United States Patent

Wech

[15] **3,678,813**

[45] **July 25, 1972**

[54] BAG MACHINE

[72] Inventor: **Robert J. Wech,** Pinecrest Road, R.R. 5, Green Bay, Wis. 54303

[22] Filed: **Sept. 1, 1971**

[21] Appl. No.: **176,898**

Related U.S. Application Data

[62] Division of Ser. No. 760,048, Sept. 16, 1968.

[52] **U.S. Cl.** **93/20,** 93/84

[51] **Int. Cl.** **B31b 37/26**

[58] **Field of Search** ..... 93/8 R, 20, 84

[56] **References Cited**

UNITED STATES PATENTS

2,961,930	11/1960	Wamshey et al.	93/20 X
3,185,044	5/1965	Ahlbrandt	93/20

Primary Examiner—Bernard Stickney

Attorney—Francis W. Anderson et. al.

[57] **ABSTRACT**

The bag machine of the present disclosure is of the type which can produce bags made of various thermoplastic sheet material and can be adapted to make side weld or bottom weld bags. The following description will, however, be confined to the production of side weld bags.

A roll of plastic web is mounted on an unwind stand and traverses a folding board constraining the web to fold along its longitudinal median or along a line spaced from and parallel to the longitudinal median in the event it is desired to produce wicketed bags having a lip with a pair of holes in which is inserted a U-shape wire called a wicket. Downstream of the folding board a gusseter is provided to produce a fold which permits greater expansion at the bottom of the bag. The folded and gusseted web thence comes under the influence of a reciprocating transversely disposed seal and cutter bar which divides the web, at longitudinally spaced intervals, to produce individual bags. The bags are then transported to a table which is provided with devices for arranging the bags into a stack.

6 Claims, 10 Drawing Figures

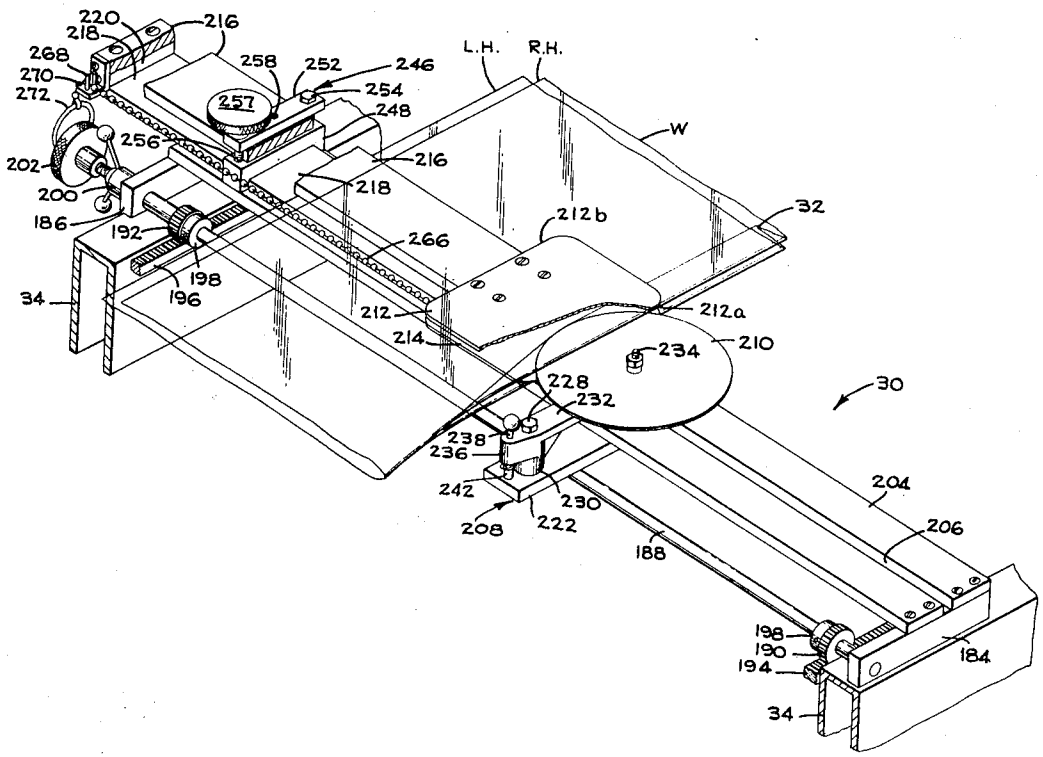
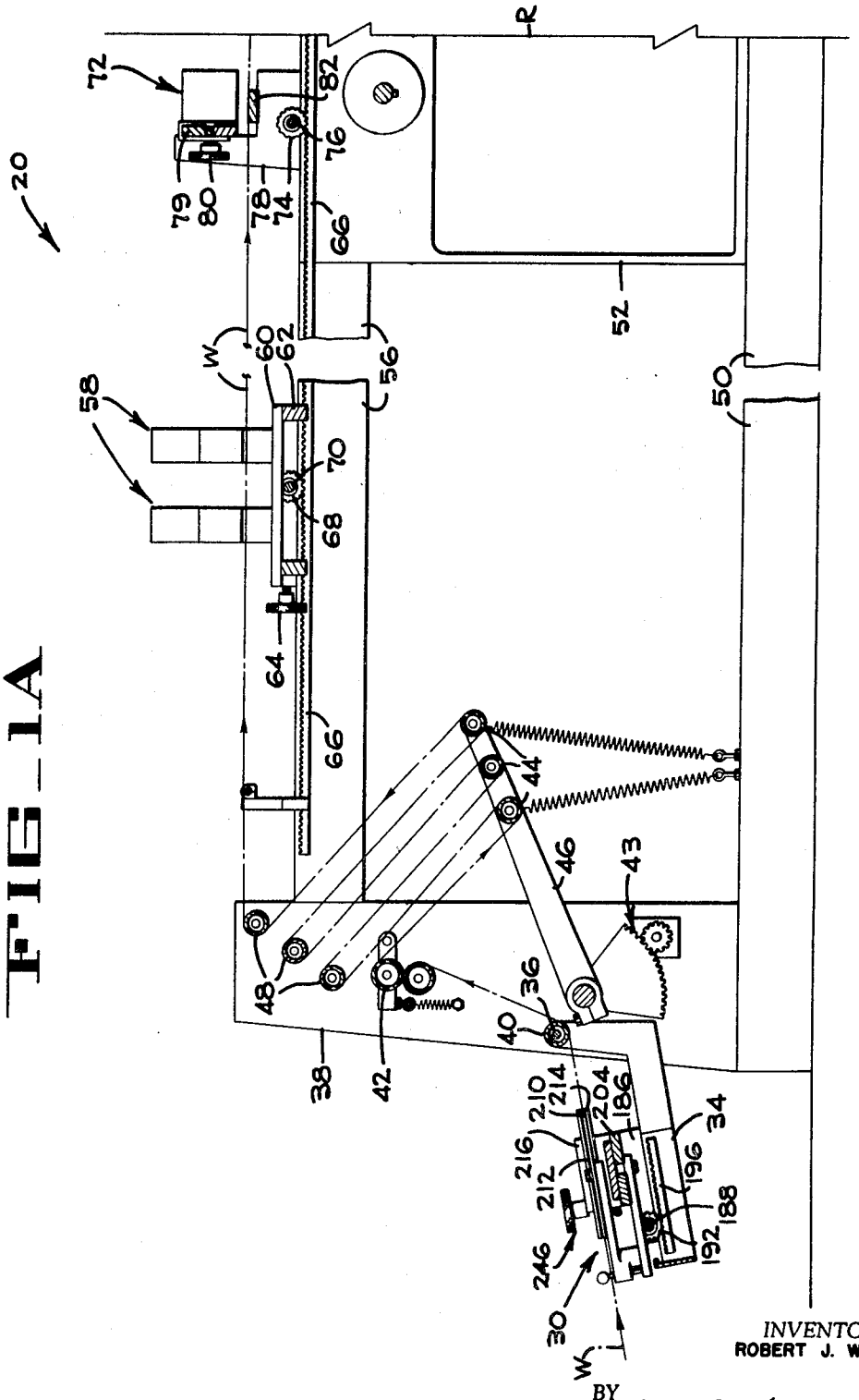


