Dec. 15, 1964 J. J. GREVICH ETAL 3,161,001

PLASTIC BAG AND PACKAGING MACHINE

Filed May 21, 1962 7 Sheets-Sheet 1

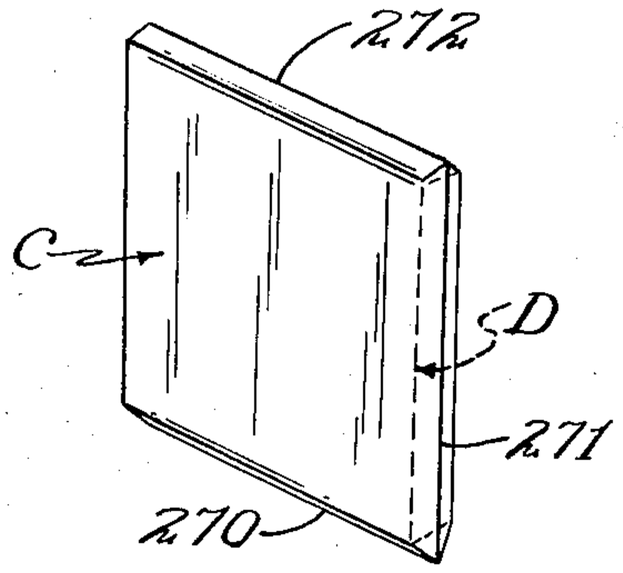


FIG. 2

FIG. 1

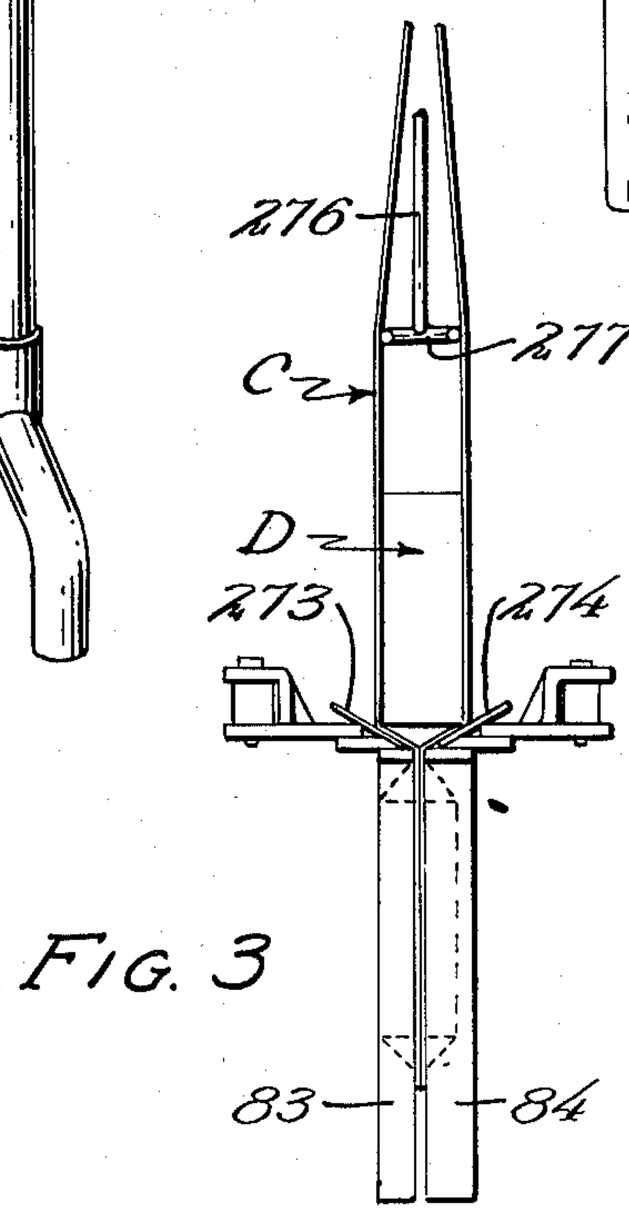


FIG. 3

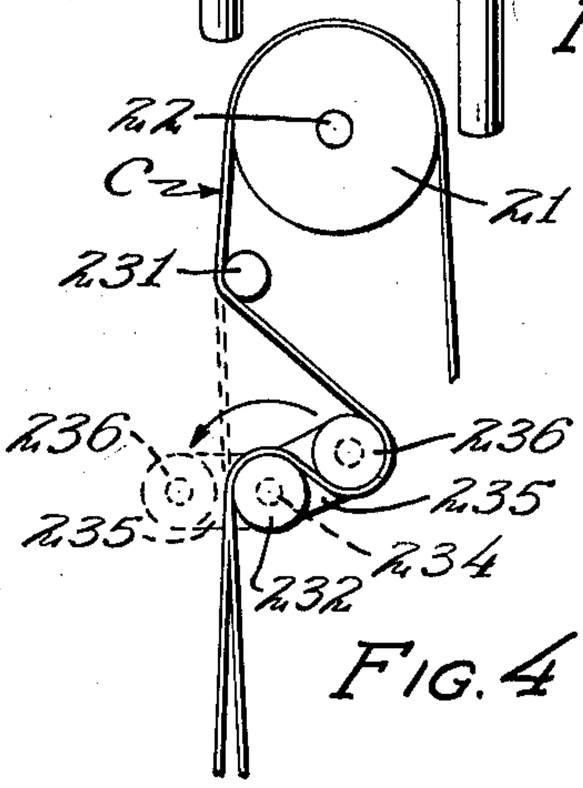


FIG. 4

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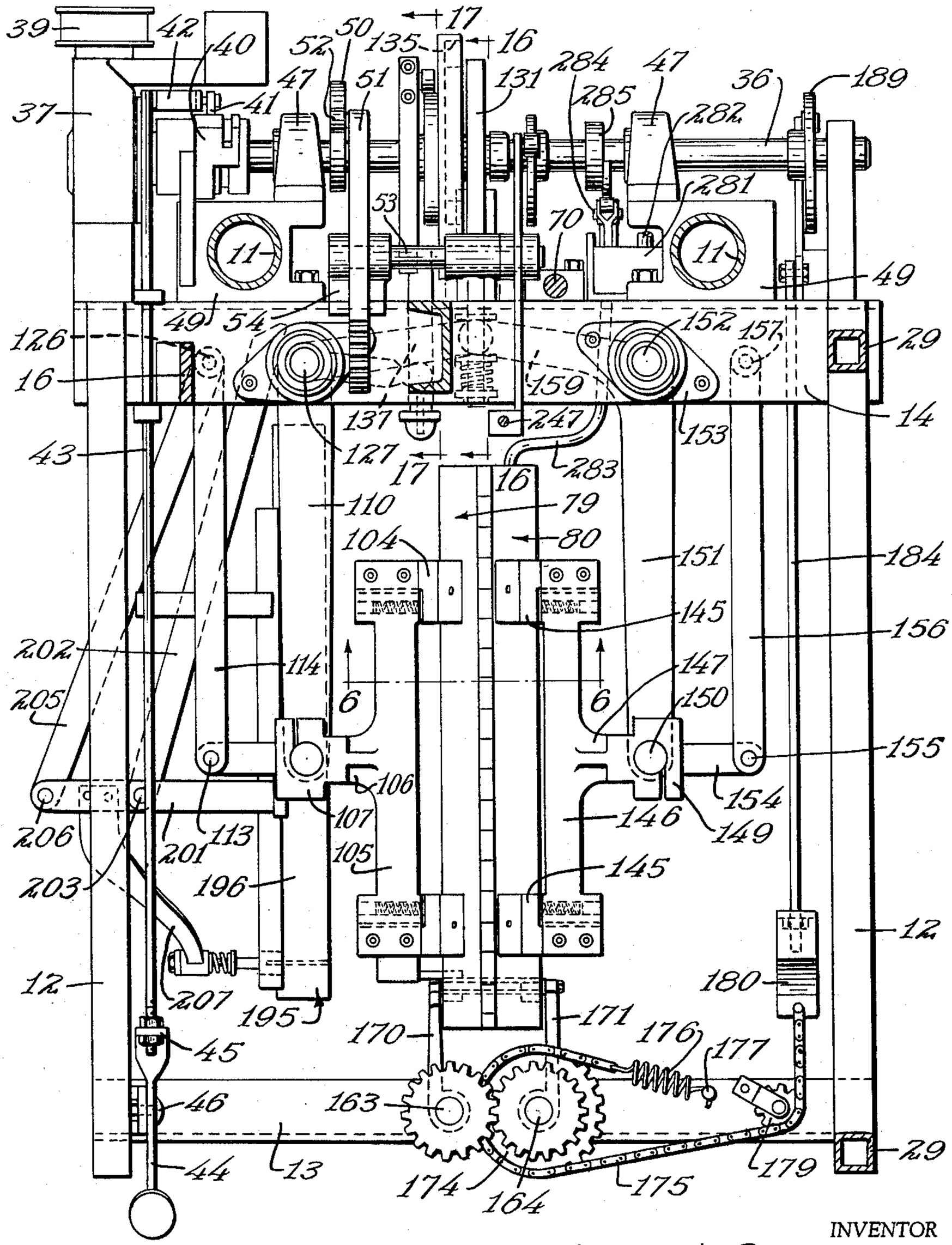


FIG. 5

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PLASTIC BAG AND PACKAGING MACHINE

