, **126** and **127** operable from the side of the machine. An upper drive shaft **128**, having a keyway **129**, extends laterally across the machine and through the upper sub frames **115** and **117**, there being a drive sprocket such as **131** and **132** in the upper portion of each sub frame, keyed to the shaft for rotation in any transverse position of the sub frame. A lower drive shaft **133**, having a keyway **134**, extends laterally across the machine for driving the keyed sprockets **135** and **136** in the lower portion of lower sub frames **116** and **118** in a similar manner. Shaft **133** carries a gear **150** meshed with a gear **141** carried by stub shaft **130**. As best shown in Fig. 2 the transverse keyed drive shaft **128** and the stub shaft **130** carry sprockets **137** and **138**, outside frame **21** and driven by the chain **139** from a gear reducer **140** powered by main drive shaft **102**. Chain **139** is trained around a tension pulley **142** and the upper creaser frames **115** and **117** are movable in a vertical plane by turn screws such as **143** and **144** for adjusting the height thereof above the paper line **145** in accordance with various thicknesses of blanks.

Within each sub frame such as **117** the keyed drive sprocket such as **132** drives a pair of sprockets **146** and **147**, by means of a silent type chain **148**, there being a tension sprocket **149** for the chain. Each sprocket such as **146** is fast on a stub shaft **151** journalled in the sub frame in suitable bearings **152** and **153** (Fig. 4). Each shaft **151** carries a driver member **154** having one of the creaser bars such as **155**, **156**, **157** or **158**, rotatably supported by a pin **159** near the periphery thereof. A counterweight **161** is mounted on each driver member **154** diametrically opposite to each pin **159**. Suitable bearings **162** are provided near the opposite ends of each creaser bar for the pins **159** and the upper and lower creaser bars are moved, in parallelism, in orbital paths toward and away from each other as shown in Figs. 11–14.

The two lower creaser bars **156** and **158** are identical and each includes a flat planar, upper face **163** having a single straight upstanding, elongated blade, or die, member **164**, centrally located thereon, the blade **164** having vertical parallel side faces **165** and **166**. As shown in

Figs. 6–9 the horizontal face **163** is preferably formed on a detachable plate **167** having depending integral pins such as **168** held in place in the bar **156** by suitable set screws **169**. The blade **164** fits in a slot **171** in plate **167** and in a groove **172** in bar **156** there being a set screw **173** for adjusting the height of the upper edge **174** above the face **163**. The upper edge **174** of blade **164** is preferably slightly rounded along the corners as shown.

The two upper creaser bars **155** and **157** are also identical and each includes a pair of side plates **175** and **176** connected by bolts such as **177** and each upper bar also includes a central, upstanding tubular element **178** (Fig. 16). Element **178** contains a coil spring **179** bearing against the head **181** of a piston **182**, the lower end **183** of piston **182** being fixed to an elongated rod or cylindrical guide **184** of circular cross section extending the full length of the creaser bar. A threaded cap **185** is provided to adjust the pressure of coil spring **179** and a threaded collar **186** is provided to cooperate with the internal shoulder **187** in adjusting the stroke of the piston. Each upper creaser bar **115** and **117** includes a pair of parti-circular pincer blades **190** and **191**, the internal arcuate faces **192** and **193** thereof slideably engaging the exterior face of rod **184** for movement therearound in a circular path, concentric with the axis of the rod. The exterior arcuate faces **194** and **195** of each parti-circular blade **190** and **191** are pivotally connected intermediate thereof to the adjacent side plate **175** or **176** by a longitudinal pivot pin **196** or **197**. In non-creasing position shown in Figs. 4, 6 and 16 the upper side edge faces **198** and **199** of blades **190** and **191** form an open slot **201** which converges outwardly while the lower side edge faces **202** and **203** thereof form an open slot **204** which diverges outwardly.

It will be understood that the two upper creaser bars **155** and **157** and the two lower creaser bars **156** and **158** rotate in unison in the direction of the arrows (Figs. 11–14) to simultaneously apply a linear pinch crease along the longitudinal fold lines **35** and **37** of each successive blank **25** advanced through the creasing zone **63** by the friction carrier belts **61** and **62**. Registration means **206** is provided on the lower creaser bars **156** and **158** which operates even though the blanks continue advancing along the paper line of the machine.