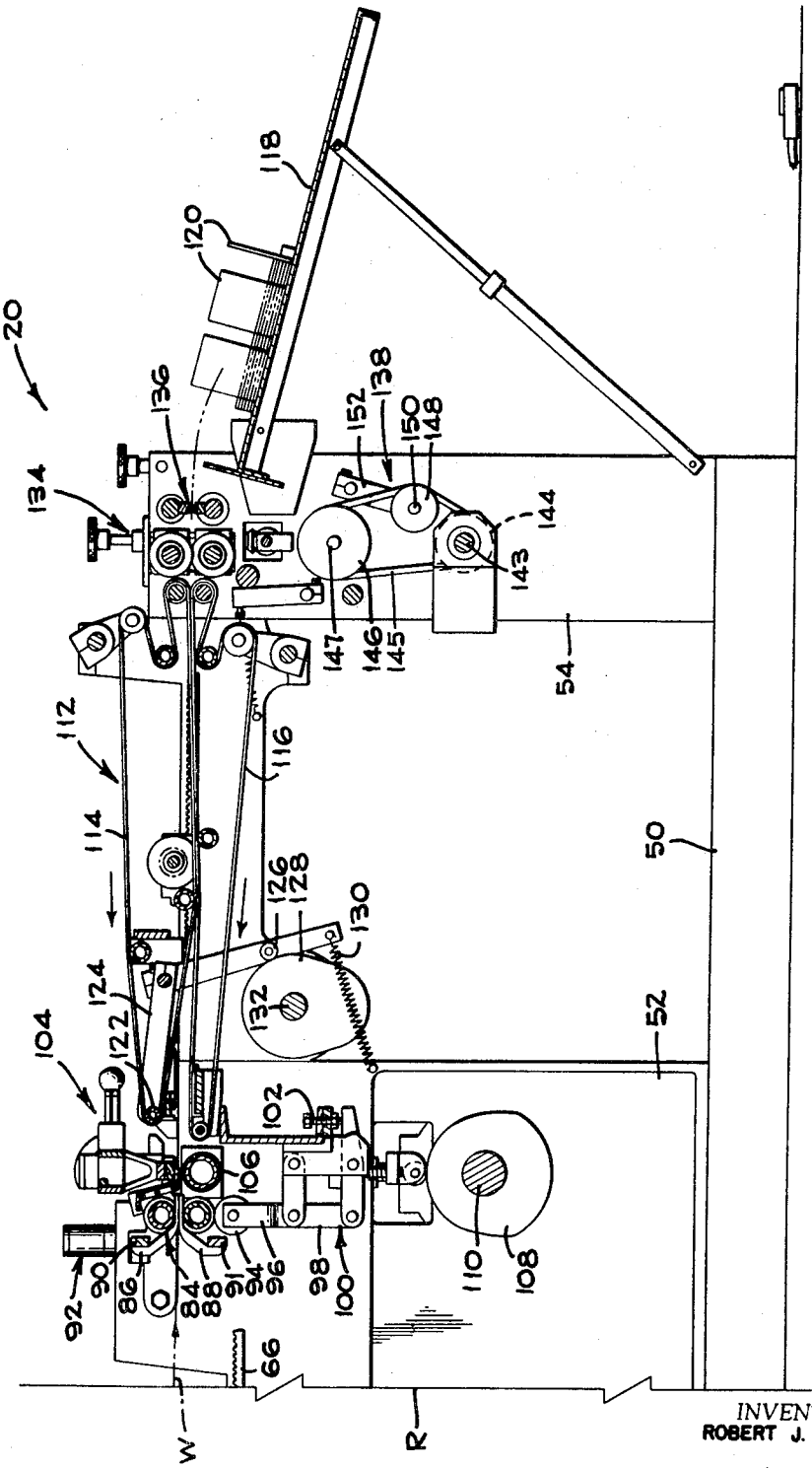
FIG_1A



INVENTOR.
ROBERT J. WECH

BY F. W. Anderson
C. E. Tripp
ATTORNEYS

FIG. 1B



INVENTOR
ROBERT J. WECH

BY F. W. Anderson
C. C. Tripp
ATTORNEYS

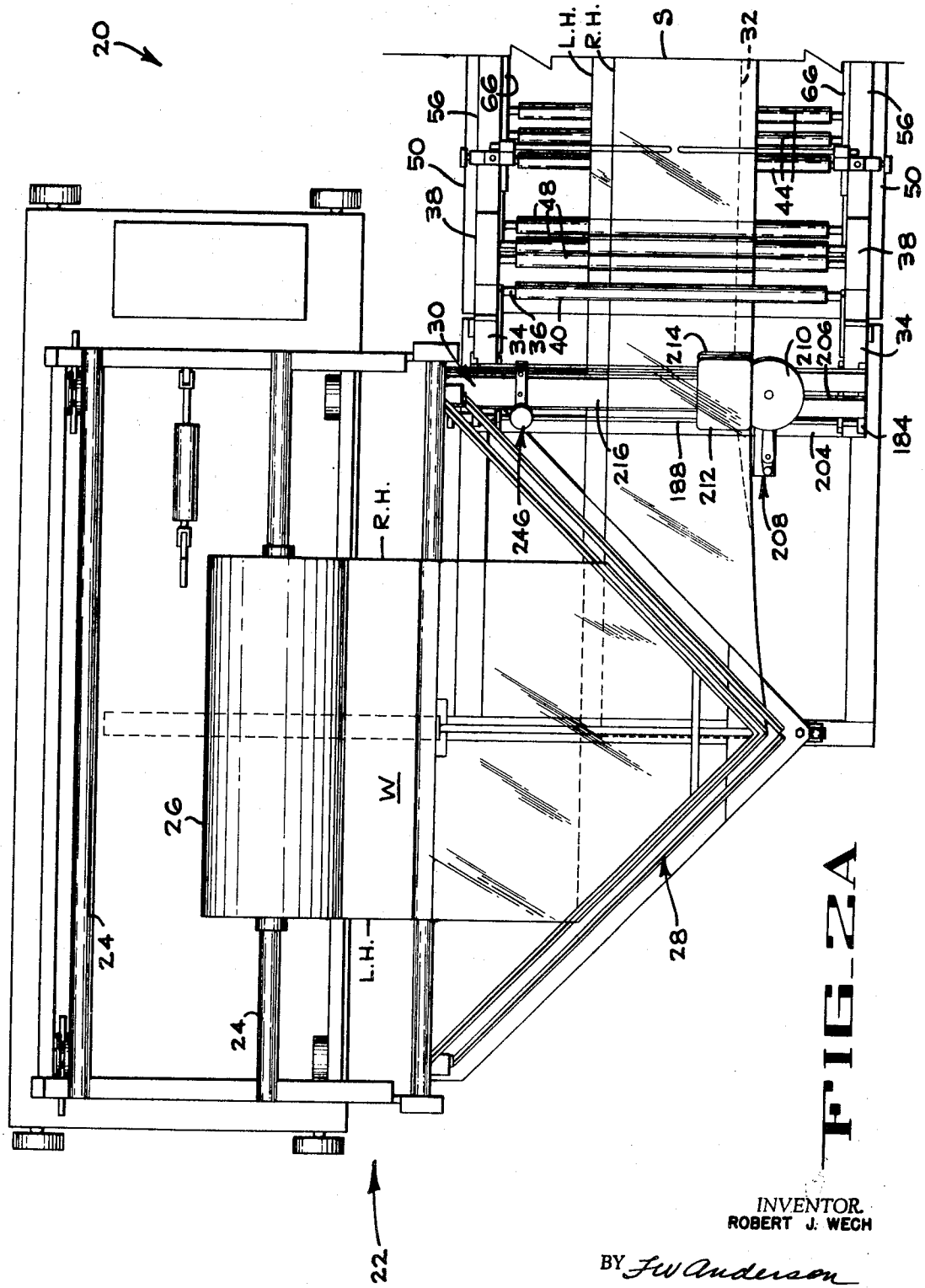


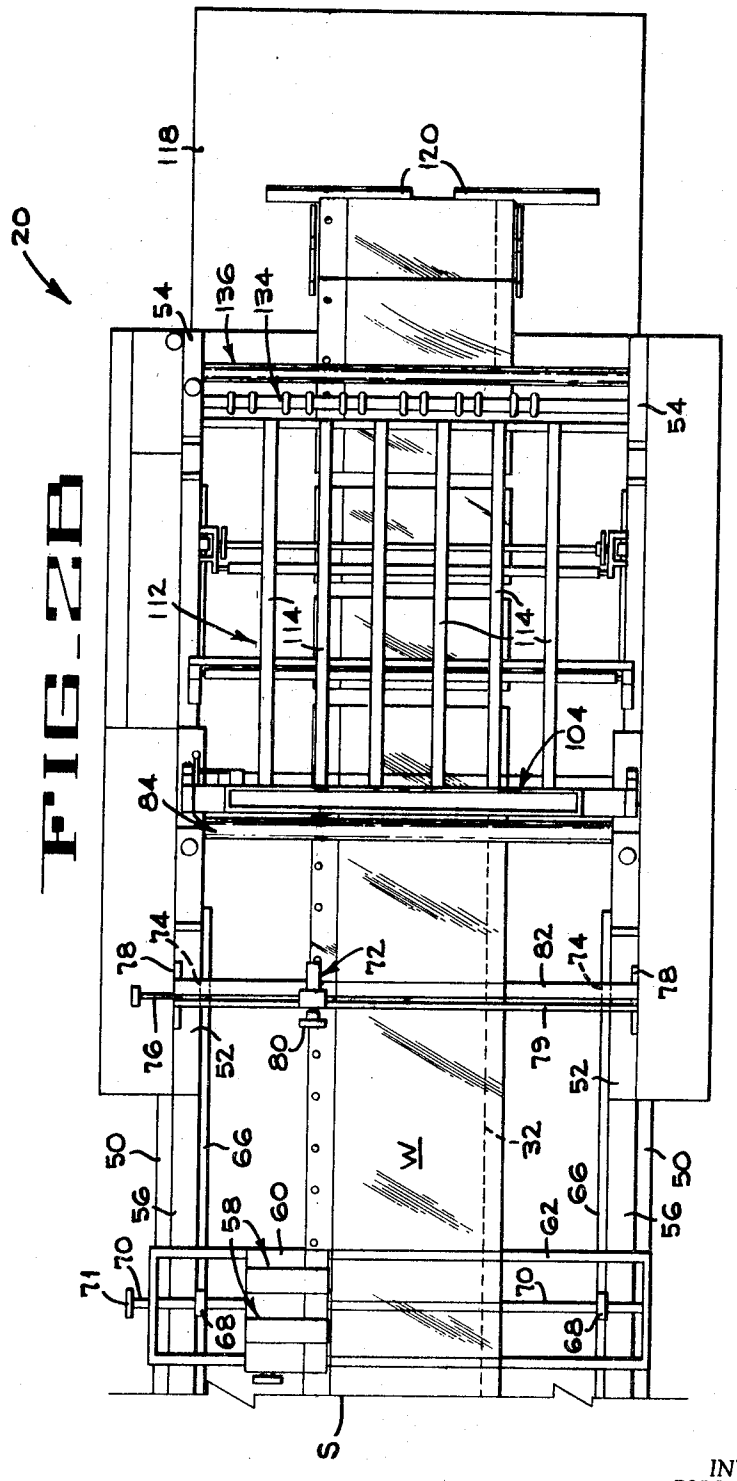