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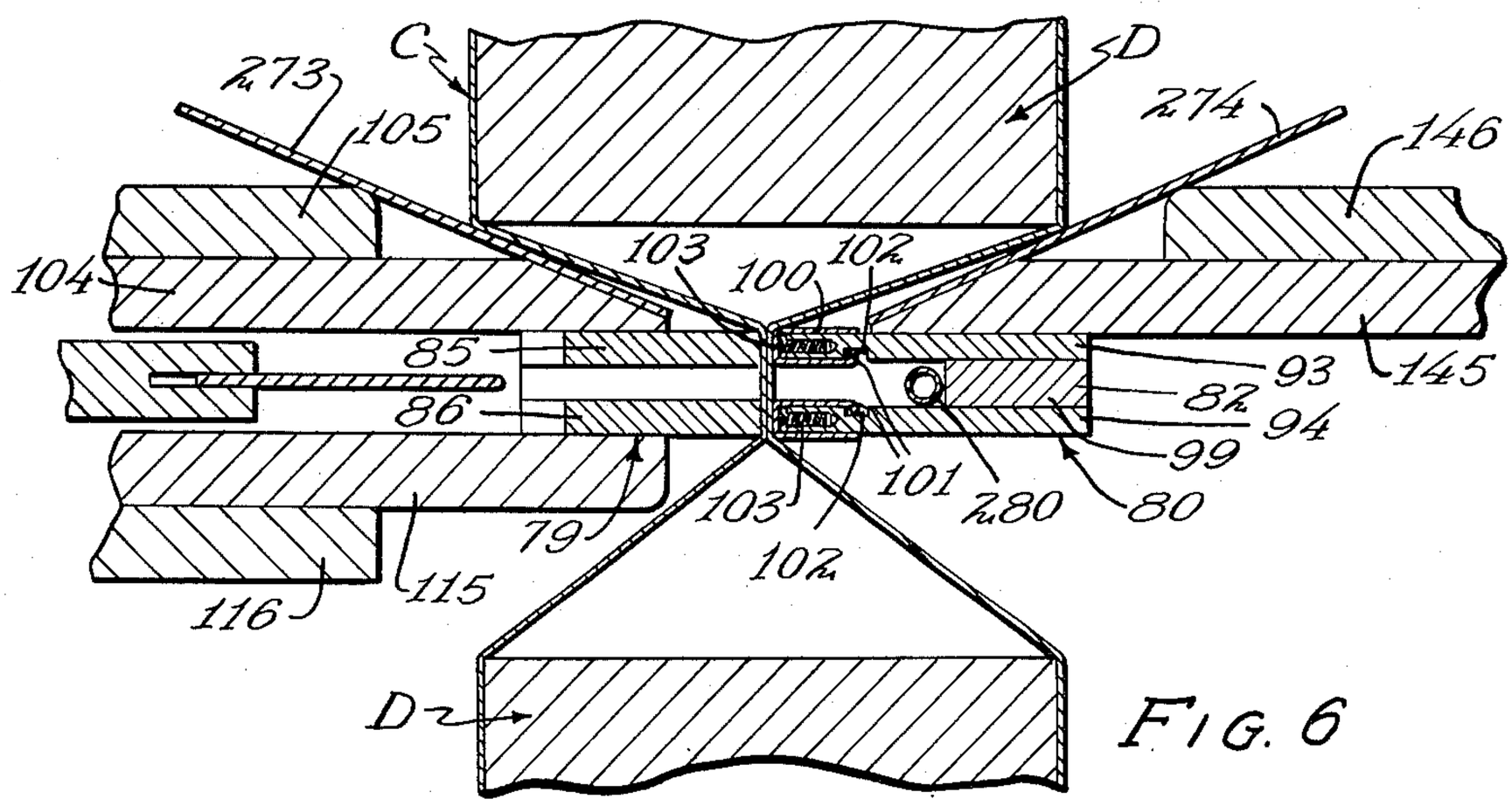


FIG. 6

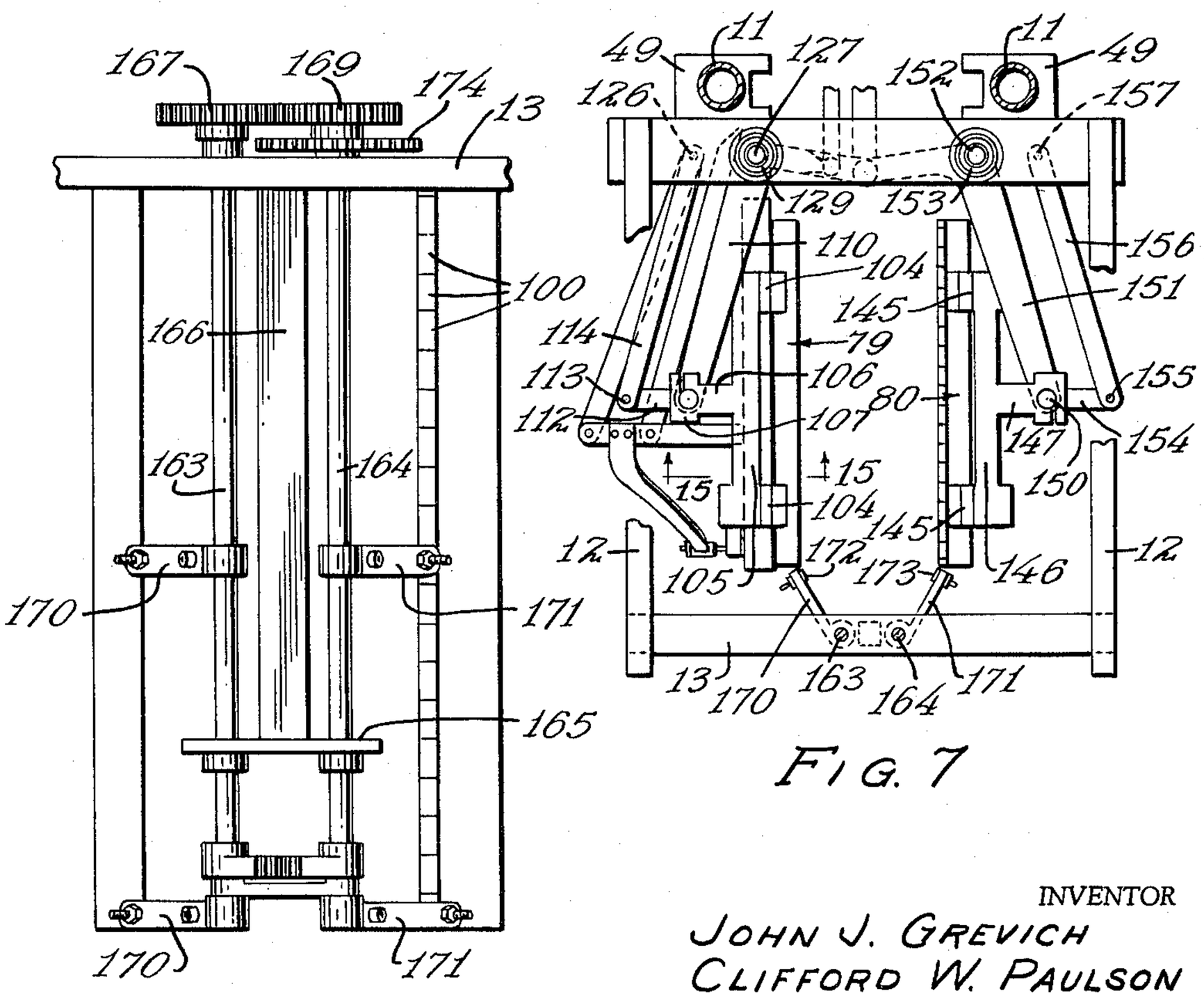


FIG. 7

FIG. 8

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PLASTIC BAG AND PACKAGING MACHINE

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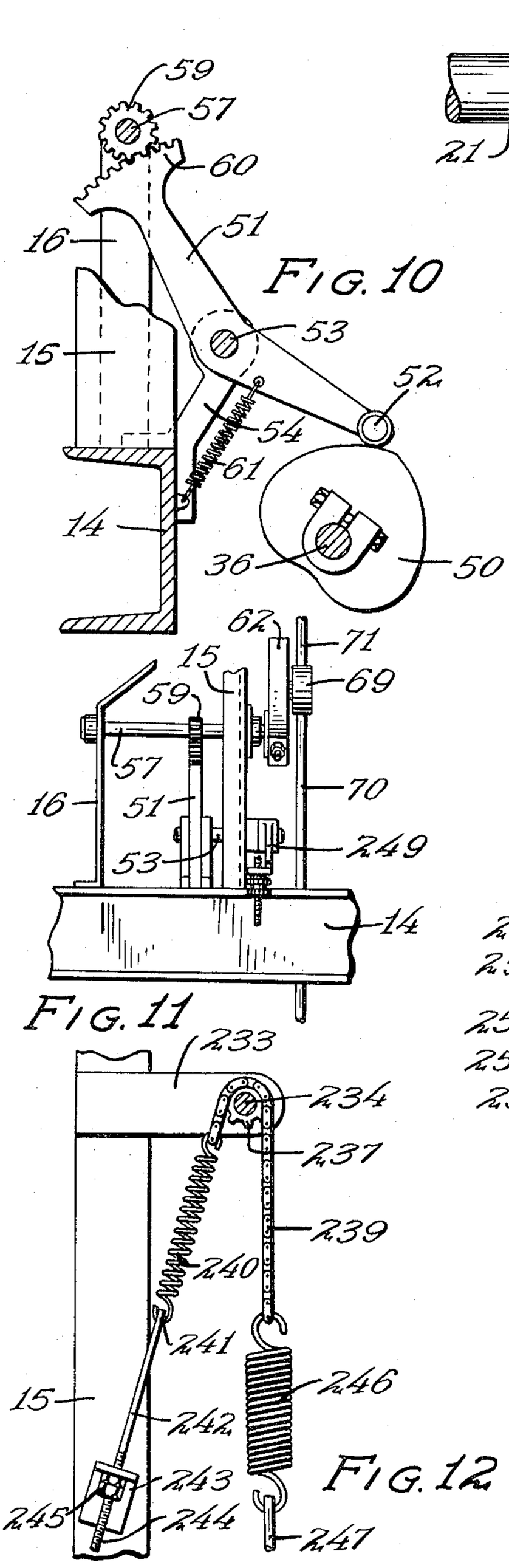