As best shown in Fig. 15, registration means **206** includes a barrier member **207** having an actuating rod **208** axially slideable in a vertical hole **209** in a bar such as **156**. A plunger notch **211** is located in rod **208** having a face **212** inclined at about 45° to engage a corresponding face **213** of the plunger **214**. Plunger **214** is spring loaded by spring **215** to exert a continuous downwardly inclined frictional pressure on the rod **208** to maintain the rod in barrier or non barrier position. A buffer plate **216** is provided on each lower sub frame **116** and **118** proximate the lower portion of the path of the lower tip **217** of each rod **208**. The barrier members **207** are located at the ends of the creaser bars **156** and **158** and, as shown in Fig. 11, are moved upwardly into blank intercepting position at the bottom of the stroke of the lower creaser bars when the lower tip **217** of each rod **208** strikes the fixed buffer plates such as **216**. The barrier members **207**, as shown in Fig. 12 rise above the paper line into the space between blanks to bar the advance of each successive blank being advanced by the belts **61** and **62** at a predetermined uniform surface speed. The creaser bars, however, while advancing temporarily in the same direction as the blanks during creasing, are travelling at a lesser predetermined surface speed. At this time the lower pressure rolls also temporarily release their pressure on the lower carrier belt **62** to temporarily assist the slippage of the blanks being creased relative to the belts. Thus each blank **25** is advanced by the belts up to the rotating barrier members **207** on the lower creaser bars **156** and **158** whereupon the blank is registered with the creaser bars and advances at the surface speed of the creaser bars while the carrier belts temporarily slip on the blank. As shown in Fig. 13 the upper tip **218** of each barrier member **207** is engaged by the laterally aligned upper creaser bar, such as **157**, as that bar rotates downwardly into creasing engagement and the member **207** is pushed downwardly in the hole **209** against the friction exerted by plunger **214**. As the two creaser bars of each pair come together to grip and crease the blank the plunger face **213** engages the inclined face **217** of rod **208** and spring presses the rod into its full downward position with member **207** below the paper line in non-barrier position. The blank **25** is thus immediately released to the carrier belts **61** and **62** as soon as the creasing operation is completed and the creaser bars move away from each other.

A second pair of registration means **220** is preferably provided, identical with means **206**, but positioned intermediate of the length of the lower creaser bars **156** and **158**. The barrier members **207**, as shown in Fig. 15A, are bifurcated at **221** and fit within a slot **222** in the upper tip of rod **208** in order that they may be snapped on and off the transverse bolts **223** and **224** in rod **208**. The creaser bars **155**, **156**, **157** and **158** are over four feet in length and can, therefore, apply a crease of equivalent length to large size blanks run one up. With such blanks the barrier members **207** of the second registration means **220** are manually removed from their respective rods **208** to make the means inoperable. However, with blanks of less length, both registration means **206** and **220** are used and the blanks are run two up with the creaser bars creasing two blanks at a time and then releasing the same to the carrier belts.

As best shown in Fig. 6 the blanks **25**, registered on the creaser bars **156** and **158** by the barrier members **207** are supported on the top edge **174** of the single blades **164** as the upper creaser bars **155** and **157** approach creasing position. The side edge faces **202** and **203** of the pincer blades **190** and **191** are still divergent and the spring **179** resiliently and yieldably maintains such divergence. As shown in Fig. 7 the slot **204** remains divergent as the blade **164** is forced into the slot while bending the fluted cardboard into a bowed formation and while deforming and flattening the flutes of the corrugated board without tearing or cutting the liners. In Fig. 8 the parti-circular blades **190** and **191** have flattened the corrugated flutes and compressed the upper and lower liners together until the flat planar face **163** of the lower creaser bar **156**, through the liners and deformed flutes offers substantial resistance to the further advance of the blades **190** and **191**. At this point the side plates **175** and **176** continue to approach the lower creaser bar, and through the pivot pins **196** and **197** force the parti-circular blades **190** and **191** to slide in a circular path around the resiliently yieldable cylindrical rod **184** thereby tending to narrow the slot **204** and to place the lower side edge faces **202** and **203** in substantial parallelism with the parallel side walls **165** and **166** of the anvil blade **164**. A pinching action thus occurs in which an inverted U shaped crease is formed with substantially parallel legs and with the flutes of the corrugated board deformed and flattened as shown. It will be understood that the crease formed by this operation is to be used for a 180° overfold in which the hingedly connected members are parallel to each other. The U-shaped crease will be on the inside of this fold and the thoroughly deformed stock at the crease not only yields easily to the action of the folder belts but assumes the parallel position shown much enlarged in Fig. 9A to make a neat and flat corner edge useful in the stacking operation.