FIG 2A

INVENTOR.
ROBERT J. WECH

BY F W Anderson
C. E. Tripp

ATTORNEYS

FIG_2B



INVENTOR.
ROBERT J. WECH

BY F. W. Anderson
C. E. Tripp
ATTORNEYS

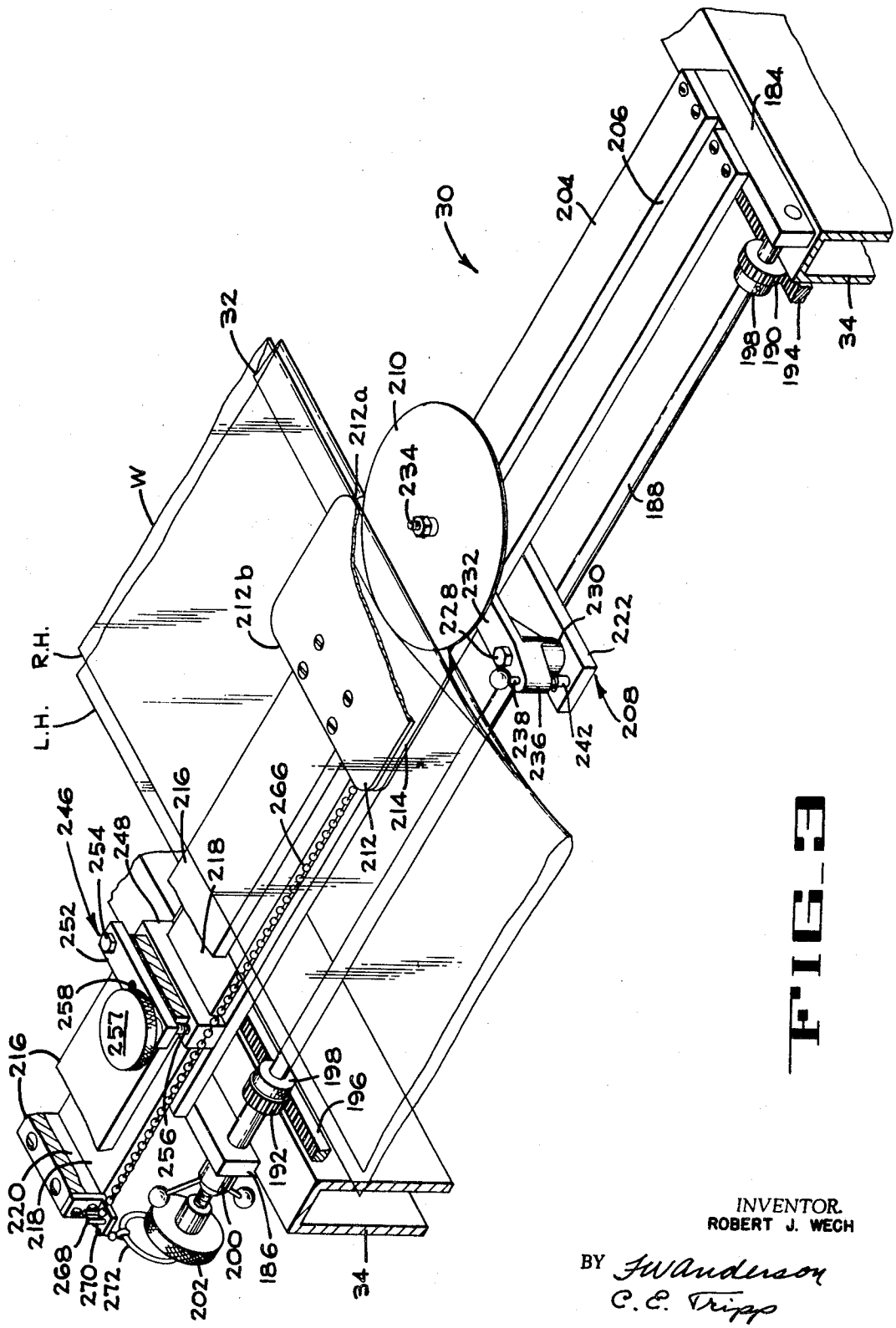


FIG 3

INVENTOR.
ROBERT J. WECH

BY F. W. Anderson