FIG. 10

FIG. 11

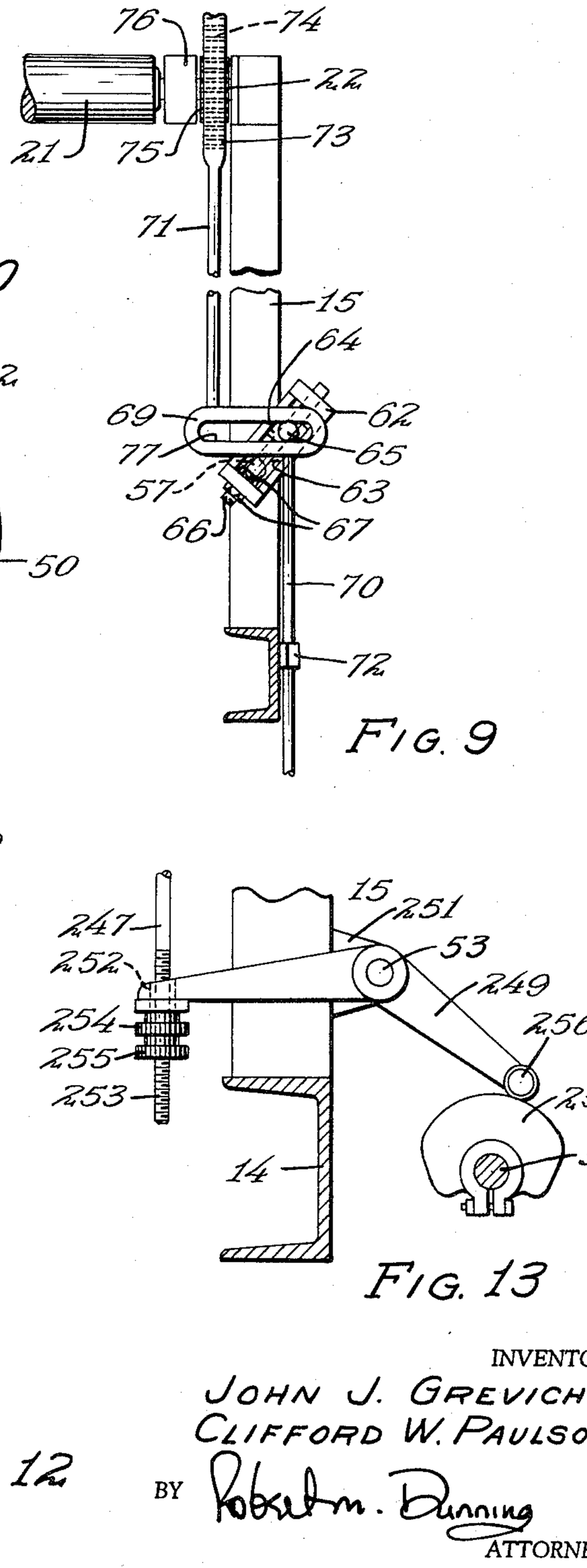


FIG. 9

FIG. 12

FIG. 13

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PLASTIC BAG AND PACKAGING MACHINE

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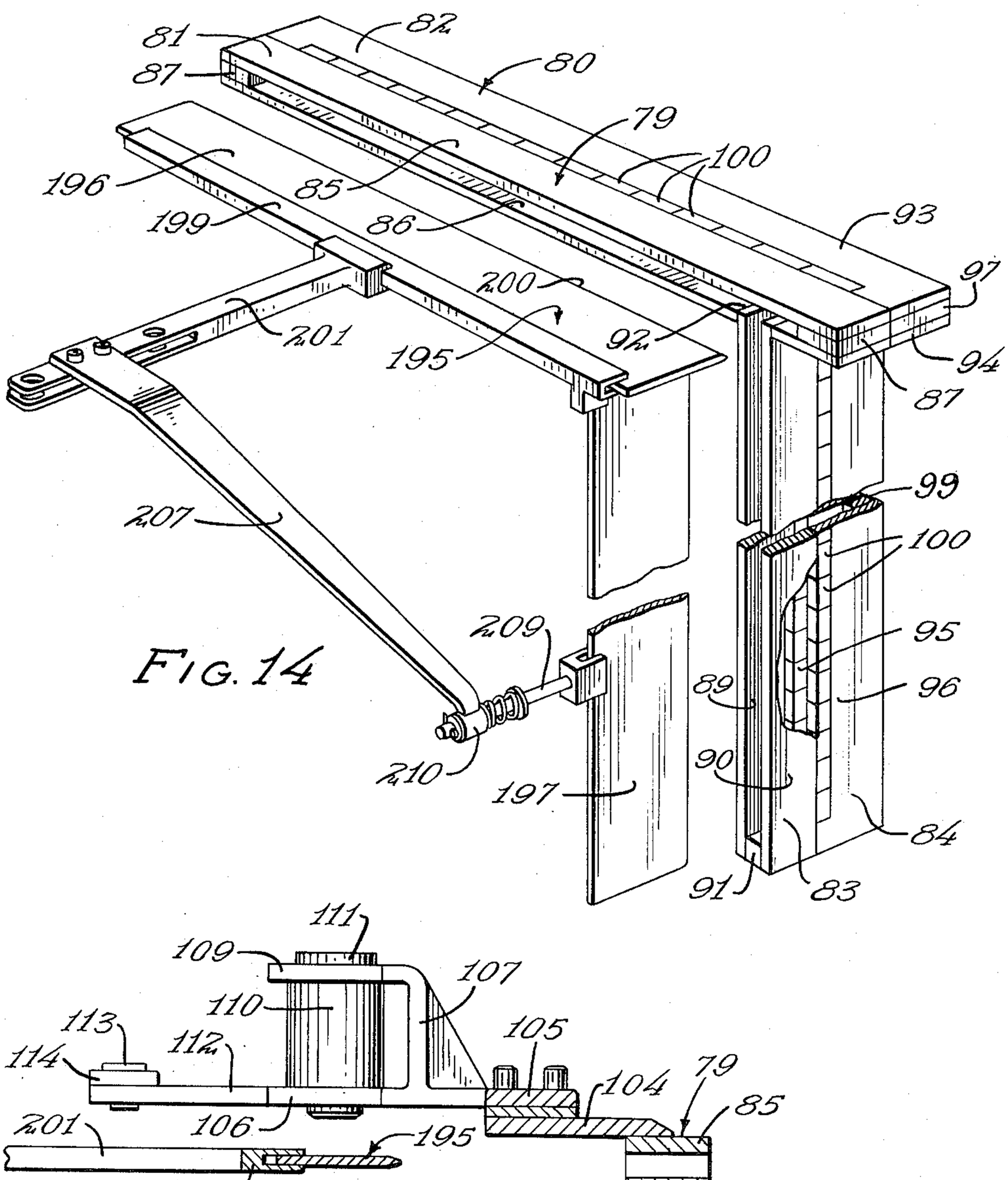


FIG. 14

FIG. 15

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PLASTIC BAG AND PACKAGING MACHINE

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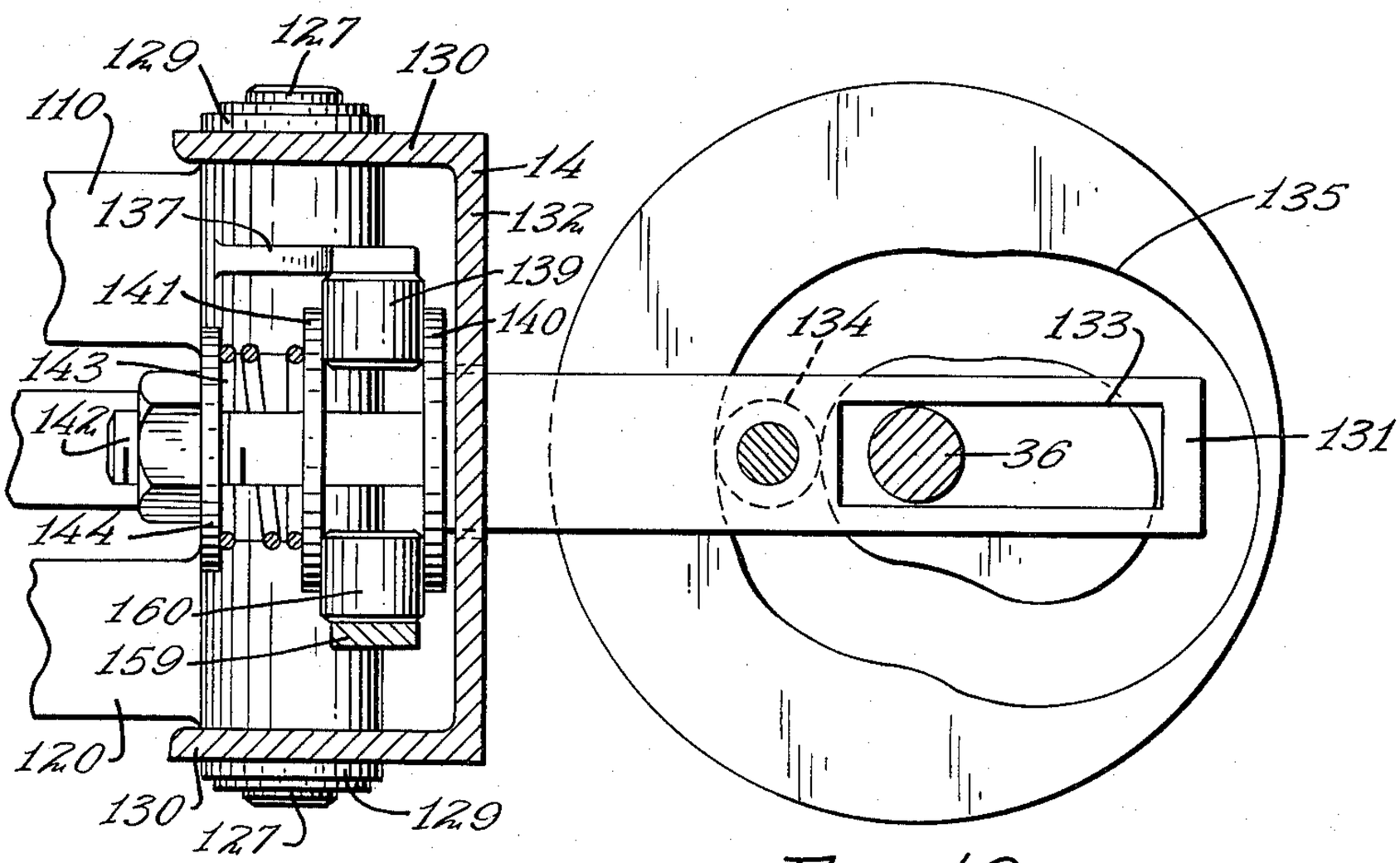


