June 22, 1965 H. E. TOBEY 3,190,053

CLOSURE MECHANISM

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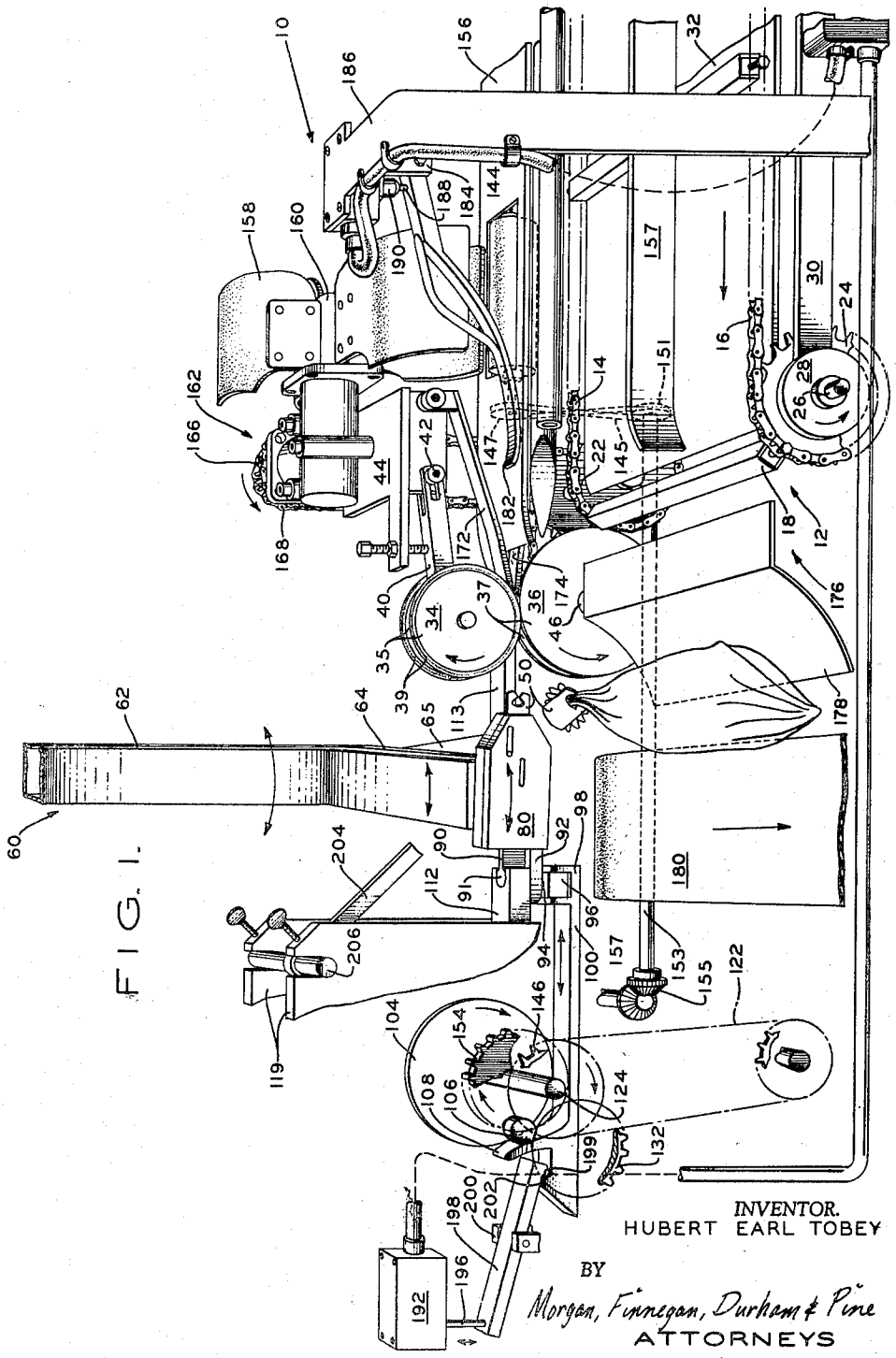


FIG. 1.

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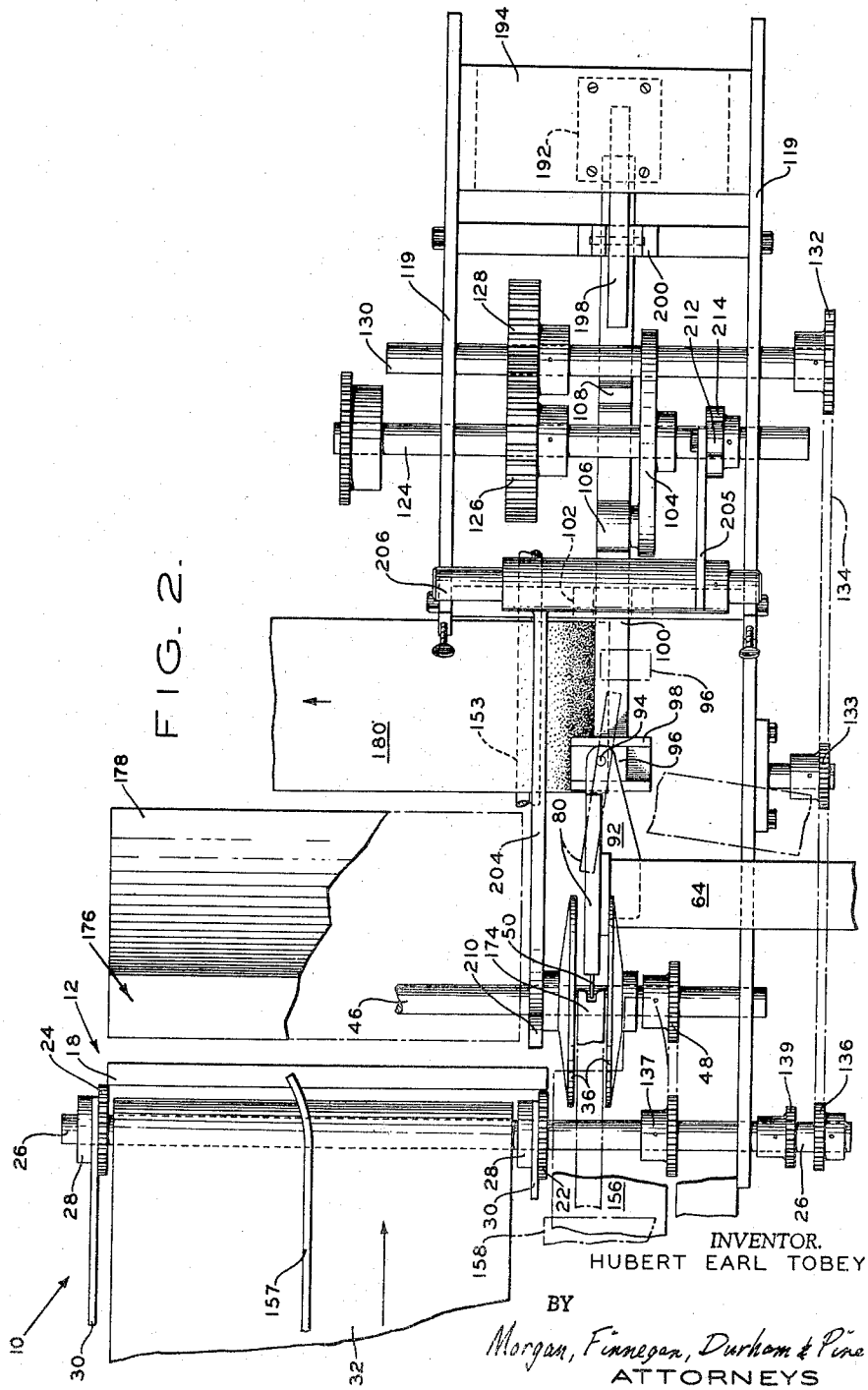
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CLOSURE MECHANISM

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FIG. 2.



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FIG. 3.

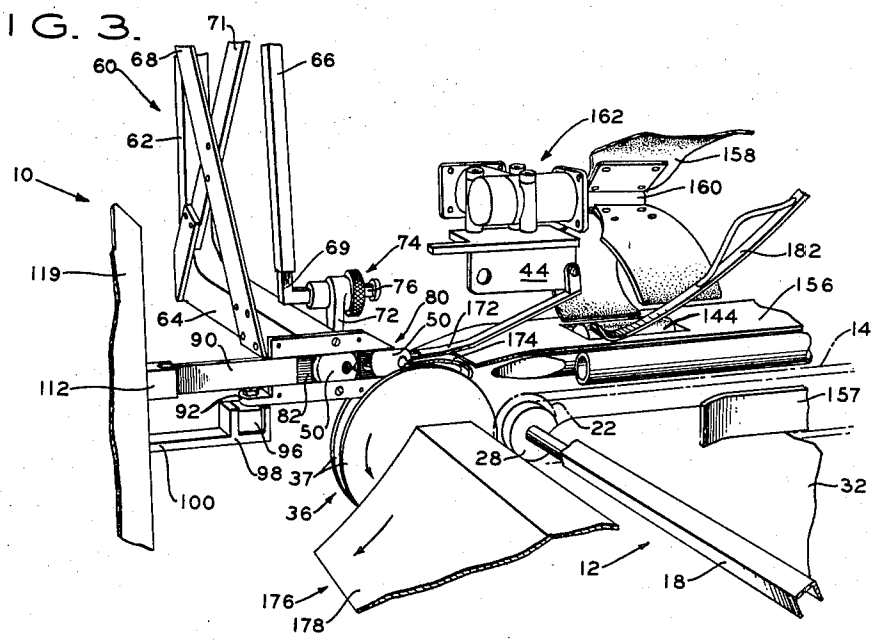
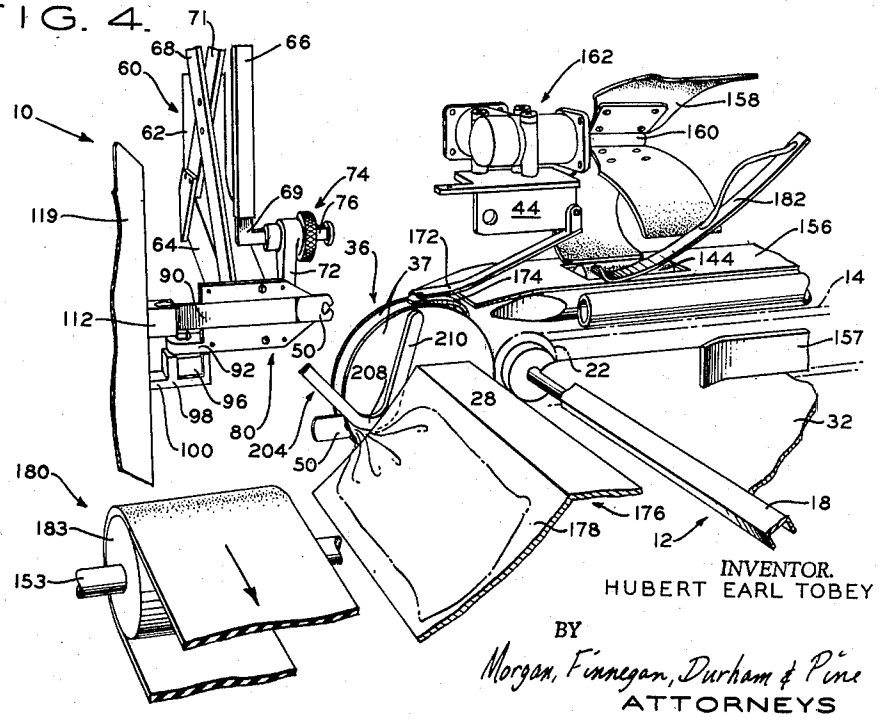