The angle formed by each side edge face **202** or **203** with its respective adjoining exterior arcuate face **192** or **193** is nearly 90° whereby relatively broad strips, such as **230** and **231** and **232** and **233**, of the fluted corrugated material are flattened on each side of the centre lines **234** and **235** of the resulting pinch crease. It is this characteristic of the fold accomplished by the creasers apparatus of this invention which permits the permanent, unbeaded and unfractured fold shown in Fig. 9A.

I claim:

1. A method of forming parallel, longitudinal creases in box blanks of paperboard, by the use of a pair of opposed creaser bars which comprises the steps of frictionally advancing said blanks individually and successively in spaced apart relation longitudinally along a path at a predetermined speed; rotating said creaser bars to advance along said path at less than the predetermined speed of said blanks; temporarily intercepting and registering each successive blank with said creaser bars while showing said blank to a reduced speed; simultaneously pinch creasing each said blank along parallel, linear, longitudinal crease lines while the blank is so registered with said creaser bars and so advancing at reduced speed and then releasing each said registered and creased blank from said creaser bars to resume frictional advance in spaced apart relation along said path at said predetermined speed.

2. In a machine for making paper boxes having a feed zone, a creasing zone and a folding zone the combination of frictional endless carrier means extending from said feed zone, through said creasing zone into said folding zone for advancing paper box blanks individually and successively in spaced apart relation longitudinally through said zones at a predetermined carrier speed; a plurality of pairs of upper and lower, elongated creasing bars rotatably mounted in said creasing zone, each pair adapted to form a longitudinal, linear crease in said blanks; means in said creasing zone rotating each said pair of creasing bars simultaneously into and out of engagement with each successive blank and advancing said blank at reduced speed through said creasing zone for applying parallel longitudinal linear pinch creases thereto and blank registration means on said machine, independent of said carrier means, for registering each successive blank relative to said creaser bars prior to the creasing thereof.

3. A combination as specified in claim 2 wherein said endless carrier means comprises a single pair of upper and lower carrier belts laterally positioned along the path of the centre slits in said blanks.

4. A combination as specified in claim 2 wherein said frictional endless carrier means includes mechanism for reducing the frictional engagement thereof with said blanks in said creasing zone.

5. In a machine for making paper boxes frictional endless carrier means for advancing paper box blanks individually and successively in spaced relation longitudinally along a path at a predetermined speed; rotatable creaser bar means along said path for simultaneously pinch creasing a plurality of parallel, linear, longitudinal crease lines in each said advancing means for rotating said creaser bar means at a surface speed less than said predetermined speed of said blanks and registration means, mounted on said rotatable creaser bar means, for temporarily registering each said blank just prior to the pinch creasing thereof.

6. A combination as specified in claim 5 wherein each said creaser bar means comprises a pair of upper and lower creasing bars equal in length to the length of the longitudinal fold lines of the maximum size blank to be folded on said machine and includes a plurality of said registration means longitudinally spaced along said creaser bar means whereby two or more blanks of less than half said maximum length may be registered and creased simultaneously in said machine.

7. A combination as specified in claim 5 wherein said frictional endless carrier means includes mechanism for reducing frictional blank engagement along the portion of said blank path in which said creaser bar means is positioned.