FIG. 16

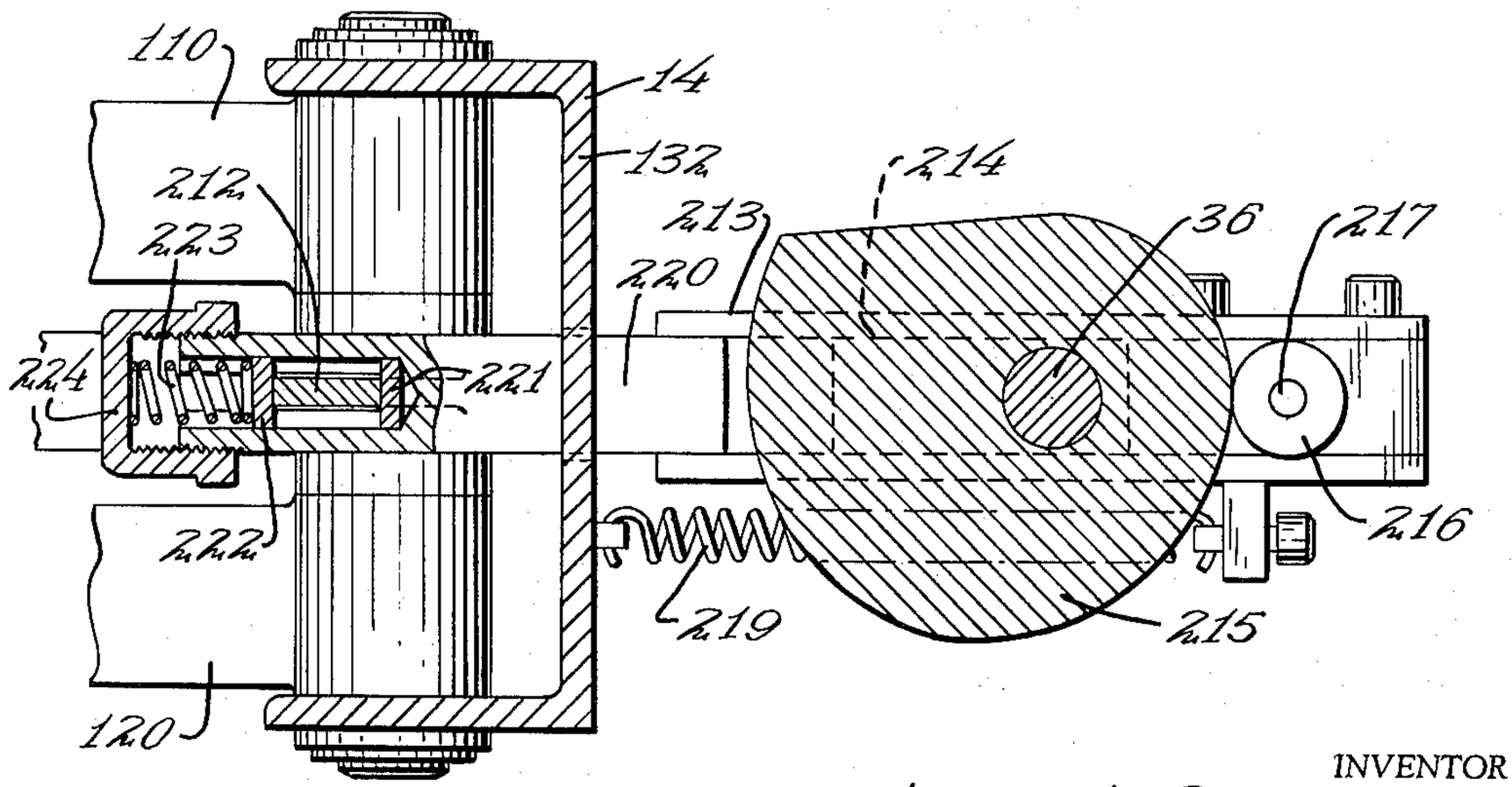


FIG. 17

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PLASTIC BAG AND PACKAGING MACHINE

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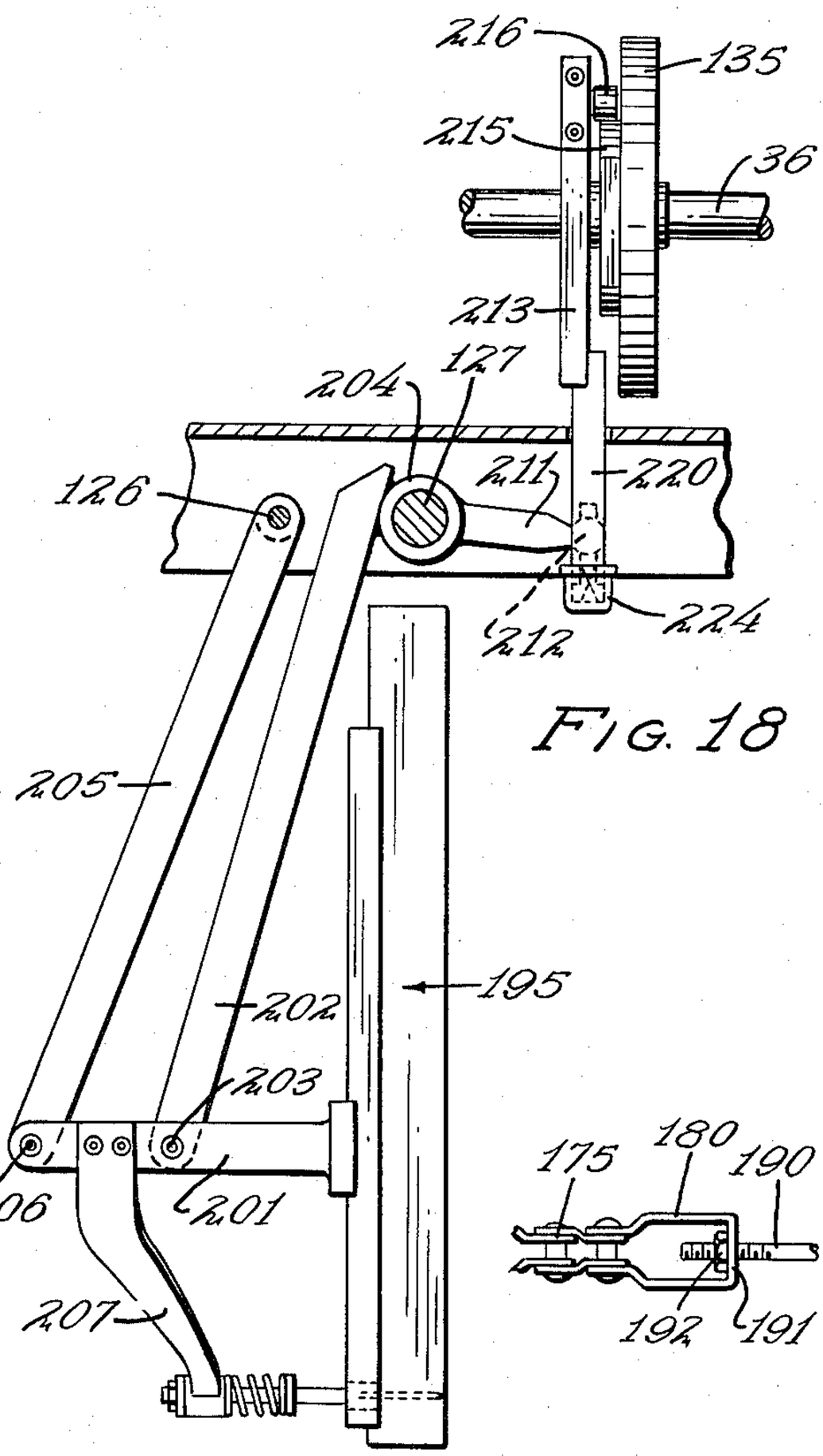


FIG. 18

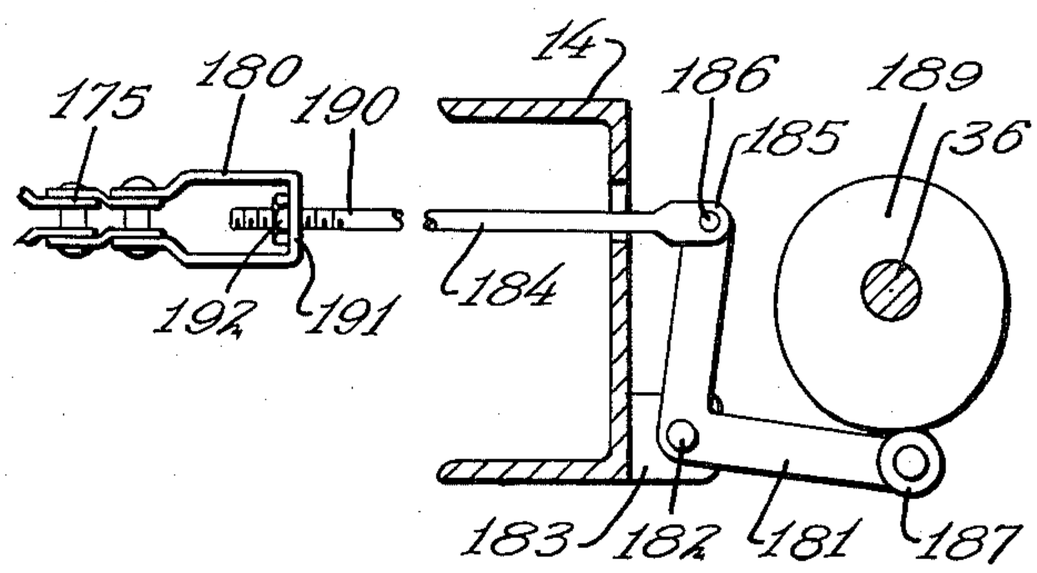


FIG. 19

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United States Patent Office

3,161,001

Patented Dec. 15, 1964

3,161,001

PLASTIC BAG AND PACKAGING MACHINE

John J. Grevich and Clifford W. Paulson, Star Prairie, Wis., assignors to Doughboy Industries, Inc., New Richmond, Wis., a corporation of Wisconsin

Filed May 21, 1962, Ser. No. 196,418
5 Claims. (Cl. 53—182)

This invention relates to an improvement in plastic bag and packaging machine and deals particularly with an apparatus for forming a bag out of thermoplastic film, and for closing and sealing the bag after the contents have been inserted therein.