FIG. 4.



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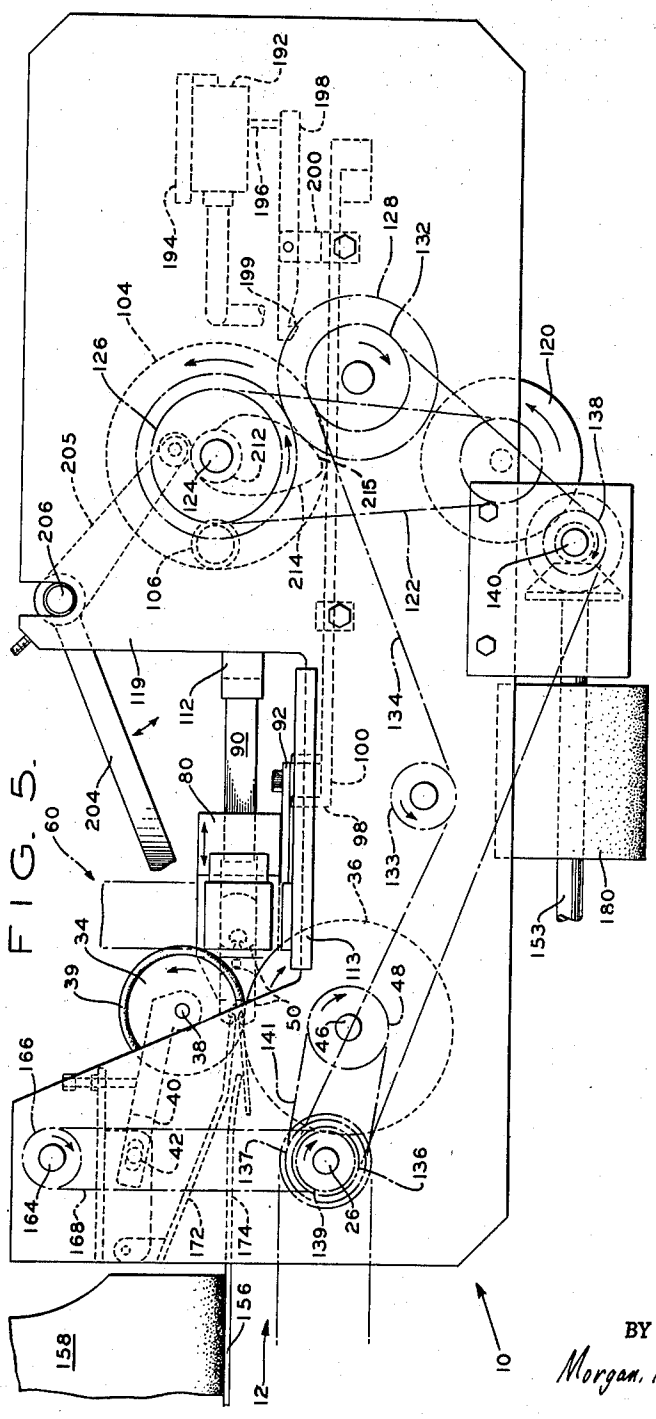


FIG. 5.

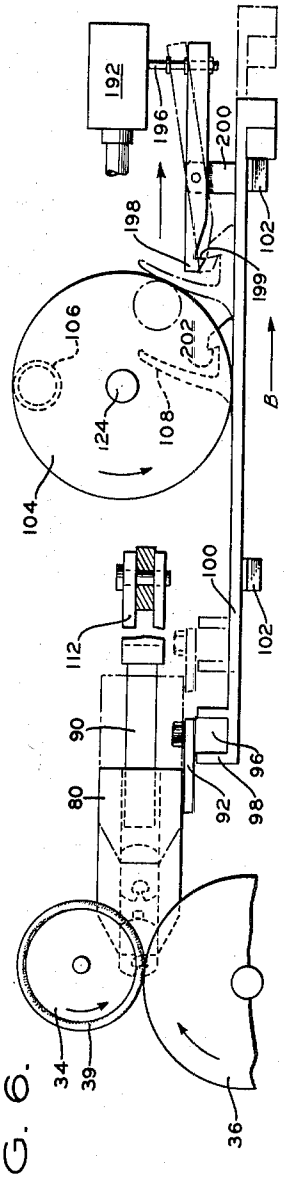


FIG. 6.

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FIG. 7.

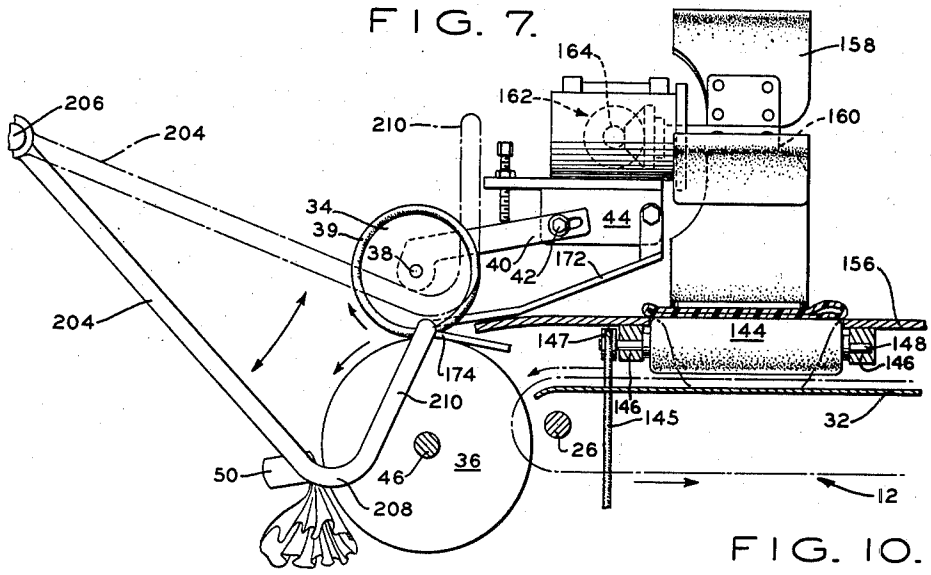


FIG. 8.

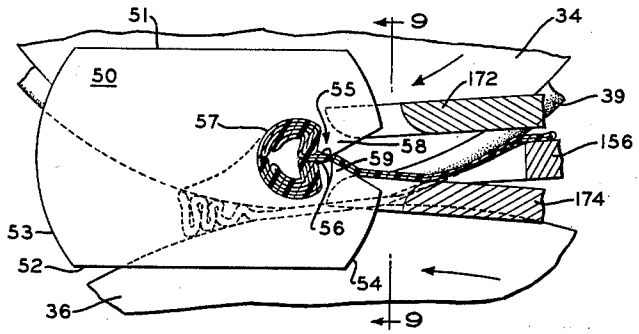


FIG. 9.

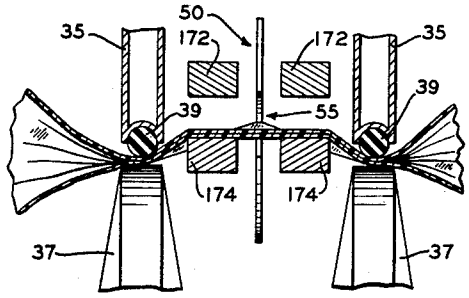
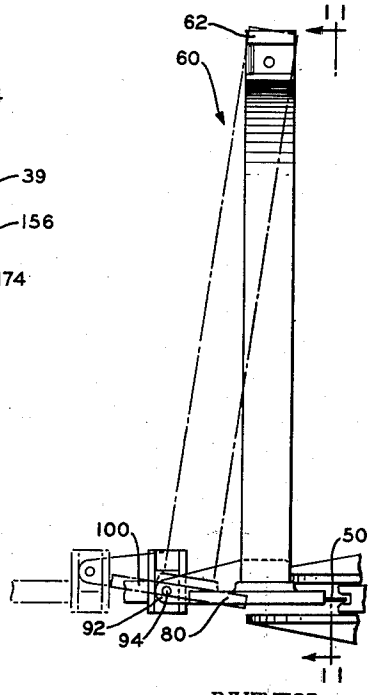


FIG. 10.



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FIG. 12.