C. E. Tripp
ATTORNEYS

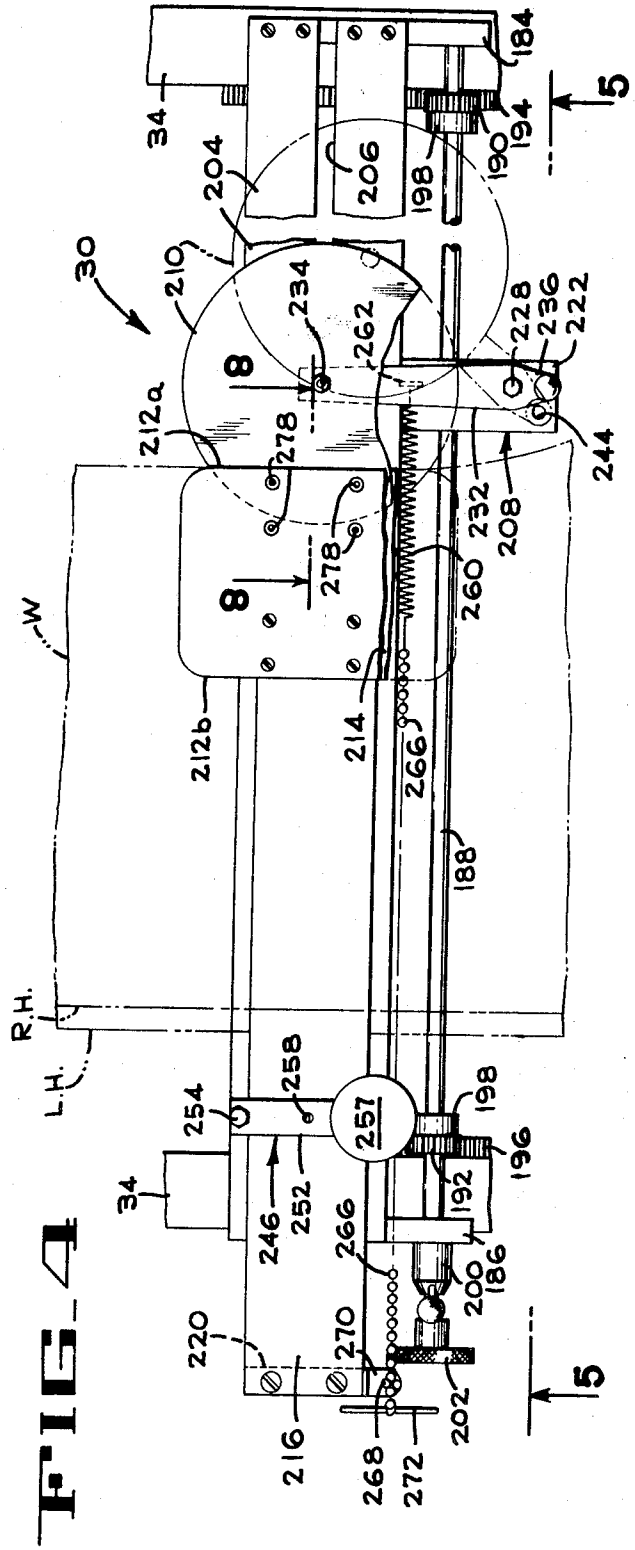


FIG. 4

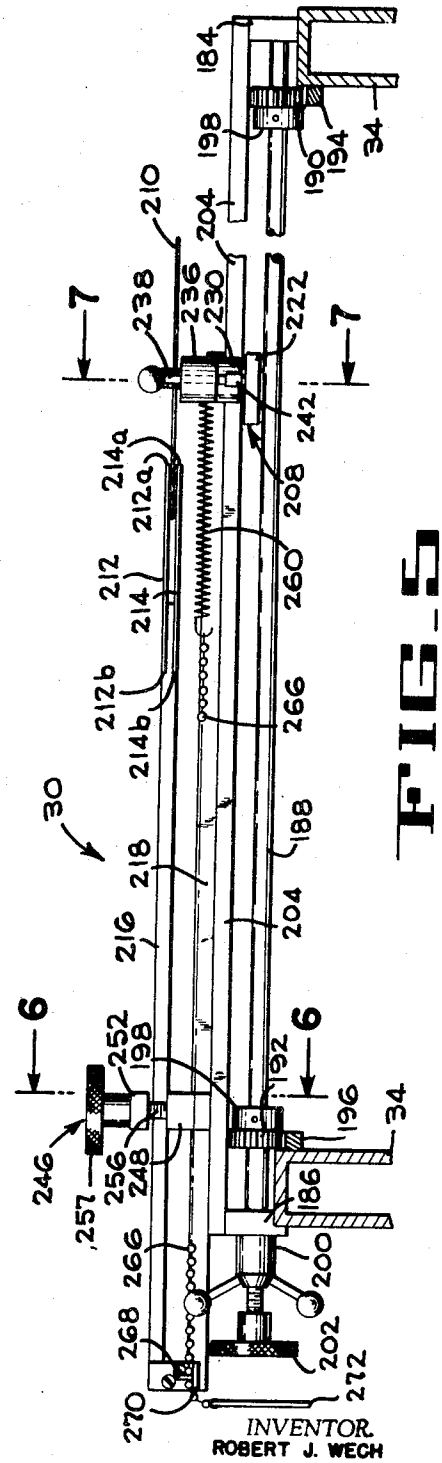


FIG. 5

INVENTOR.
ROBERT J. WECH

BY F. W. Anderson
C. E. Tripp
ATTORNEYS

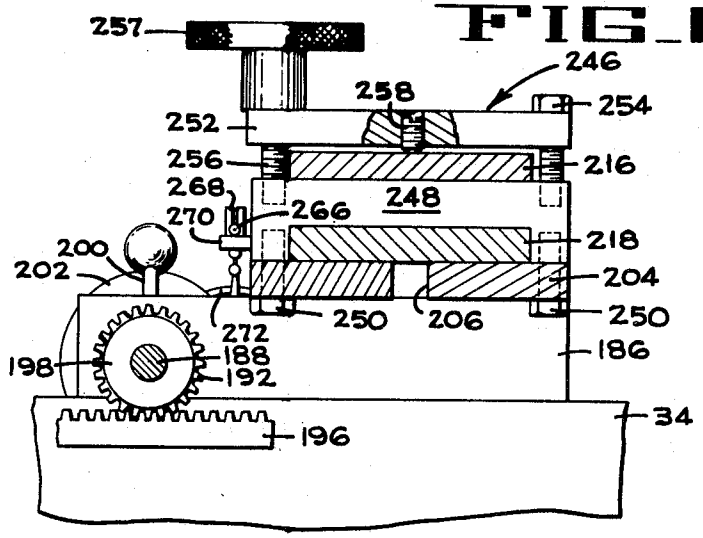


FIG_6