An object of the present invention lies in the provision of a machine capable of sealing objects in bags formed from a web of longitudinally folded heat sealable plastic film. The fold between the sides of the folded web forms one side of the bag. The other three sides of the bag are formed by heat sealing. This is accomplished in one sealing operation per bag through the use of right angular clamping bars, and through the use of a right angular burn-off blade which simultaneously cuts through the two film sides and seals the cut edges of the film. This blade functions to seal the upper horizontal edge and open vertical edge of a filled bag which has been previously sealed along its lower edge. This operation also functions to seal the lower horizontal edge aforementioned of the folded web at the point of burn-off, forming the seal for the lower edge of the next successive bag.

A feature of the present invention lies in the fact that at the time the object being packaged is inserted; the web in longitudinally folded condition is completely open along two sides of the bag. As a result, the contents may be inserted by merely placing the article between the sides of the web and allowing the article to drop while the bottom of the bag is being formed by the transverse clamping and sealing mechanism. No strain is imposed on the newly made bottom seal since it remains firmly clamped until a new cycle occurs.

Further, an added feature of the present invention lies in the provision of an apparatus of the type described which includes a pair of platform or table forming members mounted upon the transverse clamping means and movable therewith. When the clamping members are in clamping position, the table or platform forming members provide a substantial support on which the article or articles being packaged may rest when inserted between the sides of the film. As a result, the article packaged may be dropped toward the clamped portion of the film without danger of rupturing the film, as the film is supported by the platform forming members.

A further feature of the present invention resides in the provision of an apparatus of the type described which is provided with a novel and effective means of taking up slack in the film and holding the film taut during the sealing operation. After a predetermined length of film has been fed, and the weight of the article being packaged has drawn the film past the horizontal clamping members, means is provided for taking up any slack in the film before the clamping members engage the same.

A further feature of the present invention resides in the provision of a generally L-shaped clamping member on each side of the web, the clamping members being mounted for reciprocation toward and away from each other. Each clamping member includes a horizontal portion and a vertical portion, and each of these portions include two spaced clamping bars. A heated burn-off blade of generally L-shaped form is supported for reciprocation between the spaced parallel clamping portions of one clamping member to engage the film between the

spaced clamping portions to form a heat seal between the sides of the film transversely across the film and along the edge of the film.

A further feature of the present invention resides in the provision of a means for insuring the proper fit of the article within the bag. While the clamping jaws are slightly spaced, the film retracting means may, if desired, function to draw the article into close relation with the under surface of the clamping member, thus properly locating the article within the sealed bag.

These and other objects and novel features of the present invention will be more clearly and fully set forth in the following specification and claims.

In the drawings forming a part of the specification:

FIGURE 1 is a perspective view of the plastic bag and packaging machine showing the general arrangement of parts.

FIGURE 2 is a perspective view of a field bag showing the general form of construction produced.

FIGURE 3 is a diagrammatic view showing in general the manner in which the object to be packaged may be inserted between the folded sides of the web before the sealing operation.

FIGURE 4 is a diagrammatic view showing the manner in which the web is tightened just prior to the sealing operation.

FIGURE 5 is a horizontal sectional view through the apparatus above the bag-sealing position, showing the general arrangement of parts therein.

FIGURE 6 through the horizontal sealing jaw in closed position thereof, the position of the section being indicated by the line 6—6 of FIGURE 5.

FIGURE 7 is a diagrammatic view showing the clamping blade in open position, the view eliminating much of the operating structure illustrated in FIGURE 5 for the purpose of clarity.

FIGURE 8 is a front plan view of a detailed portion of the apparatus including the vertical sealing jaw.

FIGURE 9 is a diagrammatic view of the upper portion of the web feeding apparatus showing the manner in which the web feed roll is operated.

FIGURE 10 is a diagrammatic view showing inside elevation of the drive mechanism for the feed roller illustrated in FIGURE 9.

FIGURE 11 is a diagrammatic front elevational view of the drive mechanism for operating the feed roller as illustrated in FIGURE 10.

FIGURE 12 is a diagrammatic side elevational view, partly in section, showing the film take-up mechanism operating means.

FIGURE 13 is a diagrammatic view indicating the manner in which the take-up mechanism is driven.

FIGURE 14 is a diagrammatic view of the clamping jaws in closed position.

FIGURE 15 is a diagrammatic vertical sectional view through one of the clamping bar units and the associated burn-off blade associated therewith.

FIGURE 16 is a diagrammatic vertical sectional view through the drive shaft showing the clamping bar actuating means.

FIGURE 17 is a diagrammatic vertical sectional view through the drive shaft and burn-off blade actuating cam, showing the blade actuating means.

FIGURE 18 is a diagrammatic plan view partly in section showing the burn-off blade operating linkage.

FIGURE 19 is a diagrammatic elevational view showing the linkage for operating the auxiliary means for holding the clamping bar units in clamped position.

Web Feed Construction

The plastic bag and packaging machine is illustrated in general by the letter A, and is shown in complete form

in FIGURE 1 of the drawings. Due to the fact that the operating mechanism for certain of the parts is not readily visible in any complete view of the apparatus, certain of the parts have been shown diagrammatically apart from the remainder of the apparatus so that the operation may be more readily understood.

In general, the machine A includes a frame **10** which is mounted upon supporting legs such as **11**. The center portion of the frame includes frame sides **12**, a front cross member **13** extending between the sides **12**, and a rear cross member **14** connecting the rear ends of the frame sides. The rear of the frame includes an upright standard **15** which is reinforced by brace means **16** and which is provided at its upper ends a transversely extending frame yoke **17** which is mounted in cantilever from the frame standard **15**.

The frame yoke **17** is a channel shaped member having parallel ends **19** and **20**, the end **19** being secured to the standard **15**. The feed roller **21** is supported by a forwardly and rearwardly extending shaft **22** supported in bearings on the end members **19** and **20**. The end members **19** and **20** are provided with laterally extending arms **23** which support a shaft **24** in parallel relation to the shaft **22**. A pair of arms **25** are pivotally supported in spaced relation on the shaft **24** and pivotally support pressure rolls **26**. The roll-down pressure rolls **26** are urged against the roller **21** by springs **27** or other suitable means.

One side **12** of the frame **10** is provided with a pair of spaced standards **29** which are designed to support the roll shaft **30** of a roll of film **31**. The film **31** is longitudinally folded midway between its sides and the film is fed in its folded form. A pair of arms **28** may support a roller or bar **32** on an axis parallel to the axis of the roll shaft **30**, and a second pair of arms **33** may support a second parallel roller or guide bar **34**. The film from the roller **31** passes over the guide bar **32** then extends downwardly and beneath the guide bar **34** before extending upwardly around the feed roll **21**. Intermittent rotation of the feed roll **21** unwinds the film C from the roll **31**, as will be later described.

With reference now to FIGURE 5 of the drawings, the main drive shaft **36** is driven in cycles through a gear case **37** which is powered by a pulley connected to a suitable motor, not illustrated in the drawings. Intermittent rotation of the drive shaft **36** is caused by the pin type clutch **40** which permits the gear box **37** to rotate the drive shaft **36** one complete revolution each time the clutch is operated, but it is shown as including a brake **39** to limit the movements to cycles. The details of construction of the clutch **40** are not illustrated, as clutches designed to accomplish the desired result are well known in the art. For the purpose of illustration, rotation of the clutch **40** may be arrested at the end of each revolution by engagement of a pin such as **41** with a stop **42** secured to the end of an operating rod **43** actuated by the operator through an operating lever **44** loosely connected at **45** to the rod **43** and pivoted to the frame **10** as indicated at **46**.

The drive shaft **36** is supported parallel to the frame back **14** by bearings **47** mounted on suitable brackets **49** connecting the frame back **14** with the supporting legs **11**. As indicated in FIGURE 5, the drive shaft **36** supports a feed cam **50** designed to oscillate a rocker arm **51** supporting a cam roller **52**. The rocker arm **51** is pivotally supported upon a shaft **53** parallel to the drive shaft **36** and supported by suitable bracket means **54** on the frame member **14**.

With reference now to FIGURE 10 of the drawings, it will be noted that spaced uprights **15** and **16** extend upwardly from the cross member **14** and support a transverse shaft **57** on an axis parallel the axes of the shafts **36** and **53**. A pinion **59** is secured to the shaft for rotation in unison therewith, and the end of the rocker arm **51** opposite that supporting the cam roller **52** is provided

with a gear segment **60** which is in mesh with the pinion **59**. Obviously, oscillation of the rocker arm **51** causes rotation of the pinion **59** and consequently the shaft **57** first in one direction and then in the other. The cam roller **52** is held in contact with the surface of the cam **50** by any suitable means such as the spring **61**.

With reference now to FIGURE 9 of the drawings, it will be noted that one end of the shaft **57** is anchored to a generally rectangular arm **62** which oscillates with the shaft. The arm **62** is provided with a longitudinal slot **63** extending throughout the major portion of the length thereof, the slot **63** slidably supporting a crosshead **64** from which projects a cylindrical stud **65**. A threaded shaft **66** extends longitudinally through the slot **63**, and is threaded through the crosshead **64**. The threaded rod **66** is prevented from longitudinal movement in the slot **63** by collars **67** or other suitable means. By rotation of the threaded rod **66**, the position of the crosshead **64** in the slot **63** may be adjusted. As a result, this arm **62** provides a crank, the throw of which is adjustable according to the position of the crosshead in the slot **63**.