8. A combination as specified in claim 5 wherein said creaser bar means includes upper and lower creaser bars traveling in an orbital path toward and away from each other and said registration means includes a retractable blank barrier member carried by one said bar and extending toward the other said bar and mechanism for retracting said member upon the creasing engagement of said bars.

9. Corrugated box blank creasing apparatus comprising a pair of upper and lower carrier belts frictionally advancing said blanks individually and successively along a longitudinal path at a predetermined speed; a pair of rigid, longitudinally extending, creaser bars mounted to rotate in parallelism on opposite sides of said path, said bars advancing with, and pinch creasing, each successive blank along a linear, longitudinal crease line during said rotation; means for rotating said bars to advance with said blanks at less surface speed than the predetermined speed of said blanks; a blank barrier member on one of said creaser bars movable into, and out of, the path of said blanks and mechanism associated with said creaser bars, moving said barrier into said path to register each successive blank thereon as said bars converge toward each other and moving said barrier out of said path to release said blanks to said carrier belts before said bars diverge away from each other.

10. In creasing apparatus of the type having a pair of opposed, creaser bars rotating in parellelism toward and away from the path of the articles to be creased the combination of a single, straight blade centrally projecting from a flat planar face on one said bar, said blade having parallel side faces; a pair of parti-circular blades on the other said bar, each having a flat planar, side edge face normally forming an outwardly divergent slot therebetween for receiving said single blade; means on both said bars for compressing and crushing spaced parallel strips of the material of said articles on opposite sides of said single blade as said bars advance toward each other and untimed, mechanical means, automatically actuated by substantial resistance to further advance of said bars toward each other said other bar for thereafter angularly sliding said pair of blades in a circular path toward said single blade in a pinching movement until said slot faces are in substantial parallelism with each other and to the side faces of said single blade.

11. A combination as specified in claim 10 wherein said mechanical means for angularly sliding said pair of blades in a circular path includes an elongated, cylindrical rod concentrically positioned between said blades, a pair of pivot pins each connecting the intermediate exterior portion of said blades to said bar; a spring loaded rod mounted in said bar to urge said cylinder and blades resiliently outwardly against creasing pressure tending to urge said cylinder and blades inwardly relative to said bar and means for adjusting the load exerted by said spring to vary the pinch creasing effect of said creaser bar.

12. In creasing apparatus of the type having a pair of opposed creaser bars rotating in parallelism toward and away from the path of the articles to be creased, the combination of an article barrier member movably mounted on one said bar to shift from barrier position to non barrier position; means for advancing said member into barrier position with each revolution of said creaser bars and means for retracting said member into non-barrier position during each said revolution of said creaser bars.

13. A combination as specified in claim 12 wherein said barrier member includes an actuating rod axially slideable in a hole in said bar, said rod having a plunger notch intermediate of the length thereof and said retraction means includes a spring pressed plunger proximate the bottom of said hole, said plunger entering said notch when said barrier member nearly reaches non-barrier position to snap said member entirely into said non-barrier position.

14. A combination as specified in claim 12 wherein the means for moving said member into barrier position comprises an element fixed in the path of said member, when

said bars are diverging from each other, said element advancing said member into barrier position and said retraction means includes a spring loaded plunger frictionally but yieldably maintaining said member in said barrier position.

15. A combination as specified in claim 2 wherein each said creasing bar is co-extensive longitudinally with the longitudinal fold lines of the maximum size blank to be folded on said machine and each pair of said creasing bars includes a pair of said blank registration means, longitudinally spaced apart a distance equal to one half said maximum length, whereby two or more blanks of less than half said maximum length may be creased simultaneously in said machine.

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CERTIFICATE OF CORRECTION

Patent No. 2,949,066 August 16, 1960

Leon E. La Bombard

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 7, line 11, for "showing" read -- slowing --; line 52, for "advancing means" read -- advancing blank; means --; column 8, line 37, strike out "said other bar".

Signed and sealed this 31st day of January 1961.

(SEAL)
Attest:

KARL H. AXLINE
Attesting Officer

ROBERT C. WATSON
Commissioner of Patents