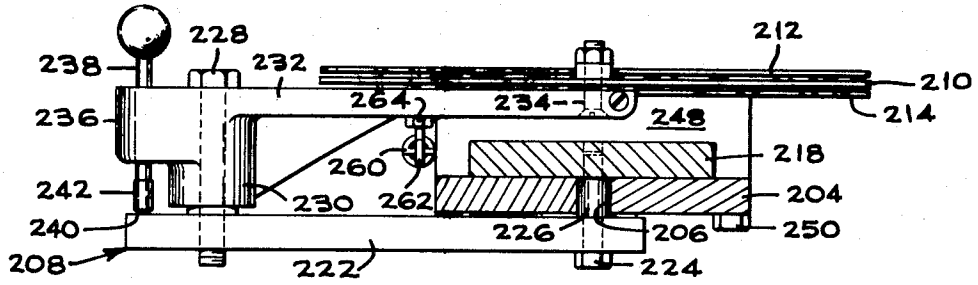


FIG_7

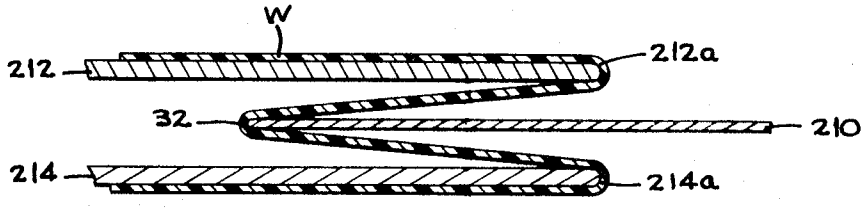


FIG_8

INVENTOR.
ROBERT J. WECH

BY F W Anderson
C. E. Tripp
ATTORNEYS

BAG MACHINE

This application is a division of U.S. application Ser. No. 760,048, filed Sept. 16, 1968.

