Oct. 21, 1969 L. G. BATEMAN 3,473,294

BAG MAKING MACHINE

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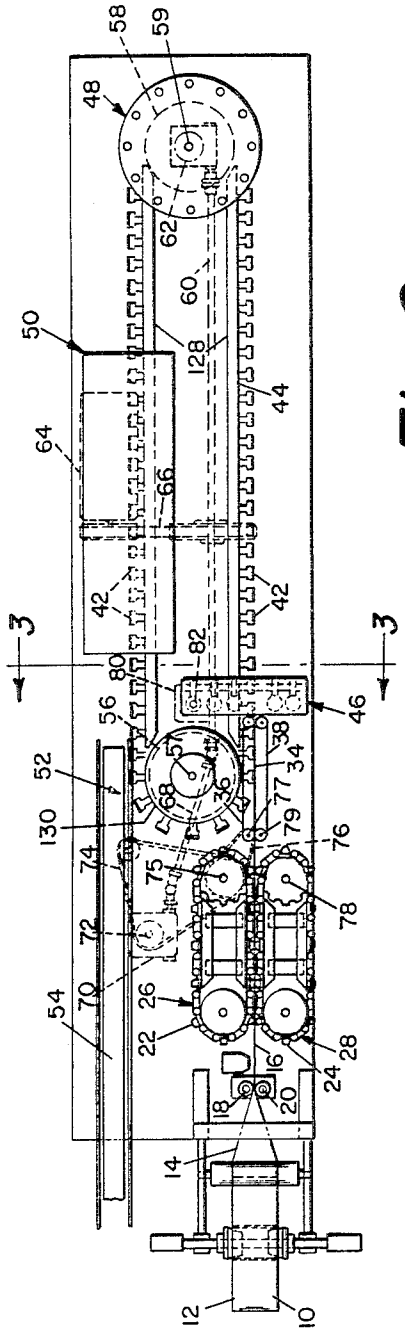