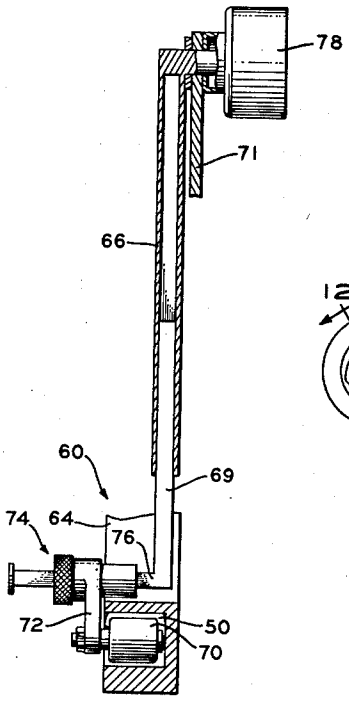


FIG. 11.

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CLOSURE MECHANISM

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FIG. 13.

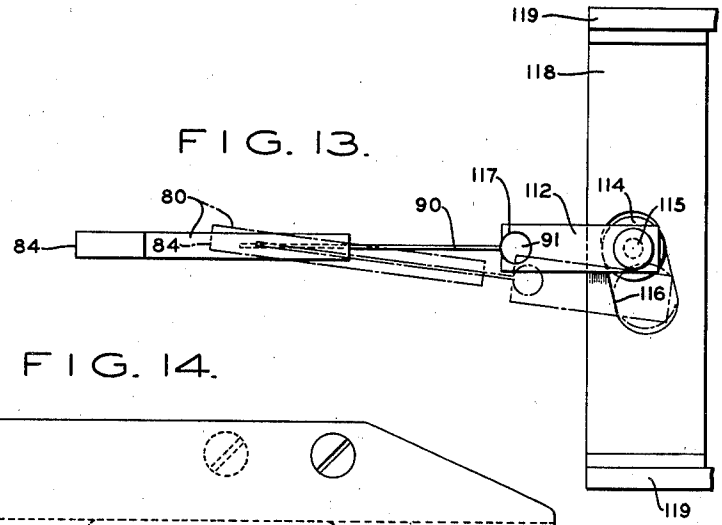


FIG. 14.

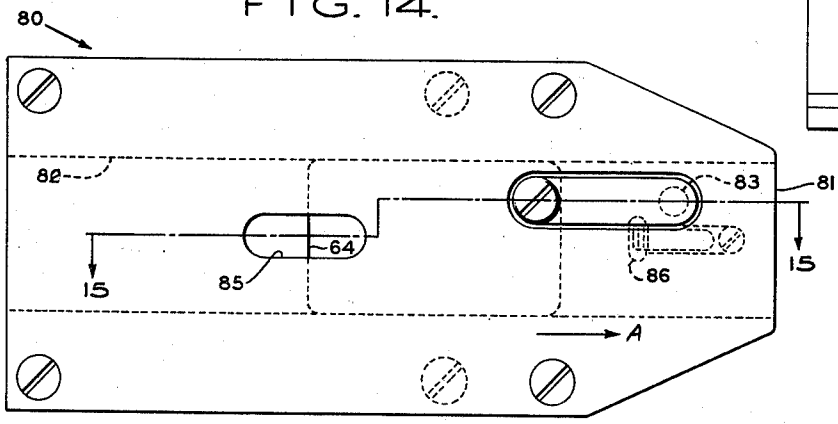


FIG. 15.

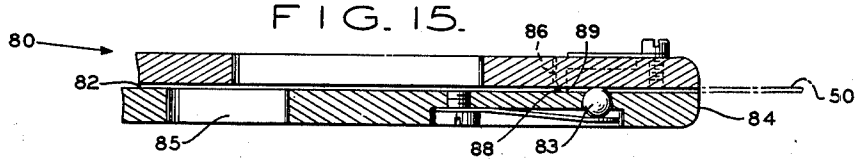
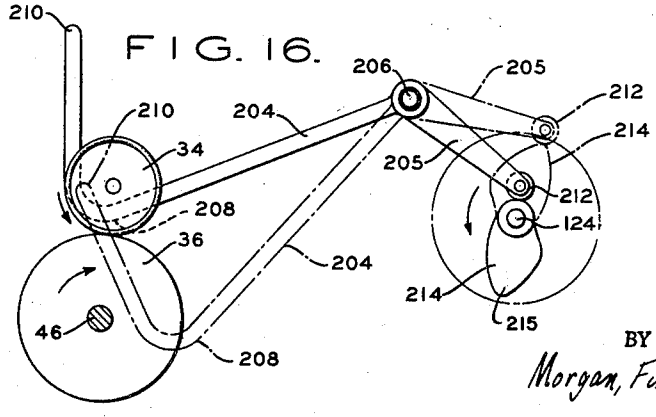


FIG. 16.



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FIG. 18.

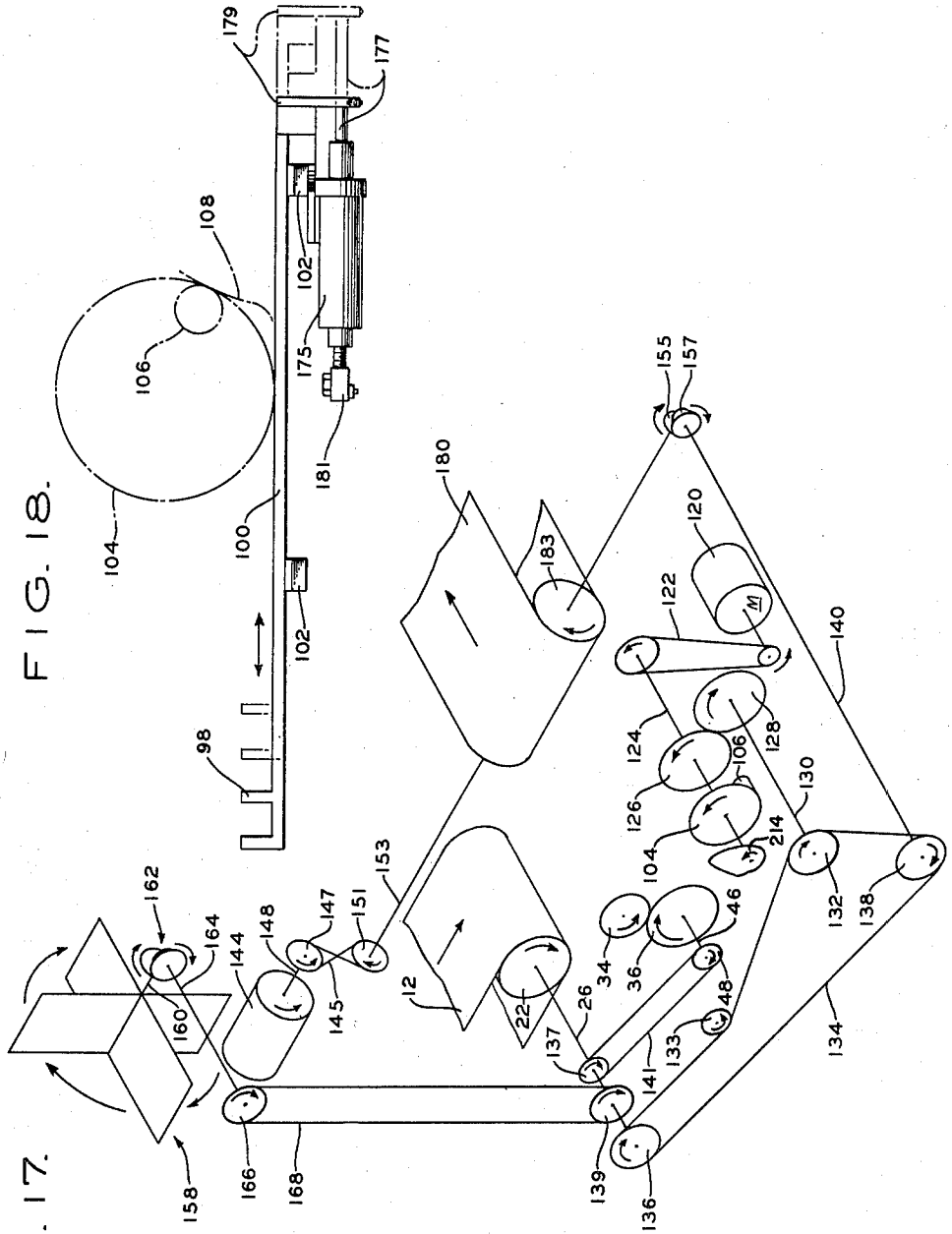


FIG. 17.

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CLOSURE MECHANISM

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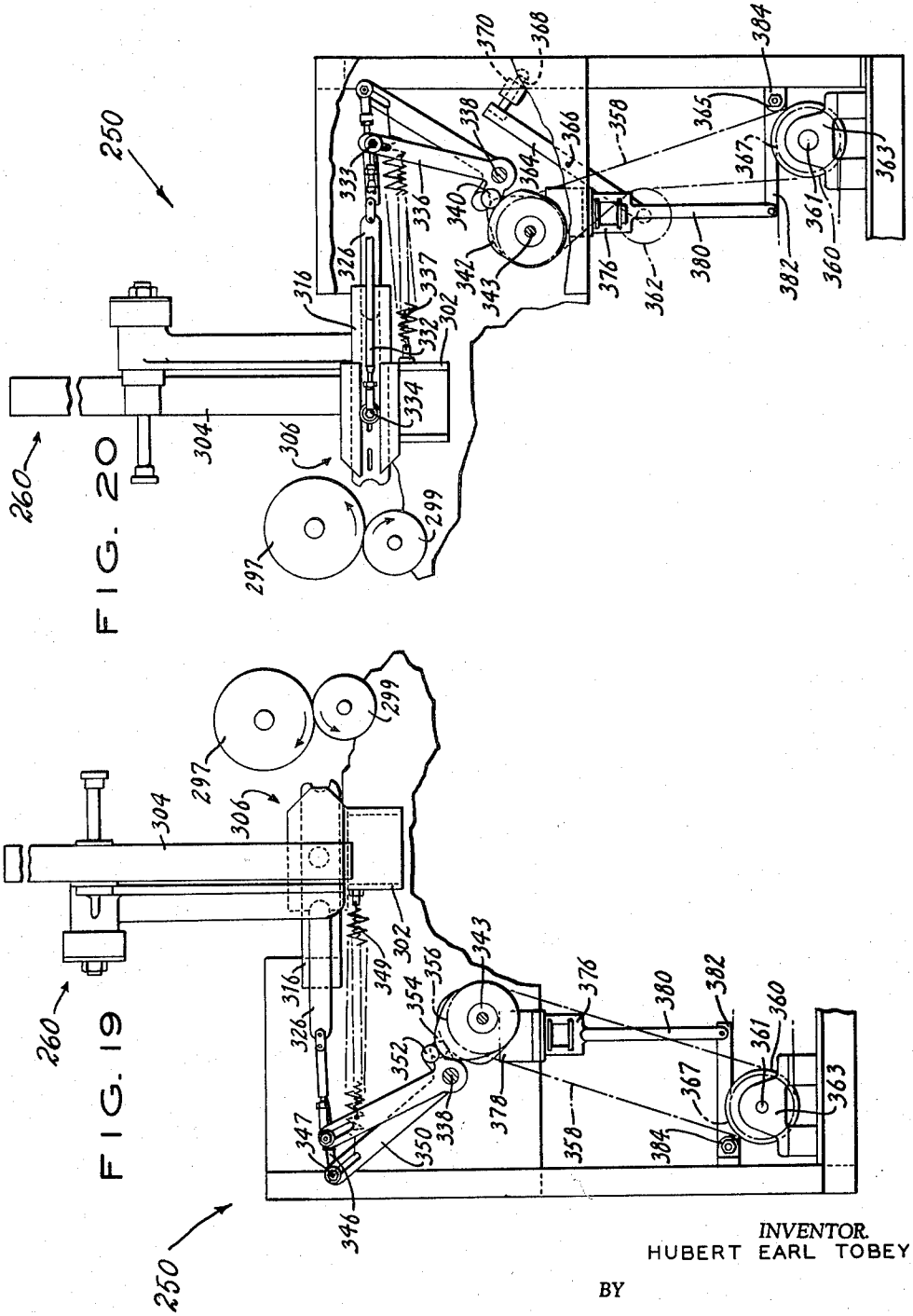


FIG. 20

FIG. 19

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CLOSURE MECHANISM

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FIG. 21

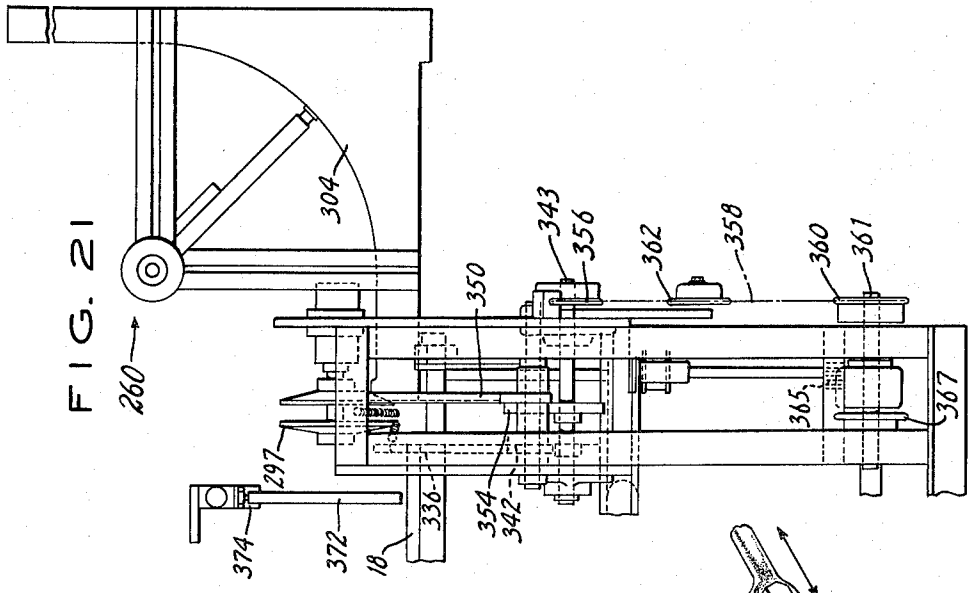
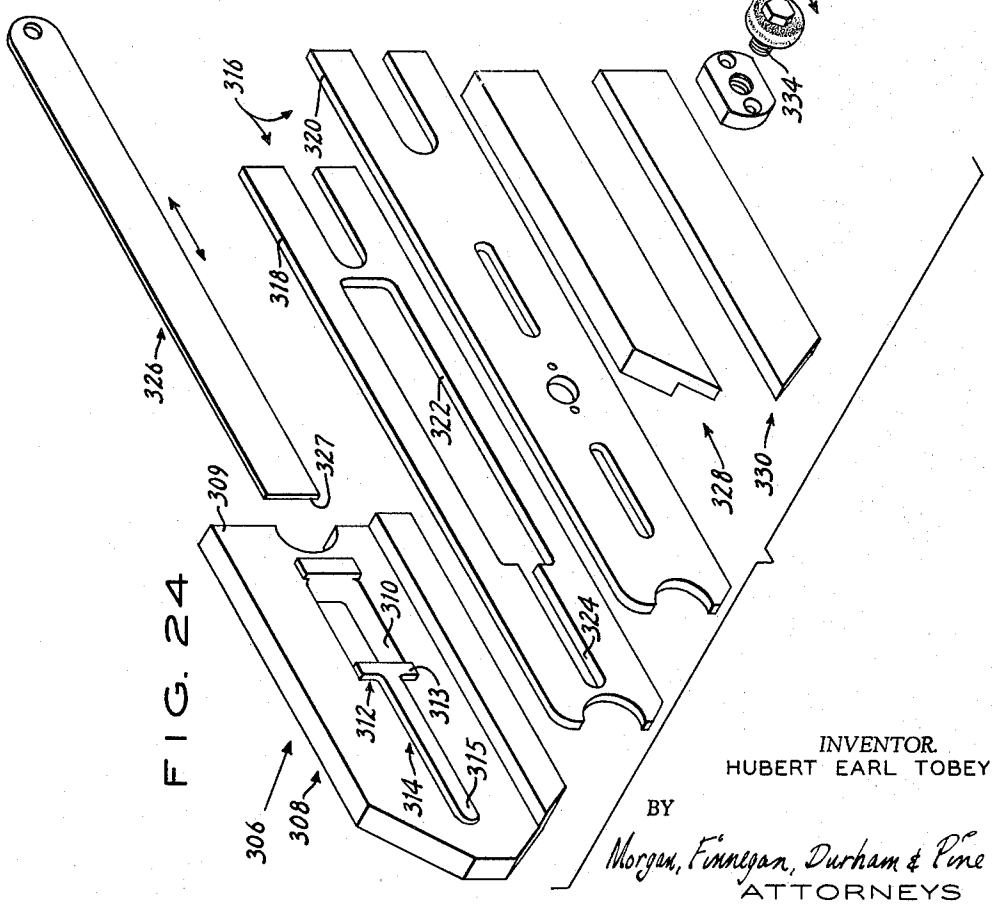


FIG. 24



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CLOSURE MECHANISM

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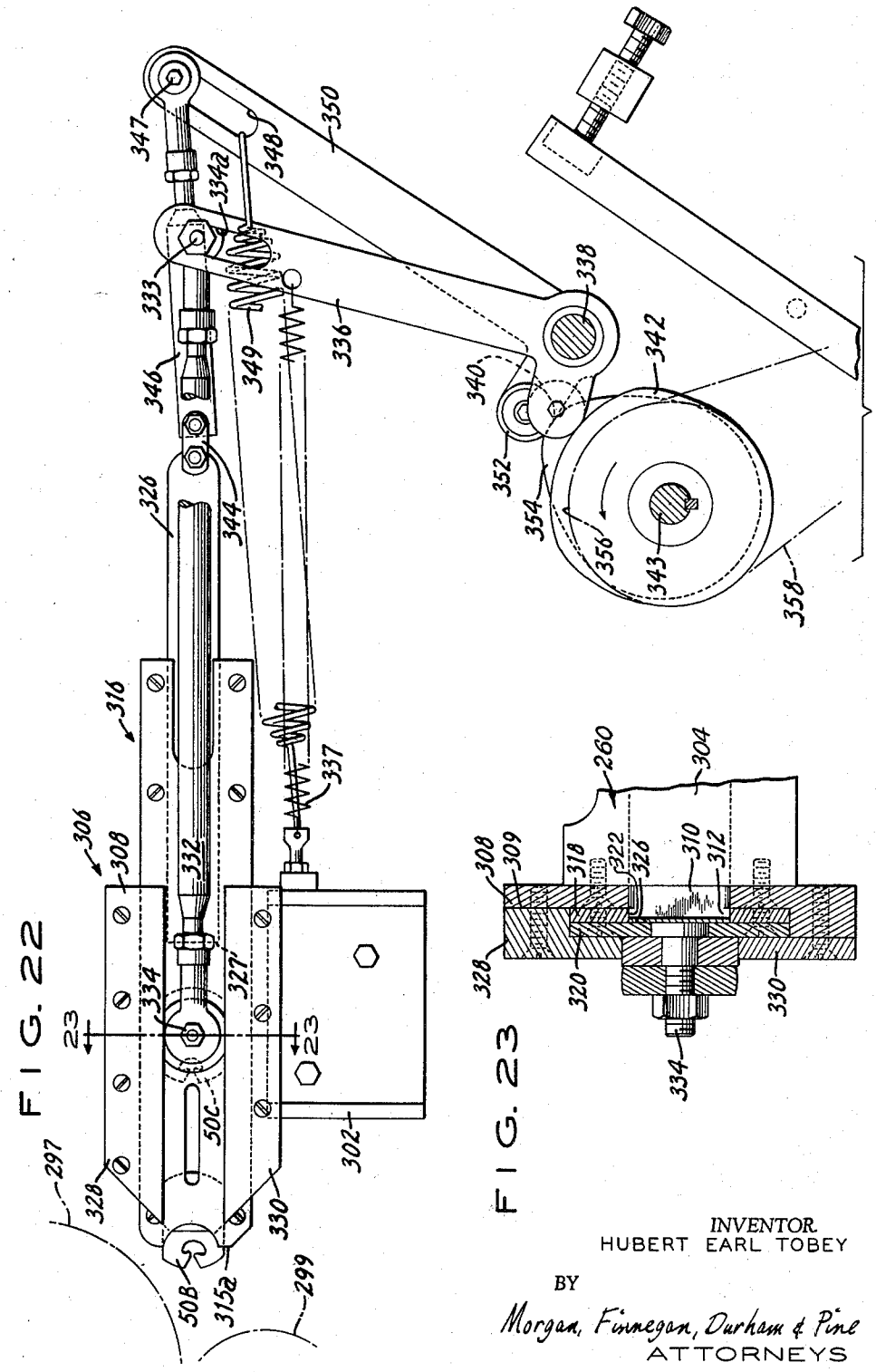


FIG. 22

FIG. 23

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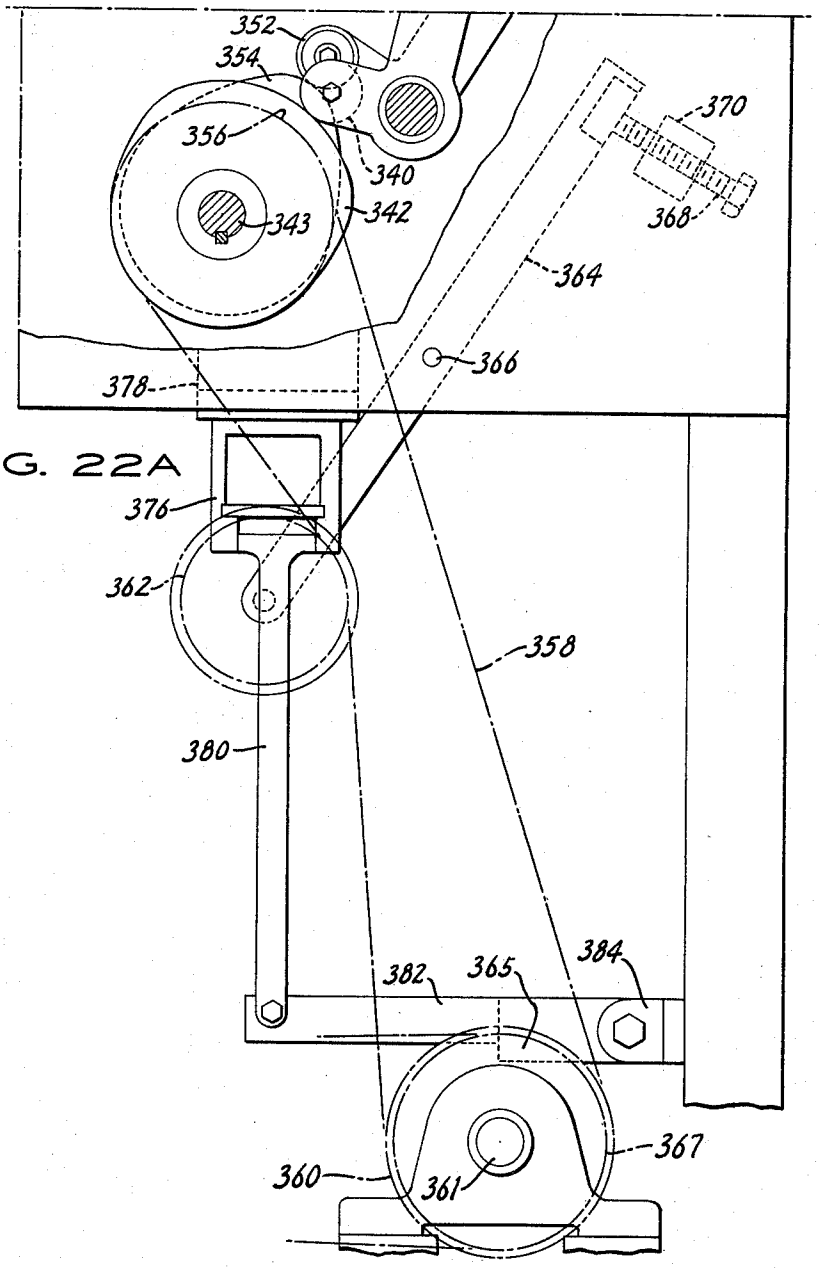


FIG. 22A

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FIG. 25

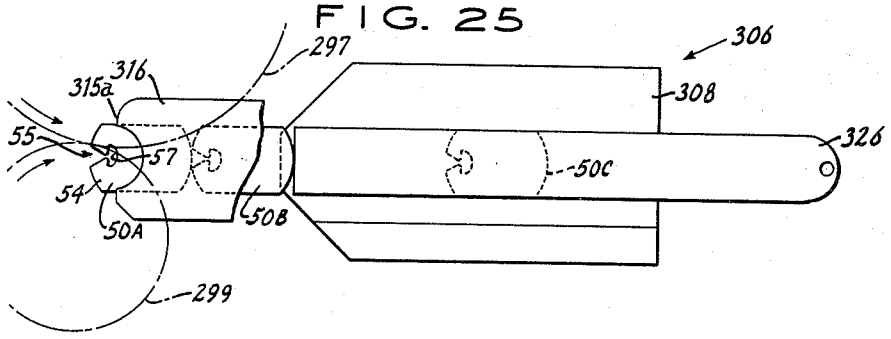


FIG. 26

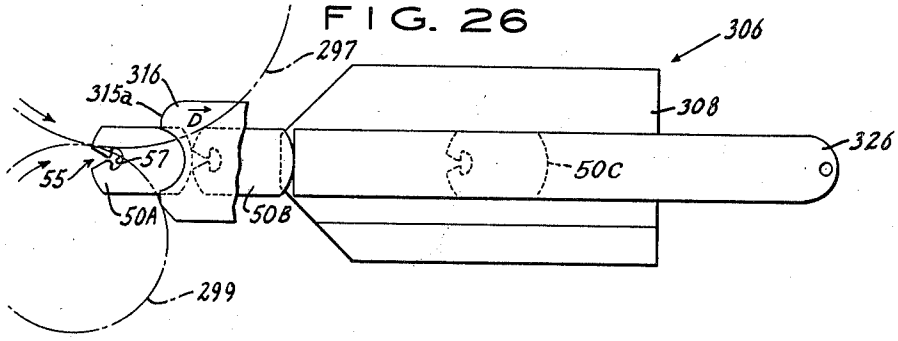
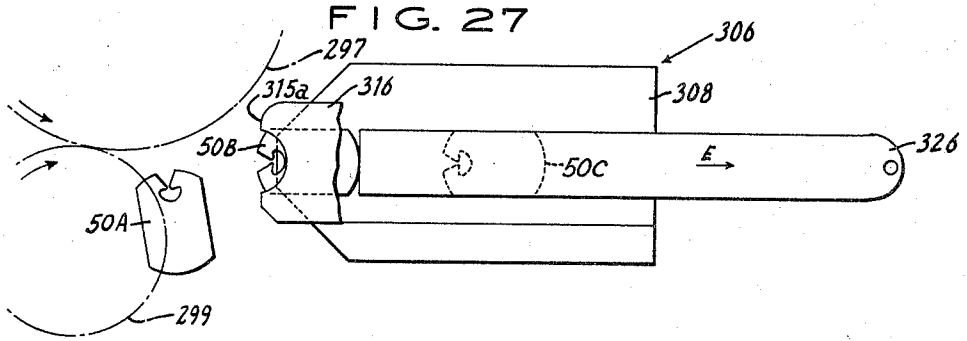


FIG. 27



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United States Patent Office 3,190,053 Patented June 22, 1965

3,190,053

CLOSURE MECHANISM

Hubert E. Tobey, Paramus, N.J., assignor, by mesne assignments, to Kwik Lok Corporation, Yakima, Wash., a corporation of Washington

Filed Oct. 29, 1962, Ser. No. 233,820
3 Claims. (Cl. 53—67)

This invention relates to the art of applying closures to the loose open necks of polyethylene bags to package products previously inserted therein and it relates particularly to an improvement in closure tab feeding, positioning and releasing means.

The invention was developed specifically to improve the closure tab feeding, positioning and releasing means employed in the Closure Mechanism disclosed in the co-pending application Serial No. 91,008 filed February 23, 1961, by Hans Gerd Rocholl. The closures applied by that mechanism are well known commercially under the trademark "Kwik-Lok" and comprise thin, flat tabs made of polystyrene or the like which have an inwardly enlarged bag neck receiving aperture, access to which is had through a narrow opening in one edge of the tab. In the Rocholl mechanism, the bags, confining a product such as a loaf of bread, are propelled by spaced transverse bars of a chain feed conveyor with the bag necks all disposed laterally toward the same side of the conveyor. Two pairs of rollers tangentially rolling against each other in the plane in which said bag necks are fed, seize each bag neck as the latter reaches the line of tangency between said pairs of rollers and whisk said neck through the opening of a closure tab positioned with said opening properly disposed to receive said neck. In an instant, a certain cross section of the bag neck becomes bunched together within the closure aperture, and, in the next instant, the machine releases said closure tab so that it may be carried away by the bag just closed by said tab, as said bag moves off on a discharge conveyor.

In the Rocholl machine, the closure tab feeding, positioning and releasing means includes a magazine confining a column of closure tabs which extends inwardly to the line of travel of the bag necks. It is mounted on a vertical pivot at its outer end and is mechanically swung to horizontally oscillate the inner end of the magazine and an individual tab feeding head mounted thereon, toward and away from said pairs of rollers. This oscillation is in cyclic timed relation with the bag feed conveyor so that each time a bag reaches said pairs of neck feeding rollers, a closure tab is positioned between said roller pairs to receive said bag neck. The withdrawal of said head, which follows immediately, is occasioned by the reverse phase of the current oscillation of said magazine. The release of the closure tab just applied to a bag is effected by a stationary ejector which the tab feeding head slidably receives in its tab feed passage (which connects with the magazine) so as to strip another tab from the tab column in the magazine and, by feeding this partly out of the delivery end of said passage, completely ejects from said head, the tab just applied to a bag.

Certain limitations were inherent in the Rocholl machine, because of its dependence upon swinging the entire heavy tab magazine to accomplish each tab feeding cycle. Dependence upon a stationary tab ejector also limited the speed of operation of the Rocholl tab feed mechanism.

It is an object of the present invention to provide an improved closure tab feeding, positioning and releasing means which is free of the limitations above noted in the Rocholl closure feed mechanism.

Another object is to provide such an improved means which has its own separate cyclic drive means which is trigger responsive to loaded bags on the incoming feed conveyor, whereby, in the absence of a bag in front of

any of the conveyor cross bars, the tab feed means will not feed a tab into position for receiving a bag neck nor release a tab during as many cycles as bags are lacking on said feed conveyor.

The manner of accomplishing the foregoing objects, as well as further objects and advantages, will be made manifest in the following description taken in connection with the accompanying drawings, in which:

FIG. 1 is a perspective view of the aforesaid Rocholl bag closing machine.

FIG. 2 is a partial plan view of FIG. 1.

FIG. 3 is a partial perspective view of the Rocholl tab head and magazine in operative position.

FIG. 4 is a partial perspective view of said tab head and magazine as it is moving from non-operative toward operative position.

FIG. 5 is a partial side elevation of the mechanism shown in FIG. 2.

FIG. 6 is a partial side elevation of the Rocholl tab magazine actuating mechanism.

FIG. 7 is a side elevation of the Rocholl bag straightener and cooling mechanisms.

FIG. 8 is a side elevation of the closure tab adapted to be used with the present invention in closing a flexible bag.

FIG. 9 is a sectional view taken along line **9—9**, FIG. 8.

FIG. 10 is a plan view of the Rocholl tab magazine.

FIG. 11 is a side elevation, partially in section, taken along line **11—11**, FIG. 10.

FIG. 12 is a sectional view taken along line **12—12**, FIG. 11.

FIG. 13 is a plan view of the Rocholl tab ejector mechanism.

FIG. 14 is a side elevation of the Rocholl tab feed head.

FIG. 15 is a sectional view taken along line **15—15**, FIG. 14.

FIG. 16 is a side elevation of the Rocholl bag ejector mechanism.

FIG. 17 is a schematic transmission diagram of the various drive mechanisms of the Rocholl bag closing machine.

FIG. 18 is a side elevation of the magazine and head actuating mechanism of the Rocholl machine.

FIG. 19 is a side elevation of the closure-applying mechanism of the present invention.

FIG. 20 is a side elevation of the other side of the mechanism illustrated in FIG. 19.

FIG. 21 is a rear view of the mechanism illustrated in FIGS. 19 and 20.

FIG. 22 is a detailed view on an enlarged scale of the tab-applying mechanism of the invention, illustrating the tab transfer and ejector in fully retracted position.

FIG. 22A is a detailed view, partly schematic, of the drive means for the mechanism illustrated in FIG. 22.

FIG. 23 is a sectional view taken along line **23—23**, FIG. 22.

FIG. 24 is an exploded view of the tab-positioning head of the present invention.

FIGS. 25–27 are sequential views for the several operations of the positioning head members during the closure-applying operation of the mechanism of the present invention.

Inasmuch as the improvement constituting the present invention is particularly adapted for use in the closure tab feed means of the aforesaid Rocholl bag closing machine, an understanding of the invention will be facilitated by first describing said Rocholl machine. The machine, designated generally **10**, is illustrated as positioned at the delivery end of a longitudinal endless bar conveyor **12**. Conveyor **12** includes a pair of spaced conveyor chains **14** and **16** which support each end of a plurality of

spaced, transverse pusher bars 18. Chains 14 and 16 are trained over a pair of spaced sprockets 22 and 24, respectively which are rotatably mounted on shaft 26 adjacent mechanism 10. Shaft 26, in turn, is rotatably carried in suitable bearings 28 mounted on brackets 30 of the conveyor frame. Shaft 26 is driven as described hereinbelow to cause bars 18 to travel along support plate 32 of the conveyor frame from a loading station (not shown) to mechanism 10.

Mechanism 10 includes two tangentially coacting pairs of pinch rollers 34 and 36. Upper pair of rollers 34 is rotatably supported on a stud shaft 38 carried in a link arm 40 pivotally connected by pin 42 to bracket 44 on the main machine frame. Lower pair of rollers 36, in turn, is fixed to one end of and rotates with a drive shaft 46. Pinch rollers 34 and 36 are preferably provided with dual spaced contacting tracks 35 and 37, respectively.

The other end of shaft 46 is provided with a sprocket 48 driven as described hereinbelow to rotate pair of rollers 36. Upper pair of rollers 34 is biased toward rollers 36 as described hereinabove, and tracks 35 thereof are provided with a peripheral rim or shoe 39 of rubber or other material having a high coefficient of friction which effects rotation of rollers 34 from rollers 36.

Mechanism 10 is adapted to apply a closure tab 50 (FIG. 8) having two longitudinal edges 51 and 52, an arcuate end edge 53 and an opposite arcuate end edge 54, which is broken by a central slot or notch 55 having converging cam faces 56 and communicating internally with a non-circular heat-shaped hole 57. Hole 57 and notch 55 produce two hook-shaped jaws 58 and 59 on tab 50 which operate to hold tab 50 onto a package or container. Tab 50 may be similar in construction and operation to the tag disclosed in the patent to F. G. Paxton et al., 2,907,586, and further disclosure thereof is omitted in the interests of brevity.

To feed tabs 50 in continuous succession, there is provided a tab magazine 60 of generally channel-shaped cross-section (FIGS. 10–12). Magazine 60 includes a generally vertically-disposed loading section 62 and a transverse feeding section 64 formed as a continuation of section 62. Tabs 50 in section 62 are disposed in overlying, flat relationship. As tabs 50 pass from section 62 into section 64, this disposition is altered from overlying relationship to side-by-side vertically-disposed relationship, as shown in FIG. 11. Magazine 60 is rotatably supported on a vertical axis by bearing 63 carried in bracket 61 fixed to an extension 67 of the main machine frame. A strut 68, fixed at one end to section 62 and at the other end to section 64, provides structural rigidity to magazine 60. To support the free end of section 64, there is provided a bearing support plate 65 fixed to the extension 67 of the main machine frame. Plate 65 is in slidable contact with a bearing plate 113 on section 64.

To ensure continuous feeding of tabs 50, magazine 60 is provided with a feeder arm 66 pivotally mounted at one end on bracket 71 attached to magazine 60 and strut 68. Arm 66 is provided at its free end with a telescoping extension 69. A pressure roller 70, adapted to be positioned against the last tab 50 in magazine 60 is rotatably carried in one end of arm 72. Arm 72, in turn, is fixed to hub 74, slidably mounted on a transverse section 76 of telescoping extension 69. A tension coil spring 78, housed on bracket 71, bears against an extension of arm 66 to apply sufficient pressure to roller 70 to ensure continuous, positive feed of tabs 50 through magazine 60.

At the end of section 64 remote from loading section 62, there is provided an insert or tab positioning head 80. Head 80, shown best in FIGS. 14 and 15, includes an internal slot 82 of sufficient width to accommodate a tab 50, disposed in vertical position, as shown in FIG. 3. Slot 82 communicates directly with section 64 such that tabs 50, urged through sections 62 and 64 by pressure roller 70, enter slot 82. Head 80 and slot 82 accommodate two tabs 50 when head 80 and magazine 60 are in operative bag-securing position shown in FIG. 3.

In this position, a first tab 50, fed to head 80, is positioned with its aperture 57 extending out beyond the end 81 of head 80 and into position between the tracks 35 and 37 of rollers 34 and 36. The arcuate extremity 53 of tab 50 remote from aperture 57 is positioned against resiliently-biased stop member 86 in head 80. Stop 86 is preferably of wedge-shape with a cam face 88 and a stop face 89. Stop 86 permits tabs 50 to move in slot 82 only in the direction of arrow A, FIG. 14. The second tab 50, fed to head 80, is positioned in slot 82 in alignment with the tabs 50 still in section 64. (See FIG. 3.) A spring-biased ball detent 83 bears against first tab 50 in slot 82 to assist in maintaining the tab in operative bag-closing position. An opening 85 provides visual access to slot 82 for inspection of tab feed.

The portion of slot 82 remote from end 84 accommodates an elongated, flexible ejector member 90, slidably mounted therein. Ejector 90 is operative to eject the first tab 50 from head 80 and position the second tab 50 in operative bag-securing position.

To effect pivotal movement of magazine 60 into and out of operative position and away from pinch rollers 34 and 36 for reasons made apparent hereinafter, the end of magazine 60 adjacent head 80 is provided with a lateral extension 92. The free end of extension 92 is rotatably secured by pin 94 to a block 96, slidably accommodated in guide 98. Guide 98, in turn, is carried at one end of a horizontally reciprocating operating arm 100, slidably supported on transverse supports 102 carried in the main machine frame. Arm 100 is moved in the direction of arrow B, FIG. 6, by a rotating cam 104. Cam 104 is provided with a cam roller 106 adapted to engage a cam block 108 during a portion of the rotation of cam 104. Upon engagement of cam block 108, cam roller 106 is operative to move arm 100 along supports 102 in the direction of arrow B.

To normally maintain magazine 60 and its associated mechanism in its operative position shown in FIG. 3, a leaf spring 110 (FIG. 11) is fixed at one end to bearing 63, the free end of spring 110 bearing against a bearing block 111 pivotally secured to bearing plate 113, urging magazine 60 into said operative position.

As magazine 60 is moved out of operative position by the action of cam 104, as described hereinabove, ejector 90 is simultaneously effecting the ejection of the first tab 50 in head 80 and positioning the second tab 50 in operative bag-securing position. As stated above, ejector 90 is slidably mounted in slot 82 in head 80. The end 91 of ejector 90, extending rearwardly from head 80 remote from end 84 there (FIG. 13), is circular in cross-section and fits freely into an accommodating recess 117 in one end of a guide block 112. Guide block 112 is secured by pin 115 to a cam roller 114. Roller 114, in turn, is mounted for travel back and forth in an elongated track 116 in a transverse guide 118, supported at each end in extensions 119 of the main machine frame. With this arrangement, ejector 90 is always disposed in alignment with slot 82 during any movement of head 80, and thereby eliminates bending and damage to ejector 90.

As head 80 and magazine 60 are rotated away from operative position, ejector 90 is travelled forwardly relative to head 80 through slot 82 toward end 84 of head 80. As it moves through slot 82, the free end of ejector 90 engages the second tab 50 in head 80 and moves it toward front end 84, against cam face 88, urging stop 86 out of the path of travel of the second tab 50. As ejector 90 continues to move second tab 50 through head 80, the front or leading edge 54 of second tab 50 engages the rear or trailing edge 53 of first tab 50, thereby urging the first tab 50 out of head 80, and positioning the second tab 50 engaged by ejector 90 in the position of the previous first tab 50.

It will be understood that ejector 90, head 80 and

their associated mechanisms are so dimensioned and positioned that when ejector **90** has reached its limit of travel in head **80**, the tab **50** engaged thereby is positioned with its heart-shaped hole **57** extending outwardly from the front edge **84** of head **80** in operative, bag-securing position.

It will also be evident that by providing a flexible ejector **90** having a degree of freedom laterally to the general direction of travel of head **80**, relative movement between ejector **90** and head **80** is assured without binding or damage to the various mechanisms.

Drive shaft **124** (FIG. 17) is provided with a drive gear **126** fixed thereto, which meshes with and rotates a cooperating gear **128** on one end of shaft **130** carried in the machine frame. Shaft **124** also supports cam **104** for rotation therewith. The other end of shaft **130** is provided with a sprocket **132** which is the power source for endless chain **134** trained therearound. Chain **134** is trained for travel about sprocket **132**, sprocket **136** fixed to shaft **26** of conveyor **12** and a sprocket **138** mounted on one end of a shaft **140** carried in the machine frame. Shaft **26** is also provided with a second sprocket **137**. Sprocket **137** drives an endless chain **141**, the other end of which is trained around sprocket **48** fixed to shaft **46**. An idler sprocket **133** maintains chain **134** out of the path of travel of magazine **60**. Thus, shaft **124** effects timed movement of conveyor **12**, pinch rollers **36** and cam **104**, and this shaft is driven by an electric motor **120** through an endless chain **122**.

An operator at the loading station inserts the articles to be packaged, such as loaves of bread, in flexible plastic bags and then places them transversely on conveyor **12** parallel with and in the path of travel of bars **18**. The bags are placed with their open ends or necks on plate **156** and with their closed ends guided by guide **157** on plate **30**. As the bags approach mechanism **10**, the open ends are wiped flat against plate **156** and straightened by a paddle mechanism (FIGS. 1 and 11) supported on bracket **44**, and including spaced, flexible paddles **158** fixed to and rotating with shaft **160**. Shaft **160** is driven through intermediate right angle gearing **162** from transverse shaft **164** to which is fixed a sprocket **166**. An endless chain **168** is trained around sprocket **166** and around a third sprocket **139** on rotating shaft **26**, thus actuating paddles **158**.

A roller **144**, provided with a covering of material having a high coefficient of friction, such as, rubber, cooperates with paddles **158** to straighten the bottom portion of the open ends of the bags on conveyor **12**. Roller **144** is supported on a shaft **148** mounted in suitable bearings **146** on the underside of guide plate **156**. The end of shaft **148** has a pulley **147** thereon, which is driven from resilient pulley belt **145**. Belt **145** is trained at its other end around pulley **151** fixed to elongated shaft **153**. As will be noted from FIG. 17, belt **145** is crossed between pulleys **151** and **147** so that roller **144** is rotated in the opposite direction than shaft **160**. Shaft **153**, in turn, is provided at its other end with a bevel gear **155**, which meshes with and is driven by a transverse pinion **157** fixed to the end of shaft **140** remote from sprocket **138**.

Upon leaving the area in which the wiping action of paddles **158** and bottom roller **144** takes place, the open end of an article-carrying bag on conveyor **12** passes between spaced upper and lower flap guides **172** and **174** and into the bight between tracks **35** and **37** of pinch rollers **34** and **36**. As its open end is engaged by rollers **34** and **36**, the remainder of the bag and loaf is delivered from conveyor **12** onto bridge plate **176** supported on shaft **46**. The open end of the bag is fed by rollers **34** and **36** past edges **58** and **59** of a first tab **50** in head **80** in operative position between rollers **34** and **36**, and through slot **55** into aperture **57** thereof, thus positioning tab **50** in securing position about the open end of the article-carrying bag delivered from conveyor **12**.

Upon completion of the insertion of the open end into aperture **57** of tab **50**, cam roller **104** is rotated into engagement with block **108**, moving head **80** away from rollers **34** and **36**. Simultaneously therewith, ejector **90** proceeds to move the second tab **50** edge to edge against the first tab **50**, effecting the ejection of first tab **50** from head **80**. When the first tab **50**, now positioned in securing position about the open end of the bag, is ejected from head **80**, the bag secured thereby slides down the inclined face **178** of bridge plate **176** (FIG. 1) onto a transverse endless conveyor **180**. Conveyor **180** includes a roller **183** (FIG. 11) mounted on and driven by shaft **153** to deliver closed bags to a storage station (not shown).

The return of head **80** and magazine **60** to operative position by the action of spring **110** effects the withdrawal of ejector **90** in slot **82**, permitting pressure roller **70** to feed the next successive tab **50** in section **64** into the portion of slot **82** aligned therewith.

To control the return of head **80** to operative position, a pneumatic dash-pot arrangement is provided on arm **100**. (See FIG. 18.) This arrangement includes an air cylinder **175** fixed to one of the supports **102**. The operating arm **177** of cylinder **175** is secured to a bracket **179** fixed to the end of arm **100**. When cam **104** is in engagement with block **108** of arm **100**, arm **177** of cylinder **175** is extended to the position shown in dotted line in FIG. 18. When block **108** is released, and spring **110** urges head **80** back into operative position, arm **177** is likewise urged thereby back into cylinder **175**, as shown in solid lines, FIG. 18. However, flow control valve **181** on air cylinder **175** controls the rate of return of arm **177** by controlling the rate of the air from cylinder **175** vented therethrough. Thus, head **80** and its associated mechanism is returned to operative position by spring **110** in a slow, controlled manner, preventing damage to the various mechanisms.

Means is also provided for interrupting the operation of operating arm **100** and its associated members in the event that there is an interruption in the movement of bagged articles on conveyor **12**. A feeler finger **182** (FIG. 1) with one end positioned in the path of travel of articles on conveyor **12** is pivotally supported adjacent its other end on bracket **184** on extension **186** of the machine frame. The end of finger **182** remote from conveyor **12** normally engages the operating pin **188** of a normally closed switch **190**. When finger **182** is lifted by a bag therebeneath on conveyor **12**, this opens switch **190**. The closing of switch **190** completes a circuit energizing a solenoid **192** supported on a bar **194** (FIG. 5) at the limit of travel of arm **100**. The armature **196** of solenoid **192** is secured to one end of a latch **198** the latter being pivotally supported adjacent its midpoint on a frame yoke **200**. Upon actuation of solenoid **192**, armature **196** thereof effects rotation of latch **198** about its pivoted axis moving locking face **199** thereof into retaining engagement with lip **202** formed on arm **100** (FIG. 6). Latch **198** holds arm **100** in non-operative position until the next successive article on conveyor **12** engages and raises finger **182**, causing this to engage pin **188** and open switch **190**. With switch **190** open, solenoid **192** is de-energized, relaxing its armature **196** and effecting release of lip **202** on arm **100** from engagement with latch **198**, and permitting spring **110** to return head **80** and magazine **60** to operative bag-securing position.

In addition, means is provided to ensure positive movement of a secured bag over bridge plate **176**, down face **178** and onto conveyor **180**. This includes a vertically-reciprocating arm **204** (FIGS. 2, 5, 7 and 16) secured adjacent its midpoint to a shaft **206** rotatably mounted at the upper extremities of extension **119** of the machine frame. Arm **204** depends downwardly from shaft **206** with the lower end **208** thereof located adjacent pinch rollers **34** and **36** and terminating in and upwardly bent extension **210**. A cam arm **205** formed integral with arm **204** is provided with a cam roller **212** adapted for travel along the periphery of cam **214** secured to and rotating

with shaft 124. The relative positions of arm 204 on shaft 206 and cam 214 on shaft 124 are such that arm 204 is disposed adjacent the inner edges of pinch rollers 34 and 36, as shown best in FIG. 16.

As a bag is engaged by pinch rollers 34 and 36, the end 208 of arm 204 is disposed as shown in full lines in FIG. 16, with its upward extension 210 generally vertical and end 208 disposed above the bight or horizontal plane of tangency between rollers 34 and 36. Cam 214 is so shaped that lower end 208 of arm 204 generally dwells in this position until the insertion of the bag neck into aperture 57 of the foremost tab 50 in head 80 has been accomplished. As the securing operation is completed, shaft 124 rotates the high point 215 of cam 214 in the direction of the arrow, FIG. 16, into engagement with roller 212. This action swings cam arm 205 of arm 204 upwardly to its position shown in broken lines in FIG. 16, and swings arm 204 downwardly as shown in broken lines in this view. It will be understood that arm 204, this movement, engages the neck section of the bag just secured together by a tab 50, urging the secured bag and its contents downwardly along face 178 onto conveyor 180 and out of the area of operation of mechanism 10. Upon ejection of the secured bag, the continued rotation of cam 214 is effective to return arm 204 to its upper operative position shown in full lines, FIG. 16, to await arrival of the next successive bag on conveyor 12. Arm 204 thus ensures positive ejecting of bags from mechanism 10, preventing damage thereto.

Referring specifically to FIGS. 19–27, wherein is illustrated my improvement upon the above described Rocholl bag closing machine, which improvement constitutes the present invention, wherein like numerals designate like parts of both said machines.

The present invention comprises a closure tab supplying mechanism 250 which includes a stationary tab magazine 260 for feeding tabs 50 into operative position adjacent coacting pinch rollers 297 and 299. Tab magazine 260 is similar in construction to magazine 60 of the above described Rocholl machine, excepting that magazine 260 is stationary and it will be understood that tabs 50 are disposed therein and urged therethrough in a manner similar to that already made clear in describing magazine 60.

In this invention, the pinch rollers 297 and 299 are substantially identical in construction and operation to pinch rollers 34 and 36 of the Rocholl machine, with the exception that the large diameter roller 297 is positioned on top for reasons which will subsequently be made clear.

Magazine 260 is fixed to a bracket 302 mounted on extension 67 of the Rocholl machine frame and is stationary relative thereto. Magazine 260 includes a tab delivery section 304 similar to section 64 of magazine 60, through which tabs 50 in proper closure orientation are delivered into operative position adjacent pinch rolls 297 and 299.

To locate tabs 50 in operative position, there is provided a positioning head, designated generally 306 (FIGS. 22, 23 and 24), fixed to the free end of tab delivery section 304 of magazine 300. Head 306 comprises a first tab retainer member 308 (FIG. 24) fixed to the free end of magazine section 304 and having an access opening 310 therein of sufficient width to accommodate the passage broadside of tabs 50 therethrough from section 304. Opening 310 communicates directly with section 304 such that tabs 50, delivered thereto by magazine 260, are urged through opening 310 in member 308. The face 309 of retainer 308 includes an abutment 312 and an elongated transfer bar guide 314 formed thereon.

Cooperating with retainer member 308 is a movable tab transfer bar 316, comprising two sections 318 and 320. Section 318 has an elongated central opening 322 of a width generally coextensive with opening 310. Opening 322 terminates in an elongated narrow slot section 324. Opening 322 and slot 324 adapt section 318 for travel adjacent face 309 with abutment 312 disposed in opening 322 and bar guide 314 in slot 324. An ejector 326 is slidably disposed for travel along the faces 313 and 315 of abutment 312 and bar guide 314, respectively. A pair of spaced outer tab retainer members 328 and 330 maintain the elements of head 306 in assembled relationship (see FIGS. 23 and 24).

To shift transfer bar 316 lengthwise relative to retainer member 308, there is provided a link arm 332 pivotally connected as by stud 334 to bar section 320. The other end of link 332 is pivotally connected to stud 333 slidably carried in slot 334*a* of bell crank arm 336. Arm 336 is rotatably mounted on a shaft 338, while the hub end of arm 336 is provided with cam follower 340. Cam 342 on drive shaft 343, in engagement with follower 340, effects rotation of arm 336 about shaft 338, travelling transfer bar 316 back and forth in head 306, as shown in FIGS. 25–27.

To move ejector 326 along faces 313 and 315, the end of ejector 326 remote from its operative tab-engaging edge 327 is connected by link bar 344 to one end of operating arm 346. The other end of arm 346 is pivotally connected to a stud 347, slidably mounted in slot 348 of bell crank arm 350. Arm 350 is freely rotatably mounted (in common with arm 336) on shaft 338. The hub end of arm 350 is provided with a cam follower 352 in engagement with cam 354, also mounted on drive shaft 343. Springs 337 and 349 normally urge cam followers 340 and 352, respectively, into engagement with their associated cams 342 and 354.

It will be understood that cams 342 and 354 are constructed and arranged to produce movement of their associated elements relatively in a cyclical sequence of operations to be described hereinbelow.

To rotate drive shaft 343, there is provided thereon a suitable drive sprocket 356. An endless drive chain 358 is disposed about a sprocket 356 and about sprocket 360 mounted on a shaft 361 rotatably carried by a bearing 363 on the main machine frame. Shaft 361, in turn, is driven through single-revolution clutch 365 by a drive sprocket 367, suitably driven from motor 120. A tension adjustment for chain 358 is provided, which includes idler sprocket 362 rotatably carried at one end of lever arm 364 pivotally supported on stud 366 mounted for travel in block 370 on the machine frame. The other end of lever 364 bears against the end of a threaded bolt 368, mounted for travel in block 370 on the machine frame. Movement of bolt 368 effects pivotal movement of lever 364 and idler 362 to control the tension in chain 358.

In the operation of this invention, tabs 50 are stored in and delivered from magazine 260 as described hereinabove for magazine 60. Tabs 50 in magazine 260 are urged through delivery section 304 into positioning head 306.

Tabs 50, from magazine delivery section 304, enter head 306 through opening 310 in tab retainer member 308, and hence through opening 322 in transfer bar section 316. Tabs 50, thus entering head 306, are disposed in the same vertical plane they will lie in when extended into their operative securing position between pinch rollers 297 and 299 by tab transfer bar 316 and ejector 326, as described hereinbelow and as shown best in FIG. 25.

At the start of the closure operation, there is disposed in transfer bar 316 between bar members 318 and 320, two contiguous tabs 50A and 50B, as shown in FIG. 25. The leading tab 50A is disposed with its edges 51 and 52 located by bar 316 in operative position between rolls 297 and 299 and slot 55 and aperture 57 extending from the leading end 315 of bar 316.

As with the Rocholl machine, pinch rolls 297 and 299 effect insertion of the open end of the article-carrying bag on conveyor 180 into aperture 57 of the leading tab 50A in bar 316.

Upon completion of the insertion operation, bar 316 is shifted by the action of cam 340 in the direction of

arrow D, FIG. 26. During this movement of bar **316**, ejector **326** remains stationary. Thus, the leading tab **50A**, in contact with the second tab **50B** adjacent edge **327** of ejector **326**, is ejected from bar **316** by the next successive tab **50B**.

It will be understood that by positioning the smaller diameter pinch roll **299** on the bottom, the bag and its securing tab **50** freely drop onto conveyor **180** without interference.

Ejector **326** remains stationary relative to transfer bar **316** until the next consecutive tab **50B** is disposed in bar **316**, and is extending from the leading end **315***a* thereof, as shown in FIG. 27. Tab **50B** however, in this position is not yet fully extended from bar **316** in bag-securing position.

With the second tab **50B** positioned in bar **316**, as shown in FIG. 27, ejector **326** is shifted in the direction of arrow E, FIG. 27, by the action of cam **354** and its associated linkages. Bar **316** and ejector **326** continue to move in the direction of arrows D and E, respectively, until they are in their respective fully-retracted positions shown in FIG. 22. In this position, the next successive tab **50C** is free to enter bar **316** through aligned access openings **310** and **322** from magazine **260**. With the next tab **50C** positioned in bar **316** in opening **322**, cam **354** effects movement of ejector **326** in the direction opposite to arrow E, FIG. 27, to move the next successive tab **50C** into position adjacent tab **50B** extending from bar **316**. With the next successive tab **50C** located against the tab **50B**, cam **340** effects movement of bar **316** in the direction opposite to arrow D, FIG. 26, moving bar **316** back to operative bag-securing position shown in FIG. 25.

Bar **316** is returned to its position shown in FIG. 25 to await the next bag to be secured. Ejector **326**, however, continues to move toward its position shown in FIG. 25. This continued movement of ejector **326** relative to bar **316** urges tab **50C** against tab **50B** and effects full extension of tab **50B** into operative bag-securing position with the leading tab **50B** adjacent pinch rolls **297** and **299** where the mechanism awaits the next successive loaf to be delivered thereto.

Means is provided for interrupting the operation of head **306** and its associated members in the event that there is an interruption in the movement of bagged articles to pinch rolls **297** and **299**. A feeler finger **372** is disposed in the path of travel of articles delivered to pinch rolls **297** and **299**, and is adapted to engage and close a normally open micro-switch **374** when articles are thus delivered along conveyor **12**. The closing of micro-switch **374**, in turn, actuates a solenoid **376** supported on a bracket **378** on the main machine frame, as shown in FIG. 22A. The armature of solenoid **376** is connected to a solenoid lever **380**, in turn pivotally connected to a transversely-disposed clutch lever **382**, pivotally mounted at its other end in a bracket **384** on the machine frame.

Upon actuation of solenoid **376**, clutch lever **382** is pivoted about bracket **384** away from single-revolution clutch **365**, releasing clutch **365** and its associated mechanism for the next cyclic operation of head **306** and its related elements.

It will be understood that if the flow of articles on conveyor **12** is interrupted, switch **374** remains open and clutch **365** remains disengaged, interrupting the operation of head **306** until the flow of articles is resumed.

Thus, there is disclosed a simple, efficient and reliable device for applying a pre-formed closure tab about the open end of a flexible container.

What is claimed is:

1. In a bag closing machine employing flat sheet closure tabs, each of which has a bag neck confining aperture and a narrow opening through which said neck may be fed into said aperture, the combination of: stationary magazine means having a chamber confining a column of said tabs in face to face relation; means propelling said column along said chamber towards an end of said magazine means; a head mounted on said end of said magazine means and having a slideway communicating with said chamber and disposed transversely thereof; a slide bar slidable in said slideway and having a passage extending lengthwise thereof and dimensioned for feeding said tabs in edge-to-edge tandem relation from said magazine chamber and out of said passage at one end thereof; an ejector slidably extending into the opposite end of said passage; and means for cyclically reciprocating said bar in said slideway and said ejector in said passage to advance tabs sequentially from said magazine along said passage and out of said end of said passage, the foremost tab being so advanced in each tab feeding cycle and being placed, by a substantial extension of said bar from said slideway, in a position for introducing a bag neck into the aperture of said tab, said tab then being ejected from said passage by a retraction of said slide bar relative to said head and said ejector; and means operating in timely relation with said cyclic means for feeding a bag neck into the closure aperture of each tab while it is in said advanced position aforesaid and before said tab is ejected from said passage.

2. A combination as recited in claim **1**, wherein means is provided for conveying loaded bags to said bag neck feeding means in timed relation with said cyclic means; and means responsive to failure of said conveyor means to deliver such a loaded bag to be closed in any particular cycle of said cyclic means, to render the latter inoperative to eject a tab from said bar during that cycle.

3. A comibnation as recited in claim **1**, wherein said cyclic means include a pair of bell cranks, link means for linking said bell cranks respectively to said bar and said ejector, a cam shaft, and cam means provided on said cam shaft for rocking said bell cranks to co-ordinately reciprocate said bar in said head and said ejector in said bar.

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