BACKGROUND OF THE INVENTION

In order to attain a production rate of **200** or more quality thermoplastic bags per minute it is essential to design the bag making machine with features that provide: (a) positive control of the film during its unwinding from the parent roll; (b) maintenance of a fixed positional relationship between the parent roll supporting stand and the infeed frame of the baging machine; (c) when desired, a gusseting mechanism which provides a minimum drag to the film while insuring a gusset of constant depth; (d) web draw rolls whose nip pressure is evenly distributed and has the ability to apply a differential nip pressure from one end of the rolls to the other; (e) mechanism which will release the nip pressure in the event film movement is stopped to prevent the creation of flat spots on the film; (f) a seal bar which will maintain a uniform evenly distributed temperature throughout its length and one that is shielded to prevent heat loss to the film; (g) a seal bar drive arranged for a manual or automatic lift when desired or when web feeding is interrupted for any reason; (h) mechanisms to vary the length of the bag being produced while the machine is operating to correct or change the size of the bags accurately under operating conditions with no down time and; (i) a bag transporting conveyor, which conventionally runs at higher speed than the film, including an easily adjustable positive control arrangement whereby adjustments can be made under operating conditions to insure that the trailing end of the bag is engaged by a conventional bag slow down mechanism to stack the bags so that their margins are in registration.

SUMMARY OF THE INVENTION

The present application is concerned with the provision of a gusseting mechanism which makes a gusset of constant depth, is rapidly adjustable to change the depth of the gusset and is movable transversely in the event it is desired to change the path of the film relative to the longitudinal median of the bag machine. To achieve such flexibility it is preferable, if not essential, that the gusseter be mounted at a place where the speed of the web is substantially constant so as to obviate the problems of uneven gusset depth due to film bounce. To fulfill this condition the gusseter of the present invention is mounted between the folding board and the infeed frame of the bag machine. The construction of the gusseting attachment is designed so that an operator can rapidly and easily adjust the gusseter to produce gussets of a wide range of depth and it also has the ability to reduce, to an absolute minimum, drag imposed on the film thereby reducing the nip pressure of the web feeding rolls. The gusseter is also designed to facilitate threading of a new roll of film into the machine. This is desirably accomplished by moving the gusset forming wheel out of contract with the film.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. 1A and 1B, when viewed together along the break line R show the bag machine of the present invention in longitudinal section wherein the path of the web is shown by a broken line and the direction of web feed is indicated by arrows applied thereto.

FIGS. 2A and 2B, when joined along the break line S, is a plan of the bag machine showing the location of the gusseting attachment of the present invention.

FIG. 3 is an enlarged perspective of the gusseting attachment.

FIG. 4 is a plan view of the gusseting attachment.

FIG. 5 is a front elevation of the gusseting attachment taken substantially along the line 5—5 of FIG. 6.

FIG. 6 is a section taken substantially along the line 6—6 of FIG. 5.

FIG. 7 is another section taken substantially along the line 7—7 of FIG. 5.

FIG. 8 is a partial section, on enlarged scale, taken along the line 8—8 of FIG. 4.

DESCRIPTION OF THE PREFERRED EMBODIMENT

General Arrangement

With reference to FIGS. 1A, 1B, 2A and 2B it will be noted that the bag machine of the present invention is generally indicated by the numeral **20** and it comprises an unwind stand **22** (FIG. 2A) rotatably supporting core shafts **24** which in turn support film rolls **26**. The web, designated by the letter W, unwound from the roll **26** is folded along a line parallel to its ends by a folding board or a V-board **28**. When so called even edged bags are made the fold line is located at the longitudinal median of the web while the fold line for lipped bags is spaced from and parallel to the longitudinal median. FIG. 2A shows the V-board set up for producing lipped bags since the left hand margin of the web, identified by L. H., is laterally spaced from the right hand margin R. H. downstream from the V-board **28**. The web then comes under the influence of a gusseting mechanism **30** which forms an inwardly directed fold on that portion of the web which defines the bottom of the completed bag. The fold is shown by a dotted line in FIG. 2A and is identified by numeral **32**.

Referring to FIG. 1A it will be seen that the gusseting mechanism **30** is mounted on support arms **34** pivotally connected to a transverse rod **36** mounted to and extending between laterally spaced infeed frame members **38**. Rotatably supported on the transverse rod **36** is a roller **40** which directs the web between a first set of infeed rolls of **42** connected to conventional nip pressure regulating means **43**. The web is thence trained about a plurality of idler rollers **44**, mounted on dancer arms **46**, and rollers **48** extending between and rotatably mounted on the infeed frame members **38**. The length of web accumulated in the path defined by the rollers **44** and **48** serves to provide a temporary supply which automatically increases or decreases in response to transient values of web tension. This arrangement tends to produce a constant value of web tension.

The bag machine frame comprises a base plate **50** having mounted thereon transversely spaced upwardly projecting side frame members **52** located substantially at the midportion of the machine. At the discharge end, outfeed frame members **54** are also mounted on the base plate **50** and served to support bag discharge control devices explained in detail hereinafter.

Referring again to FIG. 1A it will be observed that between the infeed frame members **38** and the mid-frame members **52** a horizontal accessory platform **56** is connected therebetween and it serves to support hole punching assemblies **58** mounted on a base plate **60**. As shown in FIG. 2B the base plate **60** is mounted on a rectangular frame **62** and is transversely adjustable on this frame. It is held in a selected transverse position by a lock screw **64**. Longitudinal adjustment of the rectangular frame **62** carrying the hole punch assemblies **58** is accomplished by racks **66** and pinions **68**. As shown diagrammatically in FIG. 2B the racks **66** are fixed to the inner surfaces of the side rails **56** while the pinions **68** are keyed to a transversely extending shaft **70** rotatably mounted in the rectangular frame **62**. On one end of the shaft **70** a knob **71** is keyed for rotating the shaft **70** and consequently adjusting the longitudinal position of the hole punching assemblies **58**.