Fig. 1

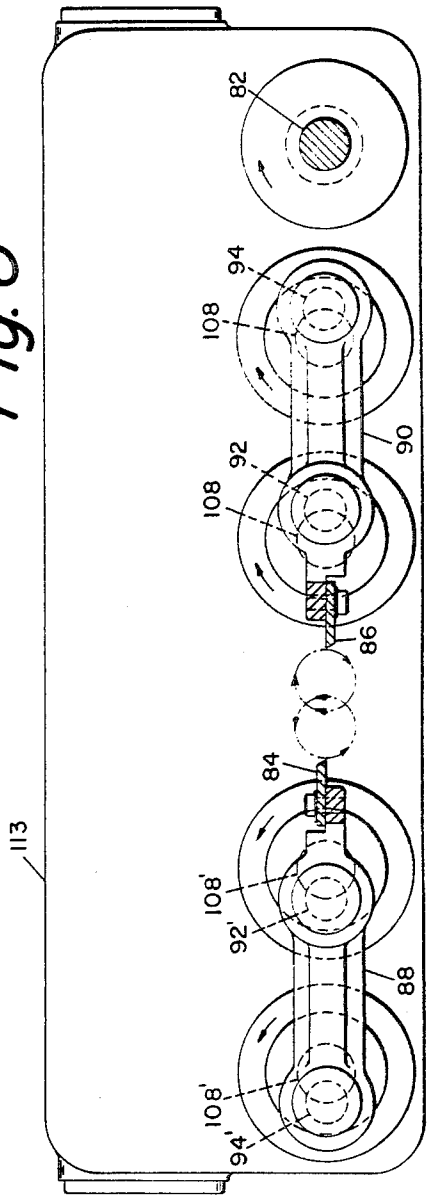

Fig. 6

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BAG MAKING MACHINE

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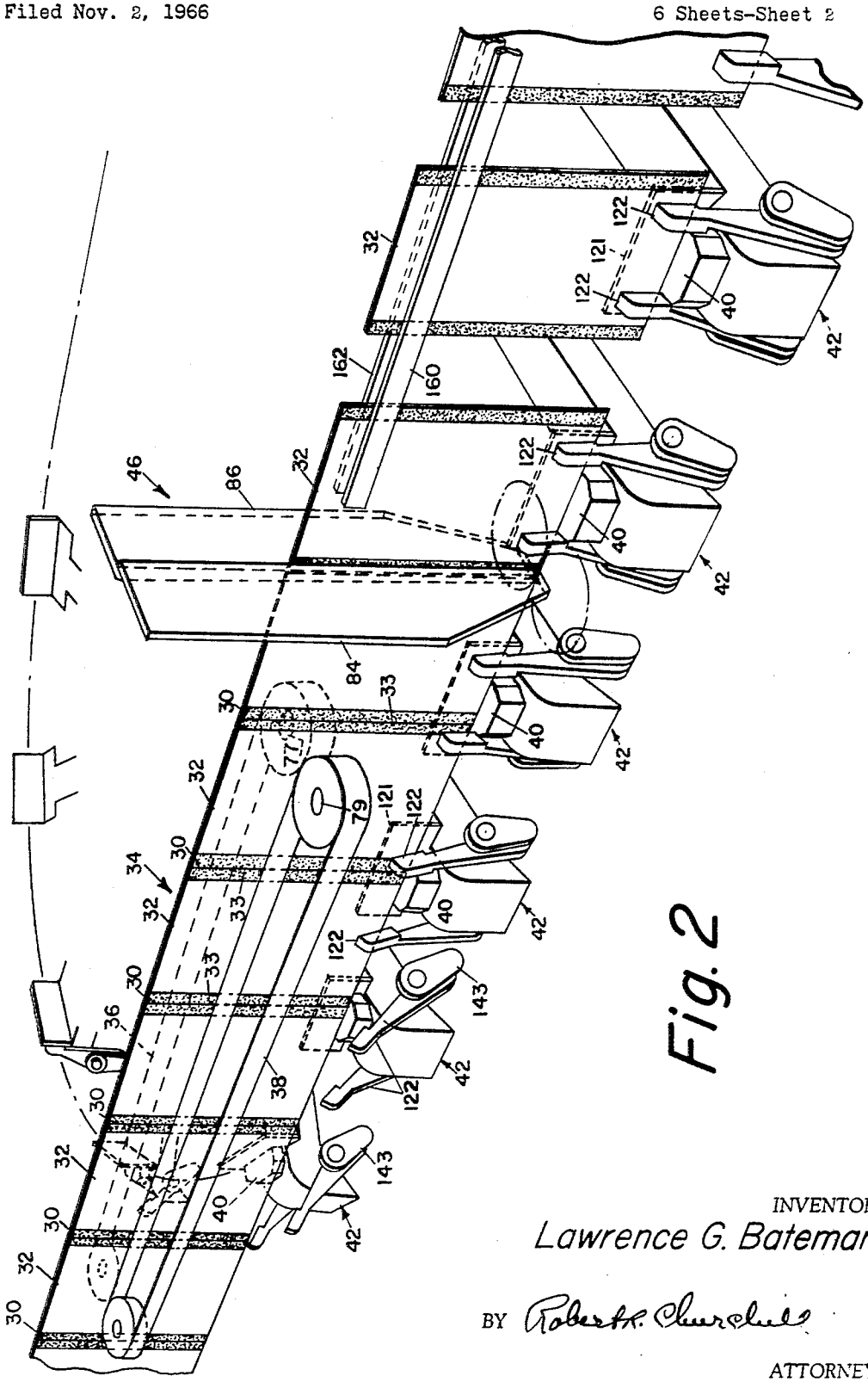

Fig. 2

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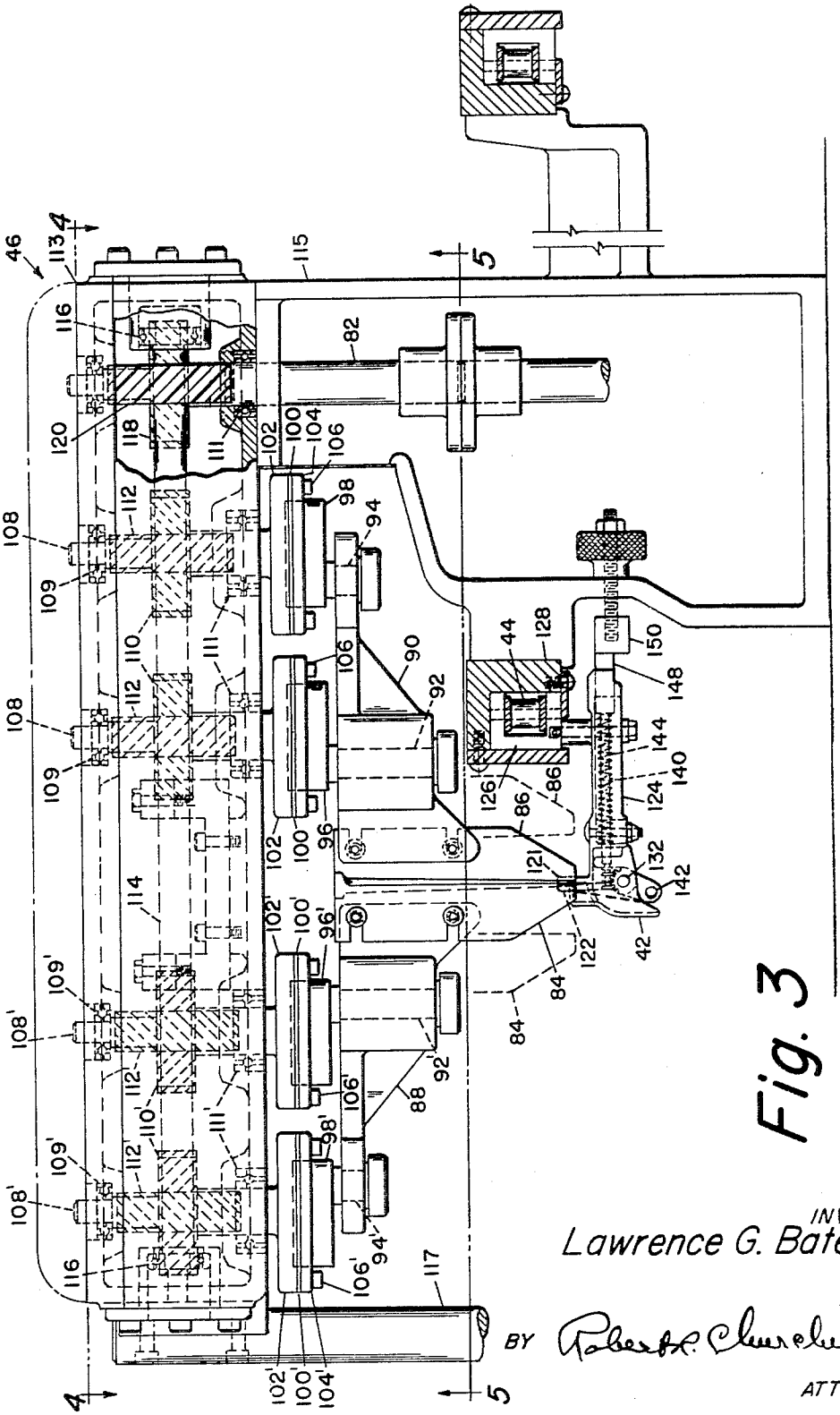