A horizontal cross head **69** connects the upper end of a guide rod **70** to the lower end of a second rod **71**, the rods **70** and **71** being supported by suitable bearings such as **72**. The upper end of the rod **71** is rectangular in cross section as indicated at **73** and is provided on one side with gear teeth which are indicated in dotted outline at **74**. Thus the upper end **73** of the rod **71** comprises a rack which is in mesh with a gear **75** mounted upon the shaft **22** of the feed roller **21**. The gear **75** drives the shaft **22** and the feed roll **21** through a one-way clutch **76** which advances the feed roller **21** upon reciprocation of the rack **73** in one direction and which is free of engagement when the rack reciprocates in a return direction.

The operation of the feed mechanism is as follows: Each time the drive shaft **36** revolves through a cycle, the cam **50** acts to oscillate the rocker arm **51** first in one direction and then in the other. This action rocks the arm **62** through a predetermined angle of movement.

The stud **65** is slidable in the slot **77** of the crosshead **69**, and reciprocates the rods **70** and **71** through a distance of movement depending upon the distance between the crosshead **64** and the axis of the operating shaft **57**. Thus the rack **73** reciprocates through an adjusted length of movement, advancing the feed roll **21** through a corresponding angular distance.

The Clamping and Sealing Mechanism

As has been described, the web is longitudinally folded intermediate its sides so that the wall of the bag nearest the rear of the machine is closed. To seal the product, it is therefore necessary to seal the upper and lower ends of the bag as well as the forward edges thereof.

In order to form the various seals in a single operation, the two sides of the web are clamped along an angular area extending transversely across the web and vertically along the forward edges of the web. An angular heated burn-off blade engages the webs between the clamped area, the blade functioning to form a seal along the top of one bag, along the forward edge of the same bag, and across the bottom of the next bag to be formed. Thus three bag edges are simultaneously sealed by the single blade.

The general arrangement of the clamping blades and the burn-off blade is diagrammatically illustrated in FIGURE 14 of the drawings. The clamping members **79** and **80** are generally similar in outline shape and include horizontal portions **81** and **82**, respectively, and vertical portions **83** and **84**, respectively. As indicated in FIGURE 14, the clamping bar **79** includes an upper clamping bar **85** and a lower clamping bar **86** which are held in spaced relation by spacing blocks **87**. A vertical portion **83** of the clamping member **79** includes an inner bar **89** and an outer bar **90** which are held in

spaced relation at their lower ends by a spacing block 91. The upper ends of the bars 89 and 90 are integrally attached to the lower clamping bar 86, and the clamping bar 86 is slotted at 92 in communication with the space between the bars 89 and 90 to form a continuous space between the horizontal and vertical clamping bars.

The clamping member 80 is generally similar to the clamping member 79. In other words, the clamping member 80 includes in its hoirzontal part 82 an upper clamping bar or blade 93 and a lower clamping blade 94. The vertical portion 84 of this clamping member 80 is also provided with an inner blade 95 and an outer blade 96. The blades are held in spaced relation by spacer blocks such as 97. Furthermore, the side of the clamping member 80 most remote from the clamping member 79 is completely closed by spacer strips 99 which extend not only along the horizontal portion of the clamping member, but also along the vertical portion thereof. As is evident from the drawings, the two clamping members operate in opposed relation.

The clamping bars 93 and 94 differ from the clamping bars of the clamping member 79 in providing retractable shoes which are slidably supported by the inner edges of the bars 93 and 94 for movement toward and away from the opposed clamping blades. Similar retractable shoes are also provided on the vertical blades as indicated diagrammatically in FIGURE 14.

Each of the clamping bars 93 and 94 as well as the clamping bars 95 and 96 are equipped with a continuous series of generally U-shaped slides 100 which enclose the inner edges of these bars. Angularly turned flanges 101 are provided on the U-shaped members 100 which extend into slots 102 in the various clamping bars. The slides 100 are limited in their sliding movement by the width of the slots 102. Springs 103 are recessed into the edge of each of the clamping bars inwardly of the slides 100, and these springs 103 urge the various slides into projected position. The purpose of the slides is to compensate for variation in the thickness of the members being sealed and to insure an equal pressure against the sides of the web throughout the width thereof.

As is indicated in FIGURES 5, 6, and 7 of the drawings, the upper clamping blade 85 is supported by a pair of spaced parallel attached arms 104 which in turn are connected by arm 105 which extends parallel to the clamping bar 85. The arm 105 is provided near its center with a bracket portion 106 which supports an angular yoke 107 extending upwardly therefrom and having a horizontal upper portion 109 parallel to the arm portion 106. A supporting arm 110, which is pivotally connected to the cross member 14 of the frame in a manner which will be later described, is pivotally supported between the bracket arm 106 and the flange 109 by a pivot 111. The bracket arm 106 is provided with an extension 112 which is pivotally connected by a pivot 113 to an arm 114 which is also connected to the cross member 14 of the frame and which is of a length similar to that of the arm 110. The arms 110 and 114 remain parallel regardless of their pivotal position so as to maintain the clamping bar assembly 79 in parallel relation to the opposed clamping bar assembly 80.

The lower blade 86 of the clamping unit 79 is provided with a similar support which is not visible in FIGURES 5 and 7 of the drawings due to the fact that the supports for the lower blade 86 are directly beneath those for the clamping bar 85. However, as indicated in FIGURE 15 of the drawings, the clamping bar 86 is supported by a pair of right angularly extending arms 115 which are directly beneath the arms 104, and the spaced parallel bars 115 are connected by a longitudinally extending bracket arm 116 having at its center a right angularly extending bracket arm 117 which is similar to the bracket arm 106 but which is inverted so that the angularly extending yoke 119 on the bracket arm 117 extends downwardly from the arm. A supporting arm 120 is connected between the

horizontal flange 121 of the yoke 119 and the body of the bracket arm 117 by a pivot 122. The bracket arm includes an extension 123 which is pivotally connected by a pivot 124 to an arm 125. The pivots 122 and 124 are aligned with the previously described pivots 111 and 113, and the arm 125 is pivotally connected to the cross member 14 of the frame on a pivot axis 126 indicated in FIGURE 5.

The manner in which the arms 110 and 120 are pivotally supported to the cross member 14 of the frame is perhaps best illustrated in FIGURE 16 of the drawings. A vertical pivot 127 is supported by bearings 129 mounted on the upper and lower horizontal flanges 130 of the frame member 14. The pivot 127 extends through the arms 110 and 120, and pivotally supports these arms on a common axis.

A bar 131 is slidable through the vertical flange 132 of the cross member 14 and is slotted as indicated at 133 to accommodate the drive shaft 36. The bar 131 is provided with a laterally extending cam roller 134 which is in engagement with the surfaces of a cam groove 135 mounted upon the shaft 36.

An arm 137 is secured to the bar 110 to extend laterally therefrom, and the extremity of the arm 137 is provided with a roller 139 which engages between a fixed shoulder 140 and a washer or collar 141 slidable upon an extension 142 of the bar 131. A spring 143 is supported between the washer or collar 141 and a fixed washer or collar 144 to urge the slidable collar 141 against the roller 139.

Due to the fact that the clamping bars or blades 93 and 94 of the clamping unit 80 are connected by a spacer such as 99, the clamping unit 80 is supported by a single pair of parallel arms. The upper blade 93 is supported by a pair of parallel right angularly extending arms 145 which are connected by a bracket bar 146. The bracket bar 146 is provided with a right angularly extending bracket arm 147 which supports an angular yoke 149 similar to the yokes 107 and 119. A pivot 150 pivotally connects the bracket 149 to the supporting arm 151 which is connected to the cross member 14 of the frame by a vertical pivot 152 supported by bearings 153. An extension 154 of the bracket arm 147 is pivotally connected at 155 to the arm 156 which is of similar length to the arm 151 and which is pivoted to the cross member 14 of the frame by a vertical pivot 157. The distance between the axes of the pivots 150 and 155 is the same as the distance between the axes of the pivots 152 and 157, so that the arms remain parallel. As a result, the clamping blade unit 80 is held in parallel relation to the clamping bar unit 79.

The arm 151 is connected to an angularly extending arm 159. The free end of the arm 159 extends into overlapping relation with the end of the arm 137, and is provided with a roller 160 which engages between the fixed shoulder 140 and the slidable shoulder 141 on the extension 142 of the slide 131.

After a suitable dwell period, the cam 135 slides the bar 131 to its other extreme position, swinging the arms 110, 120 in a clockwise direction and the arm 151 in a counter-clockwise direction to open the jaws or to move them apart. The parallel links 114 and 156 function to hold the clamping members parallel.

The operation of the clamping bars is as follows: During each revolution of the drive shaft 36, the cam 135 engages against the cam roller 134 to draw the slide 131 to the right as viewed in FIGURE 16. During this action, the rollers 139 and 160 are moved in a direction to swing the arms 110 and 120 in a counter-clockwise direction about the pivot 127, thereby swinging the clamping bar unit 79 toward the opposite clamping bar unit 80. Simultaneously, the arm 151 is swung in a clockwise direction to move the clamping unit 80 toward the clamping unit 79. The clamping units 79 and 80 thus close to clamp the heat sealable sides of the film in face contact. As the clamping bar units are angu-

larly shaped, the films are actually clamped together along spaced areas extending transversely of the direction of movement of the film, and vertically along the free edges of the sides of the sheet.

When the bags being sealed are of substantial size, it is often desirable to provide an auxiliary means for urging the vertical portions of the clamping bar units **79** and **80** into close contact. As indicated in FIGURES 5, 7, 8 and 19 of the drawings, a pair of spaced vertical shafts **163** and **164** are supported forwardly of the clamping bar units **79** and **80** by the front cross member **13** of the frame and by a second cross member **165** supported beneath the cross member **13** in any suitable way as by the brace **166**. The shafts **163** and **164** are provided with intermeshing gears **167** and **169** so as to rotate in unison. Two pairs of vertically spaced arms **170** and **171** are mounted on the shafts **163** and **164**, these arms being engageable with the outer vertical edges of the vertical clamping bars **90** and **96** to urge vertical portions **83** and **84** of the clamping bar units together. Adjustable members **172**, **173** are provided on the ends of the arms **170**, **171** so that the engagement may be adjusted.