Downstream of the hole punching assemblies **58** an electronic web registration device **72** commonly referred to as a scanner, is likewise mounted for longitudinal and transverse adjustment. Longitudinal adjustment is accomplished by pinions **74** (FIG. 1A) in mesh with the racks **66**. The pinions **74** are mounted on a transverse shaft **76** rotatably carried in generally L-shaped in frames **78**. On the upright legs of the L frames **78** a transverse bar **79** is secured. Slidably mounted on the bar **79** is the scanner **72** which can be locked in any transverse position by a lock screw **80**. On the horizontal leg of the L frame **78** a transverse bar **82** is mounted and it will be ob-

served, by inspection of FIG. 1A, that its upper surface is in substantially the same plane as the web line. In order to insure repeated response of the scanner the upper surface of the transverse bar **82** is white in color so as to provide good contrast for detection of the printed registration mark. As is conventional the scanner is electrically connected to the control circuit of the bag machine to deenergize the clutch and simultaneously energize the brake thereby arresting the movement of the web for a sufficient period of time to allow the transverse seal bar to operate and thereby make the side weld for two longitudinally adjacent bags. After the seal bar completes its function the control circuit is then conditioned to release the brake and engage the clutch commencing web movement.

As shown in FIG. 1B upstream of the scanner the web passes between intermittently operating draw rolls **84** associated with upper and lower sets of the stripper fingers **86** and **88**, respectively, detachably mounted on transverse bars **90** and **91**. The draw rolls are connected, as hereinafter will be more particularly described, with means, generally indicated by the numeral **92**, for controlling the nip pressure the draw rolls exert on the film and for removing the nip pressure when required, either selectively or automatically.

To resist the deflection of the draw rolls, particularly at their midportion and thereby insure an even value of nip pressure along the length of the draw rolls, a back-up roll **94**, in rolling contact with the lower draw roll, is provided. The back-up roll **94** is rotatably mounted in a yoke **96** having a link extension **98** which forms one link of a parallel linkage mechanism **100**. The vertical position of the back-up roll **94** and accordingly the back-up force it will apply to the draw rolls **84** can be selected by adjusting a screw jack **102**.

Immediately downstream of the draw rolls there is provided a vertically reciprocating sealing mechanism **104**, cooperating with an intermittently rotating seal roll **106** for making the transverse seals in the folded web. These seals constitute the lateral margins of the bags. The seal mechanism is reciprocated by a pair of cams **108** (one of which is shown in FIG. 1B) keyed to a shaft **110**.

After the web passes the seal mechanism individual bags are at that time produced and they are received by a continuously operating belt conveyor **112**. The index conveyor comprises a series of transversely spaced and aligned upper and lower sets of belts **114** and **116**, respectively, moving in a direction indicated by the arrows in FIG. 1B. Those reaches of the belts which are traveling from left to right, as viewed in FIG. 1B, are in contact for the purpose of gripping the bags discharged from the sealing mechanism and transporting them to a stacking table **118** provided with adjustable stop plates **120** for collecting the bags in a stack.

The upper belts **114** of the index conveyor **112** pass around an idler shaft **122** rotatably supported on linkages **124** mounting a cam follower roller **126** which is held in engagement with a cam **128** by a spring **130**. As shown in FIG. 1B the cam **128** is mounted on a shaft **132** and during operation the linkages **124** are oscillated raising and lowering the idler shaft **122** which serves the purpose of accommodating any over travel of the bags as they issue from the sealing and cutting mechanism **104** and thus prevent wrinkling of the bag.

Before the bags are discharged to the stacking table **118** they come under the influence of conventional corrugating rollers **134** which serve to stiffen the bag in the direction of movement so as to prevent distortion thereof as it is ejected to the stacking table **118**. Before being discharged to the stacking table the trailing end of the bag is momentarily gripped by a slow down mechanism **136** of known construction.

In order to synchronize the speed of the belt conveyor so that bags discharged therefrom are momentarily gripped at or adjacent their trailing edge, an electrically adjustable direct current drive arrangement **138** (FIG. 1B) is provided. The drive **138** includes a DC motor, belt and pulley, not shown, for driving a shaft **143**. The shaft **143** has an adjustable pitch pulley **144** at its opposite end which drives a belt **145** trained about a pulley **146** mounted on a shaft **147**. The shaft **147** provides power for the corrugating rollers **134**. To drive the index conveyor **112**, a belt and pulley drive train, not shown, transmits power from the shaft **143** to the upper index conveyor drive roller which is adjacent the lower set of corrugating rollers **134**. For purposes of adjusting the pitch of the adjustable pulley **144**, a tightener pulley **148** tensions the belt **145** and is carried by a stub shaft **150** mounted on an adjustable arm **152**.

Gusseting Mechanism

The gusseting mechanism **30**, generally referred to in the above described general arrangement, is shown in greater detail in FIGS. **3** through **8**. Referring first to FIG. **3**, which shows an enlarged perspective of this mechanism, it will be seen that the gusseting mechanism is supported on the arms **34** by rails **184** and **186** rotatably carrying a shaft **188** having keyed thereon pinions **190** and **192**. The pinions are in mesh with racks **194**, **196** fixed to the inner vertical surfaces of the support arms **34**. The pinions **190**, **192** are held in place on the shaft **188** by collars **198**. The shaft **188** has a threaded extension beyond the rail **186** and has threadedly mounted thereon a jam nut **200**, serving to lock the shaft against rotation, and a hand wheel **202** secured to the shaft **188** for effecting rotation thereof to thereby cause longitudinal translation of the gusseter mechanism **30** whenever the shaft **188** is rotated.

Rigidly attached to the upper surface of the rails **184** and **186** is a support plate **204** provided with a slot **206**. The support plate **204** has attached thereto a mounting bracket generally indicated by the numeral **208** for rotatably supporting a gusseter wheel **210** which, when in its operative position is located between stationary gusseter plates **212** and **214**, the upper and lower plate respectively. These plates are rigidly fastened to a laterally adjustable support bar **216** overlying and spaced from a lower support bar **218** by a spacer block **220**.

The gusseter mounting bracket **208** is shown in side elevation in FIG. **7** and reference to this Figure will show that the bracket comprises an elongate rectangular bar **222** secured to the support bar **218** by bolt **224** having slidably fitted thereon a bushing **226** which is received in the slot **206** and is dimensioned to provide a sliding fit. As will be evident by inspection of FIGS. **3** and **4** it will be seen that the bar **222** extends substantially normal to the support plate **204** and adjacent its outboard end it is tapped to threadedly receive a pivot bolt **228** passing through a boss **230** of an arm **232** rotatably mounting the gusseter wheel **210** on a small flat-head screw **234**.

Also projecting from the boss **230** is a lug **236** carrying a pin **238** having a spring biased ball **240** mounted in a retaining sleeve **242**. As shown in FIG. **4** the rectangular bar **222** has a spherically shaped depression **244** located to receive the spring biased ball **240** when the gusseting wheel **210** is moved to the phantom outlined position shown in FIG. **4**. This holds the gusseting wheel in that position and its main purpose is to facilitate threading of the film through the gusseter. Prior to repositioning the wheel for gusseting, hand folding of that portion of the film adjacent the plates **212** and **214** can be done before the wheel **210** is located between the gusseting plates **212** and **214**.

The gusset forming members, that is the plates **212**, **214**, and the gusseting wheel **210**, are arranged so that they can be located transversely relative to the longitudinal median of the bag machine. Such an adjustment is required when it is desired to produce bags of different length. For example if the film roll on the unwind stand is 24 inches wide the maximum length of a non-gusseted bag would be half that length or 12 inches; while a gusseted bag made from the same film roll would be reduced in length by the amount used for the gusset. In the event film of greater width is used in order to produce gusseted bags of greater length it would be necessary to move the gusseting wheels **210** and the gusseting plates **212** and **214** to the right, as viewed in FIG. **3**. For this purpose a clamping arrangement **246** is provided. With particular reference to FIGS. **3** and **6** it will be observed that the clamp **246** comprises a generally U-shaped base member **248** rigidly attached to the

support plate **204** by fasteners **250**. The base member **248** is formed so that the support bar **218** slidably fits in the generally rectangular space defined by the base member **248** and the plate **204** (FIG. **6**). Disposed above the base member **248** there is a clamping bar **252** having a clearance hole adjacent one end through which is disposed a bolt **254** threaded into the base member **248**. On the other end of the bar another clearance hole is provided having disposed therein a stud **256** also threaded into the base member **248** and provided with a knob **257**. At the intermediate portion of the clamping bar **252** a set screw **258** is threaded therein, bearing on the upper surface of the bar **216**, and is in forceable contact therewith when the stud **256** is tightened. This, of course, locks the bars **216** and **218** in place and accordingly maintains the lateral position of the gusseting wheel **210** and the gusseting plates **212** and **214** since they are mounted, respectively, to the bar **218** and the bar **216**. In view of the above it will be apparent that when it is desired to change the lateral position of the gusseting wheel **210** and the plates **212** and **214** all that is necessary is to loosen the stud **256** sufficient to remove the force supplied by the set screw **258** to the bar **216**. The desired position of the gusseting mechanism can then be achieved manually by pushing or pulling the interconnected bars **216** and **218**.

In order to accommodate the gusseter mechanism **30** to the machining characteristics of the film and to prevent damage to the film in the event portions of the film exhibit more or less resistance to formation, the gusseter wheel **210** is held in its operative position between the plates **212** and **214** by a spring **260**. As shown on FIG. **7** one end of the spring **260** is attached to a hook **262** having a threaded stem threaded into the arm **232**. The hook **262** is held against rotation by a jam nut **264**. The other end of the spring **260** is attached to a bead-chain **266** which extends beyond a catch **268** mounted on a bracket **270**. As will be observed by reference to FIG. **6** the catch **268** is formed with two upwardly extending fingers which fit between adjacent beads of the chain **266**. On the remaining end of the chain **266** a ring **272** is secured which serves to facilitate grasping of the chain and consequent tensioning of the spring **260** to the degree required by the forming characteristics of the film. When a desired degree of tension is achieved, usually determined by observing film formation while the machine is running, the chain is inserted between the upwardly extending pins of the catch **268**. Accordingly it will be seen that by utilizing the spring **260** for urging the gusseter wheel **210** between the plates **212** and **214** the gusseter has the ability to give in the event increased resistance is encountered consequently preventing damage to the film.

Another and further novel feature of the gusseter mechanism pertains to the general configuration of the gusseter plates **212** and **214**. As will be observed these plates are generally rectangular in configuration and are made arcuate at the intersection of the margins. As is known by those skilled in the art, regardless of their design, gusseting attachments wear rather rapidly even though surface preparations such as Teflon are applied to those portions of the gusset forming members which come in contact with the film. While the gusseting mechanism of the present invention reduces the wear to an absolute minimum, particularly on the gusseting wheel **210** since it is mounted for rotation thereby obviating or minimizing relative velocity between the gusseting wheel **210** and the film, the gusseting plates **212** and **214** do encounter an appreciable amount of friction and thus are subject to wear. As shown in FIG. **8** the film encountering edges of the gusseting plates **212** and **214** are identified as **212***a* and **214***a* respectively. The plates **212** and **214** are provided with an auxiliary set of mounting holes, collectively identified by the numeral **278** (see FIG. **4**) which correspond to the spacing of the mounting holes containing the screws **280**. When the edges **212***a* and **214***a* are worn to the extent that the gusseting function is impaired the plates **212** and **214** are removed and are repositioned on the support bar **216** locating edges **212***b* and **214***b* to make contact with the film and thus cooperate with the gusseting wheel **210** to form gussets.

While the above arrangement of reversing the plates to use opposed margins of the plates **212** and **214** to extend their useful life, it is within the scope of this invention to form the plates so that all four edges may be used.

Although the best mode contemplated for carrying out the present invention has been herein shown and described, it will be apparent that modification and variation may be made without departing from what is regarded to be the subject matter of the invention as set forth in the appended claims.

I claim:

1. An apparatus for making thin thermoplastic bags from an elongate folded web comprising means for supplying such web folded along a line intermediate its edges, means for accumulating a quantity of the folded web and for imposing a desired tension to the web, means for intermittently pulling the web from said accumulating means while causing the web to be withdrawn from said supply means at substantially a constant rate, means located between said web supply means and said accumulating means, for forming a gusset at the folded margin of the web.

2. The apparatus of claim **1** wherein said gusset forming means comprises cooperating gusset forming members mounted on a frame which is movable relative to the longitudinal median of bag making apparatus.

3. The apparatus according to claim **1** wherein said gusset forming means includes vertically spaced rigidly mounted stationary plates having located therebetween a rotatable wheel resiliently biased between said plates.

4. The apparatus according to claim **3** wherein said plates are provided with at least one set of additional mounting holes so that they may be repositioned on the support therefor to present unworn plate margins to engage the moving web.

5. The apparatus according to claim **3** further comprising means mounting said rotatable wheel for pivotal movement toward and away from said plates, and means for holding said wheel away from said plates to facilitate threading of a new roll web through said gusset forming means.

6. The apparatus according to claim **5** wherein said wheel mounting means is connected to a spring which is arranged to impart a selected preload to said wheel dictated by the depth of the gusset desired and the machinability of the web.

* * * * *