Fig. 3

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BAG MAKING MACHINE

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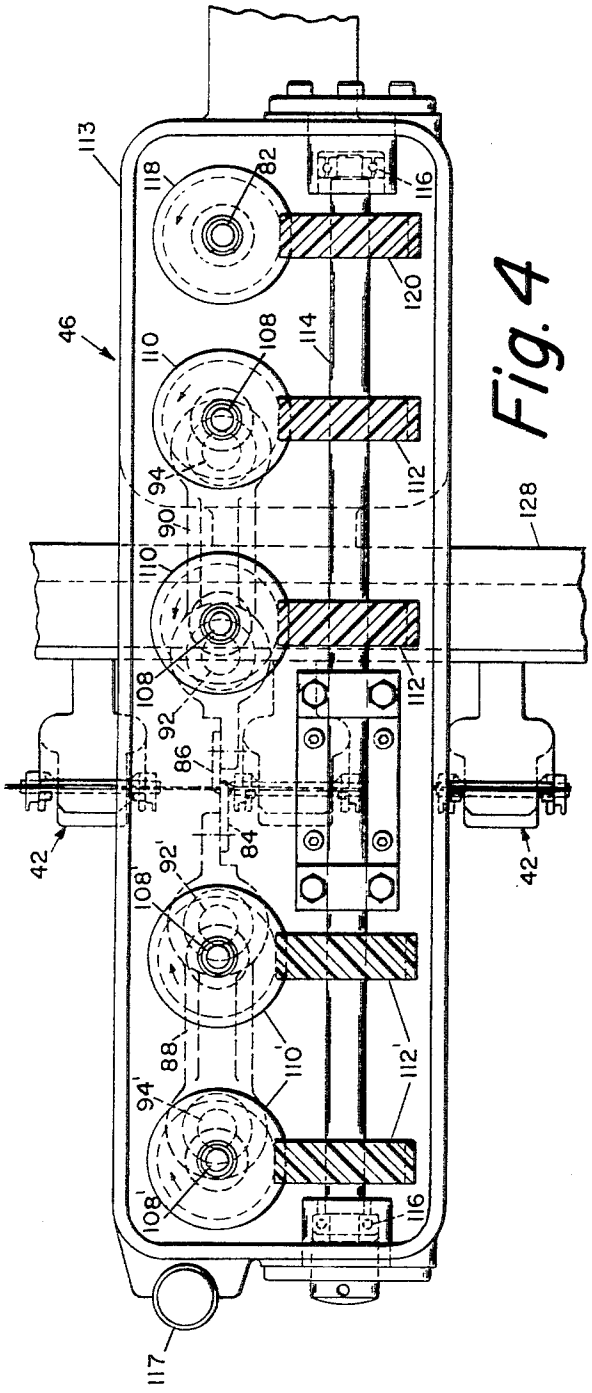