A sprocket **174** is mounted upon one shaft **164** for rotation in unison therewith. As indicated in FIGURE 5 of the drawings, a chain **175** extends partially about the sprocket **174** and is connected by a suitable spring **176** to an anchor point **177** on the frame cross member **13**. The chain **175** is guided by an idle sprocket **179** to one end of a yoke **180**.

With reference now to FIGURES 5 and 19, a bell-crank lever **181** is pivotally supported at **182** to a bracket **183** extending rearwardly from the frame cross member **14**. A rod **184** is provided with a flattened end **185** pivotally connected at **186** to one end of the lever **181**. A cam roller **187** is mounted on the other end of the lever **181** and engages a cam **189** mounted upon the drive shaft **36**.

The rod **184** is provided with a threaded end **190** which extends through an end **191** of the yoke **180** and is held in adjusted position by a nut **192**.

The cam **189** is so constructed that as the clamping bar units **79**, **80** are moved into contact, the lever **181** is moved by the cam **189** in a direction to rotate the shaft **163** in a clockwise direction and to rotate the shaft **164** in a counter-clockwise direction. This action stretches the spring **176** and at the end of the clamping operation, the clamping arms **170**, **171** are swung back out of clamping position by the spring **176** which maintains the cam roller **187** in engagement with the cam **189**.

It should be noted that means have been provided for preventing injury to the clamping bars in the event an abnormally thick member is engaged between the jaws. In the event the horizontal portions of the clamping bar units are prevented from closing, the spring **143** on the unit moving the arms will compress so that no injury will result. If the abnormal thickness is between the vertical portions of the jaws, the spring **176** will expand to prevent injury to the jaws.

The Burn-Off and Heat Sealing Mechanism

In general, the heat sealing and burn-off device comprises an angular blade which is indicated in general by the numeral **195**, and which is heated by suitable heating elements, not illustrated in the drawings, to a proper temperature to burn through the two sides of the film and to form an effective seal between these two sides during the process. The member **195** includes a horizontal blade portion **196** which is designed to extend between the upper and lower clamping bars **85** and **86** of the clamping bar unit **79**. The blade also includes a right angularly extending vertical blade **197** which is designed to extend between the clamping bars **89** and **90** of the clamping blade unit **79** when the units **79** and **80** are clamping the films therebetween. The horizontal portion **196** of the blade includes a channel-shaped reinforcing edge **199** which is spaced from the forward edge **200** a distance sufficient to permit the projecting portion of the blade to engage the films. During this operation, the heated blade **196** not only seals the upper edge of the portion of the films which are suspended below the lower clamping bar, but also forms a seal for the lower edge of the portions of the film which extend above the upper bar.

An arm **201** is secured to the horizontal portion **196** of the heating blade to extend at right angles thereto. A supporting arm **202** is pivotally connected to the arm **201** at **203**, and is welded or otherwise secured to a sleeve **204** encircling the pivot **127** which pivotally supports the arms **110** and **120**. A second link **205** is also pivotally connected to the arm **201** at **206**, the pivot **206** being spaced from the pivot **203**. The arm **205** is pivotally connected to the cross member **14** of the frame by the pivot **126** which also pivotally supports the arm **114** as well as the corresponding lower arm **125**.

As will be noted from FIGURES 5 and 18 of the drawings, the arms **202** and **25** are in converging relation, but as the axes of the pivot **126** and pivot **127** are spaced apart the same distance as the axes of the pivots **203** and **206**, the structure acts as parallelogram to keep the blade **195** in parallel relation to the clamping bar units. A brace **207** is connected to the arm **201** and is secured to the vertical portion **197**, the connection being through a bracket **209** secured to the blade portion **197** and adjustably connected at **210** to the brace arm **207**.

As is best indicated in FIGURE 18 of the drawings, the sleeve **204** is provided with a radially extending arm **211** having a rounded end **212** which pivots the linkage in the manner best illustrated in FIGURE 17 of the drawings.

An arm **213** is slidably supported for movement through a suitable aperture in the vertical web **132** of the cross member **14** of the frame and is provided with a longitudinal slot **214** designed to accommodate the drive shaft **36**. A cam **215** which, in the particular arrangement illustrated, is a part of the cam **135**, is mounted upon the drive shaft **36**. A cam roller **216** is mounted on a pivot **217** on the bar **213** and is held against the cam **215** by any suitable means such as the spring **219**.

The bar **213** is provided with an extension **220** and is provided with a fixed abutment **221** and a slidable washer or collar **222**. A spring **223** is interposed between the movable washer **222** and a fixed collar or washer **224** on the extension **220**. The spring **223** may compress if the movement of the burn-off blade is impeded.

The operation of this portion of the apparatus is as follows: Once during each cycle of operation, and after the clamping bars or jaws have engaged the film sides to press them together, the cam **215** moves the bar **213** to the right as viewed in FIGURE 17, the washer or collar **222** engaging the head **212** of the arm **211**, rocking the arm **202** and the companion link **205** in a counter-clockwise direction. The angular burn-off blade **195** passes through the space between the horizontal clamping bars **85** and **86**, and between the vertical clamping bars **89** and **90** of the clamping unit **79**, forming a right angular seal closing the upper and forward end of the film sides, and simultaneously sealing the films together along the lower edge of the adjoining portion of the film.

Film Take-Up Mechanism

Means are provided to insure the fact that the film is taut at the time the clamping jaws are closed. In most instances, the film is held suspended by the weight of the object or objects being packaged, the weight of the objects drawing the film downwardly as it is fed by the feed roll. In the present device, the feed device is designed to feed

tuated once during each cycle of operation by a cam 285 mounted upon the drive shaft 36. The air blast is particularly effective as the air is turned on while the clamping jaws are still closed and the air is forced into an area which is generally closed except for the lines where the film has been burned off by the heated blade. As a result, the air passes between the slightly spaced sealed edges, and quickly reduces the temperature of the plastic below the melting point so that the jaws may be quickly opened.

Operation

For the most part, the operation of the apparatus has been described in conjunction with the description of the various elements of the combination. The folded film web C is drawn from the roll 31 by the feed roller 21 which feeds an adjusted length of film for each cycle of operation in the manner described. When the end of the folded web extends between the clamping units 79 and 80, the sides of the web end are clamped together and the bottom seal is made. The object D to be packaged is then inserted between the sides of the film, the weight of the article D resting upon the supporting table plates 273, 274.

The clamping bar units are then moved apart and the web is fed usually slightly more than the amount necessary to properly contain the product. When upon returning to clamping position and just prior to gripping the web, said web is retracted to remove any slack from the film, and to act, if necessary to draw the product D closely adjacent to the undersurface of the clamping jaws. The clamping jaws then come together and the burn-off blade is projected through the slot in the clamping bar unit 79 forming edge seals 271 and 272 of the filled bag, and forming the edge 270 of the next succeeding bag.

At the completion of the sealing operation, a blast of air is provided into the clamping bar unit 80, quickly reducing the temperature of the sealed edges of the film. Another object D is meanwhile inserted between the film sides to rest upon the table plate, and another cycle of operation is ready to start.

In FIGURE 1 of the drawings, a conveyor 290 is illustrated which is driven by any suitable means, not illustrated in the drawings, and which may catch the package product as it is dropped by the opening of the clamping bar unit.

In accordance with the patent statutes, we have described the principles of construction and operation of our improvement in plastic bag and packaging machine, and while we have endeavored to set forth the best embodiment thereof, we desire to have it understood that changes may be made within the scope of the following claims without departing from the spirit of our invention.

We claim:

1. An article packing apparatus for use in combination with a longitudinally folded web of heat sealable material, wherein the opposite sides of the web are disposed in confronting relation with each other, the apparatus including,

a frame,

means on the frame feeding a predetermined length of the web with the opposite sides in confronting relation with each other,

clamping means for clamping the opposite sides of the web together and including a pair of clamping portions, each disposed adjacent the web and in confronting relation with one side thereof to engage the web along transverse areas across the web, each clamping portion including a pair of spaced parallel clamping bars rigidly interconnected with each other and extending transversely across the web, the clamping bars of each clamping portion being spaced from each other longitudinally of the web to define an unobstructed space across which the web extends when clamped to be severed and sealed,

means on the frame mounting and moving said clamping portions toward and away from one another,

a burn-off blade lying in the unobstructed space between the pair of bars of one of said clamping portions and being movable through the clamped web and into the unobstructed space between the other of said clamping portions to burn-off and seal the clamped web,

means moving said burn-off blade into and out of engagement with the film and through said unobstructed spaces,

the clamping bars of one of said clamping portions having edge portions confronting the web and having a series of individually resilient retractable elements on said edge portions and in opposed relation to the clamping bars of the other clamping portions.

2. An article packaging apparatus for use with elongate facially laminae of heat sealable material, the apparatus including,

means guiding said laminae for movement downwardly along a predetermined path,

a pair of clamping members supported for relative movement toward and away from said laminae and each other on opposite sides of said predetermined path and extending transversely across said predetermined path,

spreading means in the path of movement of said laminae between said clamping members to hold the laminae in spaced relation with each other to receive an object to be packaged therebetween,

a pair of article-supporting plates each affixed in overlying relation with a respective clamping member and movable therewith for supporting an object placed between the sides of said web,

said plates being obliquely oriented in downwardly convergent relation with each other to support the article placed thereabove and between the laminae and to gradually transfer the weight of the article to the laminae when said clamping members are separated,

sealing means spaced from and adjacent to said clamping members and below said plates for sealing the sides of the web together, and

means for individually moving said clamping means and said sealing means toward and away from said web.