Fig. 4

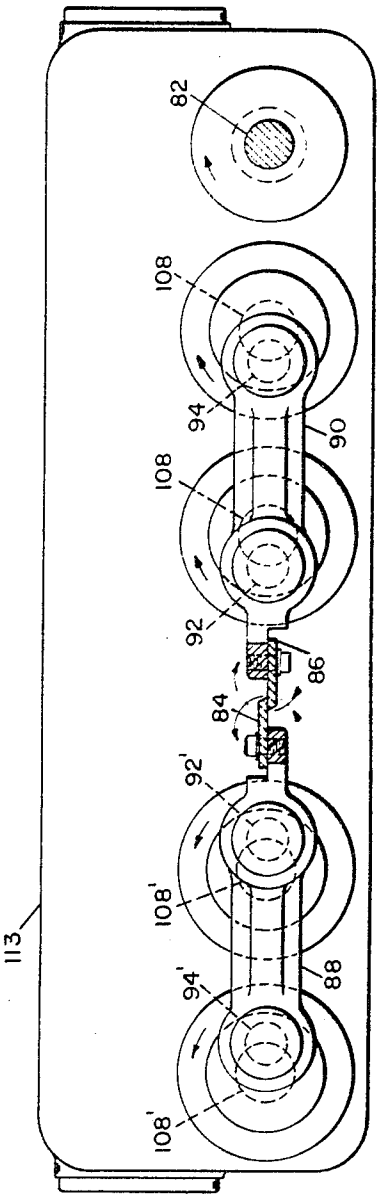

Fig. 5

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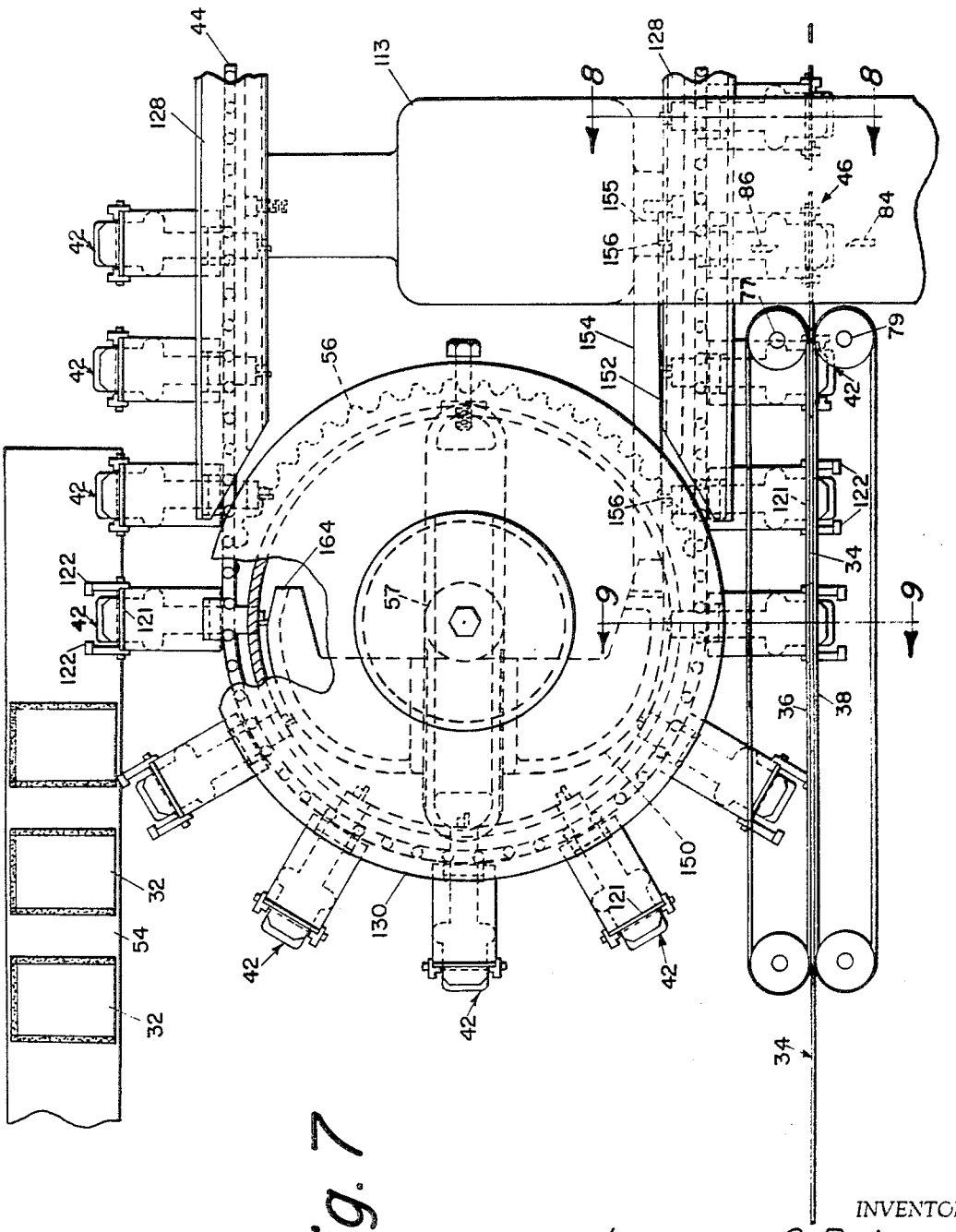

Fig. 7

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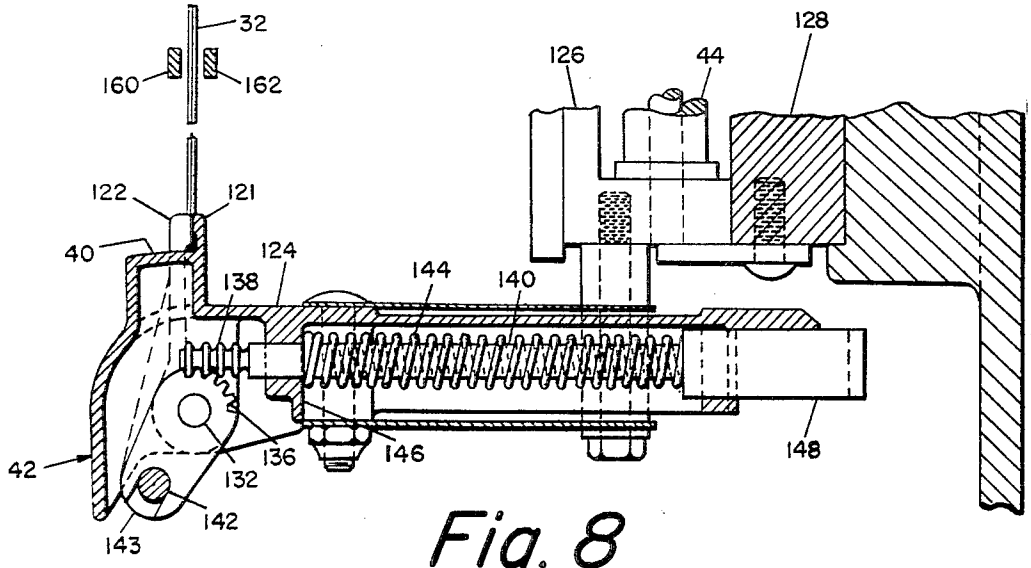

Fig. 8

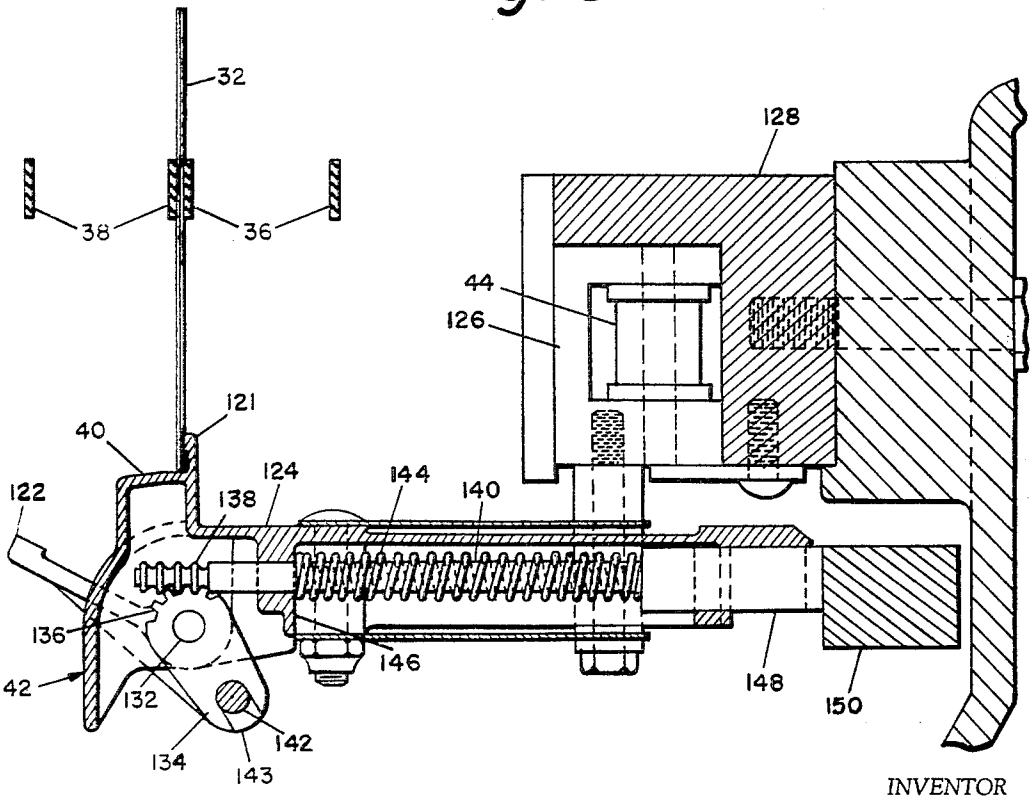

Fig. 9

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3,473,294

BAG MAKING MACHINE

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Int. Cl. B31b *23/14;* B26d *1/36, 1/40*
U.S. Cl. 53—187 9 Claims

ABSTRACT OF THE DISCLOSURE

A bag making machine for making pouch type bags wherein successive endmost bag sections of a continuously moving strip of connected bag sections are severed from the strip and wherein each severed bag section is immediately gripped and advanced in spaced relation by successive faster moving carriers which carry the bags to filling and top sealing mechanisms to complete the bag.

This invention relates to a bag making machine for producing pouch type bags.

The invention has for an object to provide a novel and improved bag making machine for producing pouch type bags characterized by novel provision for delivering successive endmost bag sections severed from a continuously moving connected strip thereof directly to successive spaced carriers traveling continuously at a higher rate of speed and which support and convey the bags in spaced relation through filling and top sealing mechanism to complete the bags.

The invention has for a further object to provide a novel and improved method of making filled and sealed pouch type bags of the character specified which includes the step of gripping successive endmost bag sections of a continuously moving connected strip thereof immediately upon severance of the bags from the strip to be carried continuously in spaced relation into operative relation to filling and sealing mechanisms.

With these general objects in view and such others as may hereinafter appear, the invention consists in the bag making machine, in the method of producing bags, and in the various structures, arrangements and combinations of parts hereinafter described and particularly defined in the claims at the end of this specification.

In the drawings illustrating the preferred embodiment of the invention:

FIG. 1 is a plan view of a bag making machine embodying the present invention;

FIG. 2 is a perspective view illustrating that portion of the machine wherein the endmost bag section is gripped bya carrier immediately upon severance of the bag section from the strip;

FIG. 3 is a side elevation of the severing and gripping mechanism as seen from the line 3—3 of FIG. 1;

FIG. 4 is a plan view of the severing mechanism as seen from the line 4—4 of FIG. 3;

FIG. 5 is a bottom view of the severing mechanism as seen from the line 5—5 of FIG. 3;

FIG. 6 is a detail view similar to FIG. 5 showing the cutting blades in their open position;

FIG. 7 is a plan view of one end of the endless carrier showing the receiving run and the delivery run; and

FIGS. 8 and 9 are cross sectional views taken on the lines 8—8 and 9—9, respectively, of FIG. 7 showing the grippers in their open and closed positions.

In general, the present invention contemplates a bag making machine of the type having provision for heat sealing together the side walls of a continuously moving folded web of heat sealable bag making material along spaced transverse zones to provide a series of connected bag sections open at their upper ends. The connected bag sections are then severed intermediate the sealed areas to produce individual bags open at the top, the individual bags being then transferred to continuously moving spaced carriers or grippers. The carriers are arranged to convey the bags past filling mechanism wherein a predetermined quantity of material is deposited into each bag whereupon the open mouths of the bags are sealed and the completed bags are released by their grippers onto a conveyer to be delivered from the machine.

In practice, the strip of connected bag sections is continuously moved at the rate of one bag length per cycle of operation of the machine while the spaced carriers which receive successive bags severed from the strip necessarily travel at a higher rate of speed to convey the bags in spaced relation to the filling and sealing mechanisms. In prior machines of this type it has been the practice to transfer the individual bags severed from the strip into operative relation to be gripped by the carriers, the transferring operation being performed by means of accelerating rolls or belts arranged to bring the speed of the bags up to the speed of the carriers whereupon the bags were gripped by the carriers. This prior arrangement left much to be desired because of the difficulty in handling and supporting the individual bags after being cut from the strip and because of the additional mechanism required to transfer the bags from the severing mechanism to the carriers.

In accordance with the present invention, provision is made for presenting the endmost bag section of the strip directly into the partially open jaws of the gripper or carrier prior to severance thereof and for thereafter closing the jaws of the gripper on the endmost bag section immediately upon severance thereof from the strip whereby to obviate the need for any accelerating or transferring mechanism between the severing mechanism and the carriers. In the illustrated embodiment of the invention provision is made for supporting the leading end of the strip of connected bag sections in longitudinal alignment with the faster moving carriers and with the gripping jaws in their partially open position. The slower moving strip and the faster moving carriers are arranged so that just prior to registration of a carrier with the endmost bag section the severing operation is started so that at the completion of the severing operation the bag is in registered position with its carrier at which time the grippers are completely closed upon the bag to convey the bag at a higher rate of speed and in spaced relation to succeeding bags, the grippers serving to carry the bags through the filling and sealing mechanisms and to release the bags onto a discharge conveyer.

Referring now to the drawings, the present invention is embodied in a bag making machine, as more or less dia-

grammatically illustrated in FIG. 1, wherein a web of thermoplastic bag making material **10** is withdrawn from a supply roll **12** thereof and guided under a shaping member **14** arranged to form the web into a U-shaped strip **16** as the web is advanced. The leading end of the folded strip is threaded between a pair of upright rollers **18, 20,** and the strip is then engaged between opposed upright sealing bars **22, 24,** a series of which are carried in spaced relation by opposed continuously traveling conveyer chain units **26, 28,** respectively. The continuously traveling cooperating sealing bars serve to grip and withdraw the web from the supply roll and to heat seal together the side walls of the strip along spaced transverse zones **30,** see FIG. 2, to provide a series of connected bag sections **32** open at the top. The broken line **33** intermediate the edges of each sealed area **30** represents the line through which the bags are subsequently severed. The illustrated sealing mechanism forms the subject matter of my United States Patent No. 3,147,168, issued Sept. 1, 1964, to which reference may be made.

As herein illustrated, in general, the strip **34** of connected bag sections **32** is extended from opposed sealing units **26, 28** between a pair of continuously moving opposed belts **36, 38** which support the leading end of the strip in an upright position, the lower edge of the strip being supported on platforms **40,** see FIG. 2, of a series of spaced gripper carriers **42** carried by an endless conveyer chain **44.** The leading end of the strip passes between the open blades of the severing mechanism indicated generally at **46,** and immediately upon severance of the endmost bag section **32** the grippers are closed on the bag section to carry successive bags in spaced relation to the filling and top closing mechanisms. The filling mechanism is indicated generally at **48,** and the top closing mechanism is indicated generally at **50.** The completed bags are then released by their grippers at the delivery end **52** of the conveyer, the bags being received by a discharge belt **54** to carry them out of the machine.

As illustrated in FIG. 1, the conveyer chain **44** is arranged to run over sprockets **56, 58** carried by upright shafts **57** and **59,** respectively, the latter comprising the driven shaft which is rotated from a main drive shaft **60** through gear connections indicated generally at **62** at one end of the shaft **60.** The main shaft **60** is driven by a motor **64** and belt and pulley connection **66.** The other end of the shaft **60** is connected by an angle shaft **68** to the input shaft of a gear box **70,** the output shaft **72** of the gear box being connected by a chain and sprocket drive **74** to a drive shaft **75** forming a part of the side seam or transverse zone sealing units **26, 28.** The drive shaft **75** is connected by a chain and sprocket drive **76** to a shaft **77** forming a part of the web supporting belts **36, 38.** It will be understood that the shafts **75, 78** of opposed sealing units **26, 28** are geared together to run at the same speed in opposite directions, and the shafts **77, 79** of the web supporting belts are likewise geared together to support and advance the leading end of the strip into operative relation to the grippers **42** and the severing mechanism **46.** As indicated generally in FIG. 1, the severing mechanism is driven from the main drive shaft **60** through a gear box **80** having a vertical output shaft **82.**

Referring now to FIGS. 3, 4 and 5, the severing mechanism **46** includes a pair of opposed cooperating shear blades **84, 86** carried by parallel crank arms **88, 90,** respectively. The blades are arranged to be adjusted to a suitable shearing angle, as shown, and are arranged to be rotated through circular paths into and out of shearing engagement with the strip in a manner such as to move along with the continuously moving strip during the shearing operation.

The crank arms **88, 90** are similarly mounted and, as herein shown, the arm **90** which carries the blade **86** is carried by pins **92, 94** depending from crank disks **96, 98,** respectively. Each crank disk is provided with a flange **100** interposed between and arranged to be rotatably adjusted relative to an upper flange member **102** and an annular retaining member **104,** the parts being connected together in their adjusted position by bolts **106.** Each flange member **102** has connected thereto an upstanding shaft **108** mounted to rotate an upper and lower bearings **109, 111,** respectively, and to which a helical gear **110** is keyed. The gears **110** mesh with helical gears **112** fast on a shaft **114** mounted to rotate in bearings **116.** The shaft **114** is arranged to be rotated from the vertical drive shaft **82** through intermeshing helical gears **118, 120.** The severing mechanism is mounted in a casing **113** supported at one end by a bracket **115** and at its other end by an upright rod **117.** The crank arm **88** is similarly mounted, corresponding parts being identified by the same numerals with the addition of a prime. The helical gears **118, 120** comprise right hand gears, and the helical gears **110, 112** are likewise right hand gears to effect bodily rotation or orbital movement of the shear blade **86** in a counterclockwise direction viewing FIG. 4. The helical gears **110'** and **112'** comprise left hand gears to effect bodily rotation or orbital movement of the shear blade **84** in a clockwise direction viewing FIG. 4. Thus, in operation, the shear blades **84, 86** are moved in parallel alignment into and out of overlapping shearing engagement with the strip of connected bags, the shear being started a short distance prior to their centrally aligned or maximum overlap position, the shear being completed when the blades arrive at their centrally aligned position. It will be apparent that the orbital movement of the blades in parallel relation causes the same to move along with the continuously moving web, the blades being retracted or moved away from each other after the cut is completed. FIG. 5 is a bottom view showing the blades **84, 86** in their centrally aligned shearing position, and FIG. 6 is a similar view showing the blades in their maximum spread apart position. It will be understood that the shearing operation is performed between adjacent carriers, the gripper jaws being spaced inwardly from the adjacent transverse sealed zones **30.**

In accordance with the present invention, the endmost bag section **32** is arranged to be gripped between the stationary and movable jaws **121, 122,** respectively, of a carrier or gripper unit **42** immediately upon severance of the bag section. As illustarted in FIGS. 8 and 9, each gripper unit **42** includes a laterally extended hollow gripper supporting member **124** bolted to a U-shaped block **126** connected to the chain **44,** the block being guided in elongated tracks **128** along the straight runs of the chain, and in stationary semicircular guides **130** at the ends of the conveyer, see FIG. 1.

The outer end of the gripper supporting member **124** provides the platform **40** along which the bottom of the strip and also the severed bag section rests, the spaced stationary jaws **121** extending upwardly from the inner end of the platform for cooperation with the movable jaws **122.** The spaced movable jaws are fast on the ends of a pin **132** carried by the supporting member. Also fast on the pin **132** and intermediate the ends thereof is an arm **134** having a segmental gear **136** formed thereon for cooperation with gear teeth **138** formed on the end of a shaft **140** slidingly supported in the hollow member **124.** The movable jaws **122** are connected to move together by a pin **142** extended between arms **143** formed integrally with the jaws, and the arm **134** is slotted to embrace the pin **142** and to effect rocking of the jaws **122** upon longitudinal reciprocation of the shaft **140.** the shaft **140** is provided with a spring **44** coiled thereabout and interposed between a depending bearing portion **146** of the member **124** and a shouldered extension **148** formed at the inner end of the shaft. The spring **144** is arranged to urge the shaft **140** inwardly to effect closing of the gripper jaws **122** into cooperating engagement with the stationary jaws **121,** the inward movement of the shaft **140** being limited by closing of the jaws as shown in FIG. 8.

As illustrated in FIG. 7, the movable jaws **122** are

arranged to be opened by engagement of the inner end of the shaft **140** with a stationary curved cam rail **150** disposed at the receiving end of the conveyor, the jaws being opened wide at this time, as shown in FIG. 9, so that the jaws will be rocked down out of the path of the lower edge of the extended end of the strip of connected bag sections as the gripper units are moved from the circular path into the straight run of the gripper conveyer. Thereafter, the inner end of the shaft **140** follows an angular surface **152** of a stationary cam rail **154** which is arranged to effect gradual closing of the movable jaws to a nearly closed position. It will be understood that at this time the extended strip of connected bags rests on successive platforms **40** of successive faster moving gripping units **42**, the latter sliding along under the slower moving strip which is supported at its upper end between the driven belts **36, 38**. With the gripper jaws **122** in their nearly closed position, the lower edge of the strip is supported in alignment with the stationary jaws **121**. Also, the nearly closed gripper jaws permit the jaws to pass between the open shearing blades **84, 86**, as indicated in FIG. 3, to avoid interference with the blades. Furthermore, the nearly closed position of the gripper jaws **122** is arranged so that the remaining movement to effect complete closing of the jaws upon severance of the endmost bag section is reduced to a minimum for rapid clamping or gripping action. As herein shown, the end of the shouldered extension **148** in engagement with the cam rail **154** is provided with a narrow offset or stepped portion **156** and the cam rail **154** terminates at a point **155** arranged so that in operation when the narrow portion **156** slides off the end of the rail **154** immediately after severeance of the bag section, the jaws **122** are rapidly closed on the severed bag section with a snap by virtue of the spring **144**.

It will be understood that the rate of speed of the slower moving strip of connected bag sections and the rate of speed of the gripper units are coordinated so that the endmost bag section will be momentarily aligned with its respective faster moving gripping unit immediately upon severance of the endmost bag section and that the shearing blades **84, 86** and the end of the cam rail **154** are disposed relative to the momentary registration of the bag and the gripping unit so as to effect gripping of the bag section immediately upon severance thereof. As illustrated in FIG. 2, after severance and gripping of the bag sections at their lower ends, the upper ends of the bags are supported between spaced guide rails **160, 162**. In the illustrated embodiment of the invention the strip of connected bag sections travel one bag width or two and three-quarters inches per cycle, and the gripper units travel four inches per cycle corresponding to the spacing thereof.

After the bags supported in the gripper units **42** have passed through the filling and sealing mechanisms, the bags are released at the end of the return run **52** of the chain 44 by engagement of the inner end of the shaft **140** with a stationary curved cam **164**, as shown in FIG. 7, to effect outward rocking of the grippers **122**, the released bags being received on the discharge conveyor **54**.

From the above description it will be seen that the present bag making machine is capable of aligning and registering successive endmost connected bag sections traveling at one rate of speed with successive spaced carriers traveling at a higher rate of speed in a manner such that the endmost bag section may be gripped by its carrier immediately upon severance thereof from the strip whereby to eliminate intermediate accelerating and advancing mechanism between the shearing mechanism and the carriers.

While the preferred embodiment of the invention has been herein illustrated and described, it will be understood that the invention may be embodied in other forms within the scope of the following claims.

Having thus described the invention, what is claimed is:

1. In a bag making machine of the character described, in combination, means for continuously advancing an elongated strip of connected bag sections sealed along spaced transverse zones, means for severing successive endmost bag sections from the strip through said transverse zones during the continuous advance thereof to form individual bag sections, and continuously moving means for gripping and conveying successive bag sections in spaced relation immediately upon severance thereof from the strip, each of said gripping means having a supportion platform upon which the strip is supported in non-gripping relation prior to the severing operation, and against which the individual bags rest during and after the severing and gripping operation.

2. A bag making machine as defined in claim **1** wherein the elongated strip of connected bag sections is continuously advanced at a rate of one bag width per cycle of operation of the machine, and wherein the spaced gripping and conveying means comprise carriers traveling at a greater rate of advance per cycle of operation of the machine.

3. A bag making machine as defined in claim **1** wherein the elongated strip of connected bag sections is continuously advanced at a rate of one bag width per cycle of operation of the machine, and wherein the spaced gripping and conveying means comprise carriers traveling at a greater rate of advance per cycle of operation of the machine, said severing operation being completed and said gripping operation occurring upon momentary registration of a slower moving bag section with its faster moving carrier.

4. A bag making machine as defined in claim **3** wherein the severing means is arranged to move along with the strip of connected bag sections during the severing operation, and wherein the severing operation is initiated prior to registration of the bag section with its carrier.

5. A bag making machine as defined in claim **1** wherein the gripping and conveying means includes gripper jaws, and wherein the elongated strip of connected bag sections is aligned with and supported between the partially open jaws of successive gripping and conveying means prior to and during severance of the endmost bag section from the strip, and means for rapidly closing the gripper jaws on the endmost bag section immediately upon severance thereof from the strip.

6. In a bag making machine of the character described, in combination, means for continuously advancing an elongated strip of connected bag sections sealed along spaced transverse zones, an endless conveyor having spaced carriers provided with gripper jaws and traveling continuously at a faster rate than said strip, said advancing means arranged to guide said slower moving strip in longitudinal alignment with said carriers and with the strip supported between the partially open jaws of said carriers, means for severing successive endmost bag sections through said sealed transverse zones to form individual bag sections, and means for closing said jaws upon a bag section immediately upon completion of the severing operation and at a time when the endmost bag section is momentarily aligned with its carrier, each of said carriers being provided with a platform upon successive of which the lower edge of said elongated strip is supported during longitudinal alignment with said carriers, and wherein said strip advancing means includes a pair of cooperating belts arranged to support the strip in an upright position.

7. A bag making machine as defined in claim **6** wherein the machine is provided with a bag filling means, top closing means, and a bag release station associated with said conveyor, and wherein the carriers are adapted to convey the individual bags in spaced relation to the bag filling and closing means and to the bag release station to discharge the completed bags.

8. A bag making machine as defined in claim **6** wherein the gripper jaws include a relatively stationary jaw upstanding from each platform for cooperation with mov-

able jaws, said jaws being closed upon the lower end of each individual bag, and stationary rails for supporting the individual bag sections in an upright position.

9. The method of producing bags which consists in advancing a strip of connected bag sections sealed along spaced transverse zones, arranging the strip in longitudinal alignment with and supporting the same in non-gripping relation by a series of faster moving spaced gripper carriers, severing successive endmost bag sections from the strip through said sealed zones to form individual bags while supported in said non-gripping relation, and then gripping successive endmost bag sections in the carriers immediately upon severance thereof from the strip and during momentary registration of the endmost bag section with its carrier.

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U.S. Cl. X.R.

93—13; 83—26, 110, 151