3. An article packaging apparatus for use with elongate facially engaging laminae of heat sealable material,

comprising laminae feeding means intermittently feeding a predetermined length of laminae in a downward direction of travel to permit insertion of such articles between the laminae, said feeding means including a feed roll engaging one of the laminae and restraining slippage of the laminae with respect to the feed roll,

a pair of clamping members below said feed roll to receive said laminae therebetween,

means producing relative movement of said clamping members toward and away from said laminae and effecting clamping of the laminae together,

said clamping members each including a horizontal portion extending across said laminae,

a burn-off blade extending along the horizontal portion of said clamping members and operable upon engaging with said laminae, to burn off the laminae, and to seal the sides of the laminae on both sides of the area of burn-off,

means for moving said burn-off blade into and out of engagement with the clamped laminae,

takeup means between said feed roll and said clamping members and engageable with said laminae to draw the laminae and article upwardly with respect to the clamping members and pull the laminae tightly around the articles thereby producing a tightly

the film slightly past sealing position, and thereafter means are provided between the feed roll and the clamping bars to retract the film upwardly a distance sufficient to insure the removal of any slack from the film.

An arm 230 is secured to the end blade 20 of the yoke frame 17 to extend downwardly therefrom to the frame standard 15. A guide rod or roller 231 is positioned below the discharge side of the feed roller 21 between the arm 230 and the end blade 19 of the frame yoke 17. A roller 232 is pivotally supported at one end by the vertical arm 230 and at the other end from a bracket 233 on the frame standard 15. The roller 232 includes axially aligned pivot shafts 234 which support a pair of rocker arms 235, one at each end of the roller 232. The arms 235 support a second roller 236 in spaced relation to the roller 232. In FIGURE 4 of the drawings, the details of the support have been eliminated to diagrammatically illustrate the operation of the apparatus. In general, this is also true of FIGURES 12 and 13, which also show portions of this construction.

In the portion of the operating cycle when the film is being advanced by the feed roll, the arms 235 support the roller 236 in substantially the same horizontal plane as the roller 232, and the folded plastic web C is fed from the feed roll 21 downwardly past the rod 231 and between the horizontally spaced rollers 232 and 236.

As is indicated diagrammatically in FIGURE 12 of the drawings, the shaft 234 which rotatably supports the roller 232 is provided with a sprocket 237 which rotates with the shaft, and which acts to rotate the parallel arms 235. The sprocket 237 is engaged by a short length of chain 239 which extends over the sprocket and is connected at one end to a spring 240. The spring 240 is connected at 241 to an adjustment rod 242 which extends through a yoke 243 attached to the frame standard 15, and the threaded end 244 of the rod 242 is held in an adjusted relation by a suitable nut 245.

The other end of the chain 239 is connected through a spring 246 to an operating rod 247. The spring 246 is normally somewhat stronger than the spring 240 so that the spring 240 will normally expand when a downward pull is exerted upon the operating rod 247 while the spring 246 will not expand unless the film is drawn sufficiently taut to make possible the breaking of the film. The lower end of the operating rod 247 is drawn downwardly by the means best illustrated in FIGURE 13 of the drawings.

A bellcrank lever 249 is pivoted intermediate its ends by the pivot 250 to a bracket 251 on the frame standard 15. The operating rod 247 extends loosely through an aperture 252 in one end of the arm 249 and the lower threaded end 253 of the operating rod 247 is provided with an adjustment nut 254 held in place on the rod by a lock nut 255. The other end of the lever 249 supports a cam roller 256 which rides the surface of a cam 257 mounted upon the drive shaft 36. Thus the cam 257 functions once during every revolution of the drive shaft 36 to exert a downward pull upon the operating rod 247.

The operation of this portion of the apparatus is believed understandable from the foregoing description. After the film has been fed a predetermined distance by the feed roller 21, the clamping jaws 79 and 80 are moved together toward clamping position. Just before the film is clamped, the cam 257 functions to pivot the bellcrank lever 249 in a counter-clockwise direction, exerting a downward pull upon the operating rod 247. This pull is exerted through the spring 246 to the chain 239, the pull elongating the spring 240 and causing the chain 239 to oscillate the sprocket 237 through a predetermined angle. Rotation of the sprocket 237 causes rotation of the shaft 234 supporting the arms 235, and swinging the roller 236 in a clockwise direction against the portion of the film between the roller 232 and the roller or guide rod 231. As is indicated in FIGURE 4 of the drawings, this action deflects a portion of the film between the guide rod

or roller 231 and the roller 232 thereby exerting an upward pull upon the depending end of the film. With this movement, any slack in the film is taken up and, if desired, a depending portion of the film which contains the packaged product and which is to be sealed may be drawn upwardly into close relation to the clamping bar units.

Film Pocket-Forming Means

An important feature of the present invention lies in the fact that the product or products being packaged may be firmly supported while the object or objects is being inserted between the sides of the film. This arrangement is highly advantageous in view of the fact that the article packaged may possess considerable weight and would have a tendency to rupture the film or to break the seal at the bottom of the bag or enclosure if the article were merely dropped between the unsupported sides of the film and upon the newly formed bottom closure. FIGURE 2 of the drawings diagrammatically illustrates a flat rectangular block or slab D which is enclosed between the folded sides of the film C, the lower edge 270 of the enclosure has been sealed at the time the upper edge of the previous bag was sealed. During the sealing operation, after the two sided bag and its contents D have been lowered into sealing position, the bag is sealed along the forward free edge 271 and along the upper edge 272 above the product. If, after the seal 270 has been formed, the clamping jaws are opened before the object D is dropped into place, it might be possible to rupture either the bag or the seal. In order to prevent such difficulty, a product-supporting table is provided on the upper surfaces of the jaws comprising a pair of downwardly and inwardly converging plates 273 and 274 which are connected to the parallel arms 104 supporting the clamping bar unit 79 and by the arms 145 supporting the clamping bar unit 80.

As is indicated in FIGURE 6 of the drawings, when the object D is inserted between the sides of the film C, the object is supported by the plates 273 and 274 so that the act of dropping the object into the bag does not tend to break it open. As the clamping bar units spread apart, the weight of the contents is gradually applied to the bag bottom to assist in protecting the newly formed seal.

As is indicated in FIGURE 1 of the drawings, the downwardly extending bar 230 supports a horizontal cross arm 275 which extends between the sides of the film C to gradually spread these sides apart. A downwardly extending arm 276 is adjustably supported extending downwardly from the cross bar 275 at the end thereof adjoining the folded film, and a film spreading fork of generally U-shaped form is indicated at 277 at the lower end of the vertical support 276, the fork 277 holding the sides of the film spread apart a distance sufficient to permit insertion of the contents.

Bag Cooling Mechanism

After the burn-off blade has cut the film and formed the edge seals, it is desirable to cool the film as rapidly as possible so that a high cycle of operation may be maintained when desired. To accomplish this result, a blast of air is introduced into the space between the clamping bars 93 and 94 of the clamping bar unit 80 immediately after the seal has been performed. Obviously, this blast of air may be introduced at more than one point between the clamping jaws, but for the purpose of illustration an air blast is directed to one end of the clamping bar unit 80, the air entering the space between the bars through the inlet 280 which may be seen in FIGURE 6 of the drawings.

As is indicated in FIGURE 5 of the drawings, an air valve 281 is mounted upon the cross member 14 of the frame including an inlet 282 connected to a suitable air supply, and an outlet connected by a flexible tube 283 to the inlet 280 between the clamping bars 93 and 94. The valve 281 is operated by an operating lever 284 ac-

wrapped package when burn off and sealing is effected,

said take-up means including a pair of spaced and juxtaposed guide members supported on one side of the path of travel of the laminae, and a third guide means spaced from said guide member and supported on the other side of the laminae,

and means for supporting said third guide means for movement between said spaced guide members.

4. An article packaging apparatus for use with elongate facially engaging laminae of heat sealable material,

comprising laminae feeding means intermittently feeding a predetermined length of the laminae in a downward direction of travel to permit insertion of such articles between the laminae, said feeding means including a feed roll engaging one of the laminae and restraining slippage of the laminae with respect to the feed roll,

a pair of clamping members below said feed roll to receive said laminae therebetween,

means producing relative movement of said clamping members toward and away from said laminae and effecting clamping of the laminae together,

said clamping members each including a horizontal portion extending across said laminae,

a burn-off blade extending across the horizontal portion of said clamping members and operable upon engaging with said laminae, to burn off the laminae, and to seal the sides of the laminae on both sides of the area of burn off,

means for moving said burn-off blade into and out of engagement with the clamped laminae,

takeup means between said feed roll and said clamping members and engageable with said laminae to draw the laminae and article upwardly with respect to the clamping members and pull the laminae tightly around the articles thereby producing a tightly wrapped package when burn off and sealing is effected,

said take-up means including a pair of spaced and juxtaposed guide members supported on one side of the path of travel of said laminae,

a third guide means spaced from said guide members on the other side of the path of travel of said web,

arm means attached to said third guide means at a point laterally of the path of movement of said laminae,

means pivotally supporting said arm means for swinging movement of said third guide means between said spaced guide members, and

means for swinging said arm means to apply tension to said laminae.

5. An article packaging apparatus for use with elongate facially engaging laminae of heat sealable material,

comprising laminae feeding means intermittently feeding a predetermined length of the laminae in a downward path of travel to permit insertion of such articles between the laminae, said feeding means including a feed roll engaging one of the laminae and restraining slippage of the laminae with respect to the feed roll,

a pair of clamping members below said feed roll to receive said laminae therebetween,

means producing relative movement of said clamping members toward and away from said laminae and effecting clamping of the laminae together,

said clamping members each including a horizontal portion extending across said laminae,

a burn-off blade extending along the horizontal portion of said clamping members and operable upon engaging with said laminae, to burn-off the laminae, and to seal the sides of the laminae on both sides of the area of burn-off,

means for moving said burn-off blade into and out of engagement with the clamped laminae,

and take up means between said feed roll and said clamping members and engageable with said laminae to draw the laminae and article upwardly with respect to the clamping members and pull the laminae tightly around the articles whereby producing a tightly wrapped package when burn-off and sealing is effected.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,161,001 December 15, 1964

John J. Grevich et al.

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

Column 11, line 57, for "packing" read -- packaging --; column 12, line 20, after "facially" insert -- engaging --; column 13, line 6, for "member" read -- members --; line 30, for "whereby" read -- thereby --.

Signed and sealed this 27th day of April 1965.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents