United States Patent

Wech

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[54] BAG MACHINE

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

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Related U.S. Application Data

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[52] **U.S. Cl.** **93/20,** 242/55, 276/86

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

[58] **Field of Search** ..... 93/8 R, 20, 84; 270/86; 242/55, 79

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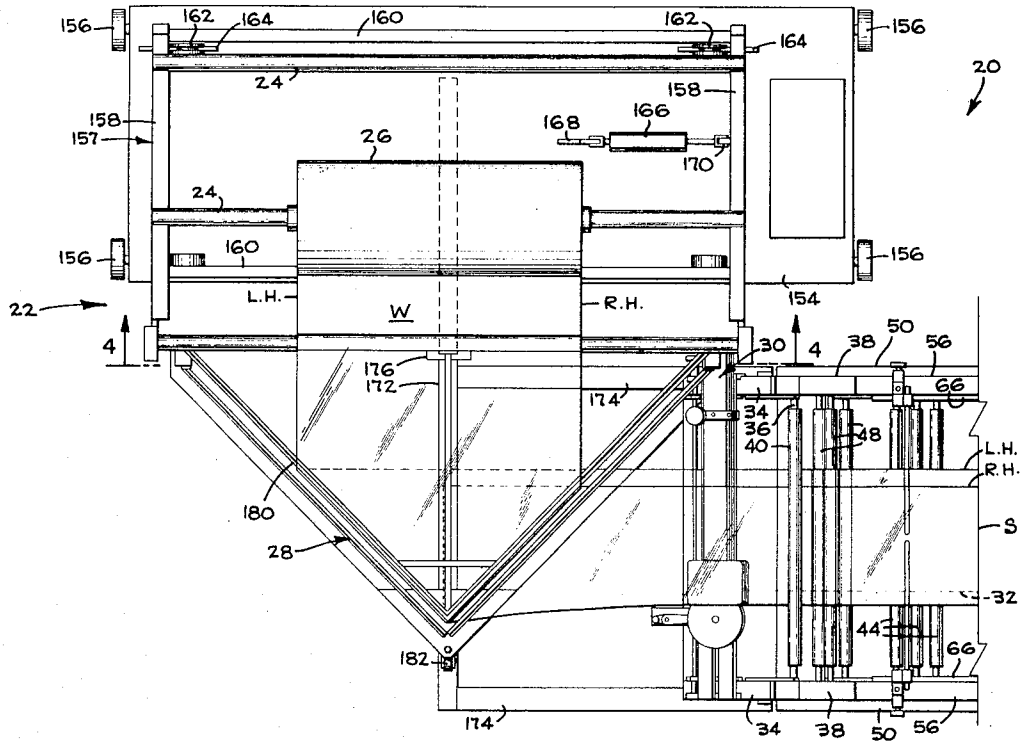
Primary Examiner—Bernard Stickney
Attorney—Francis W. Anderson et al.

[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-shaped 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.

3 Claims, 6 Drawing Figures



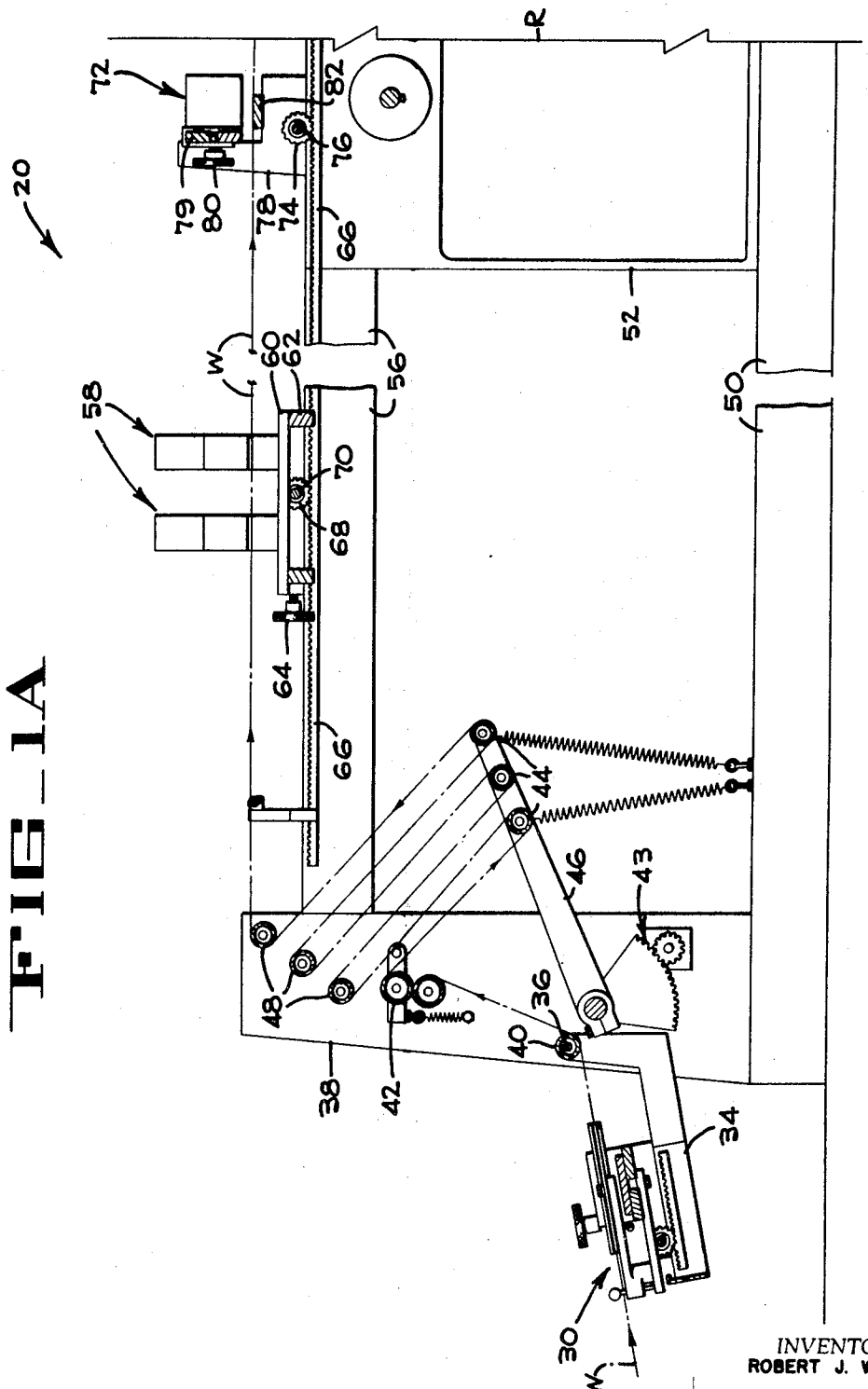


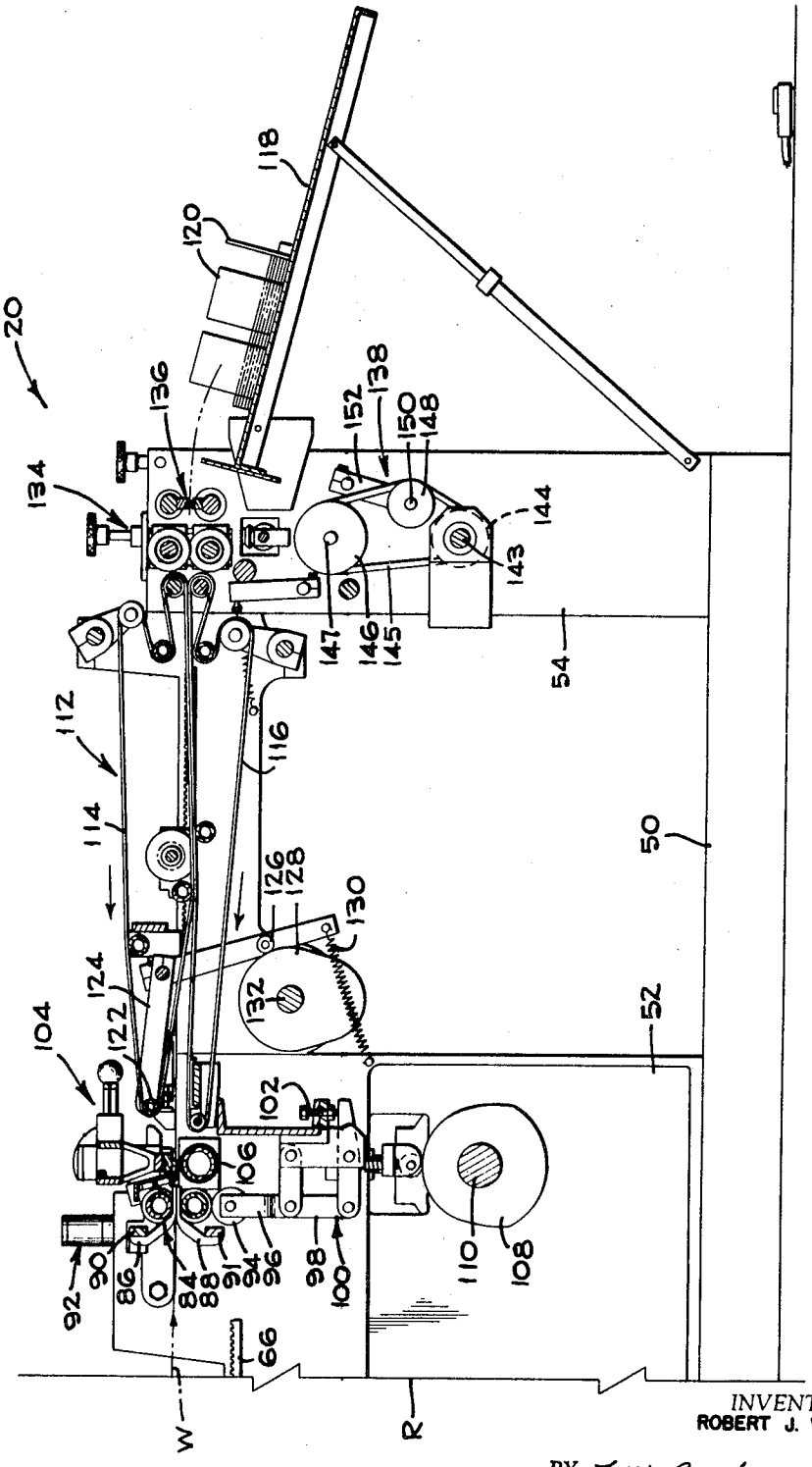
FIG_1A

INVENTOR.
ROBERT J. WECH

BY F. W. Anderson
C. E. Tripp

ATTORNEYS

FIG. 1B



INVENTOR.
ROBERT J. WECH

BY F. W. Anderson
C. E. Tripp

ATTORNEYS

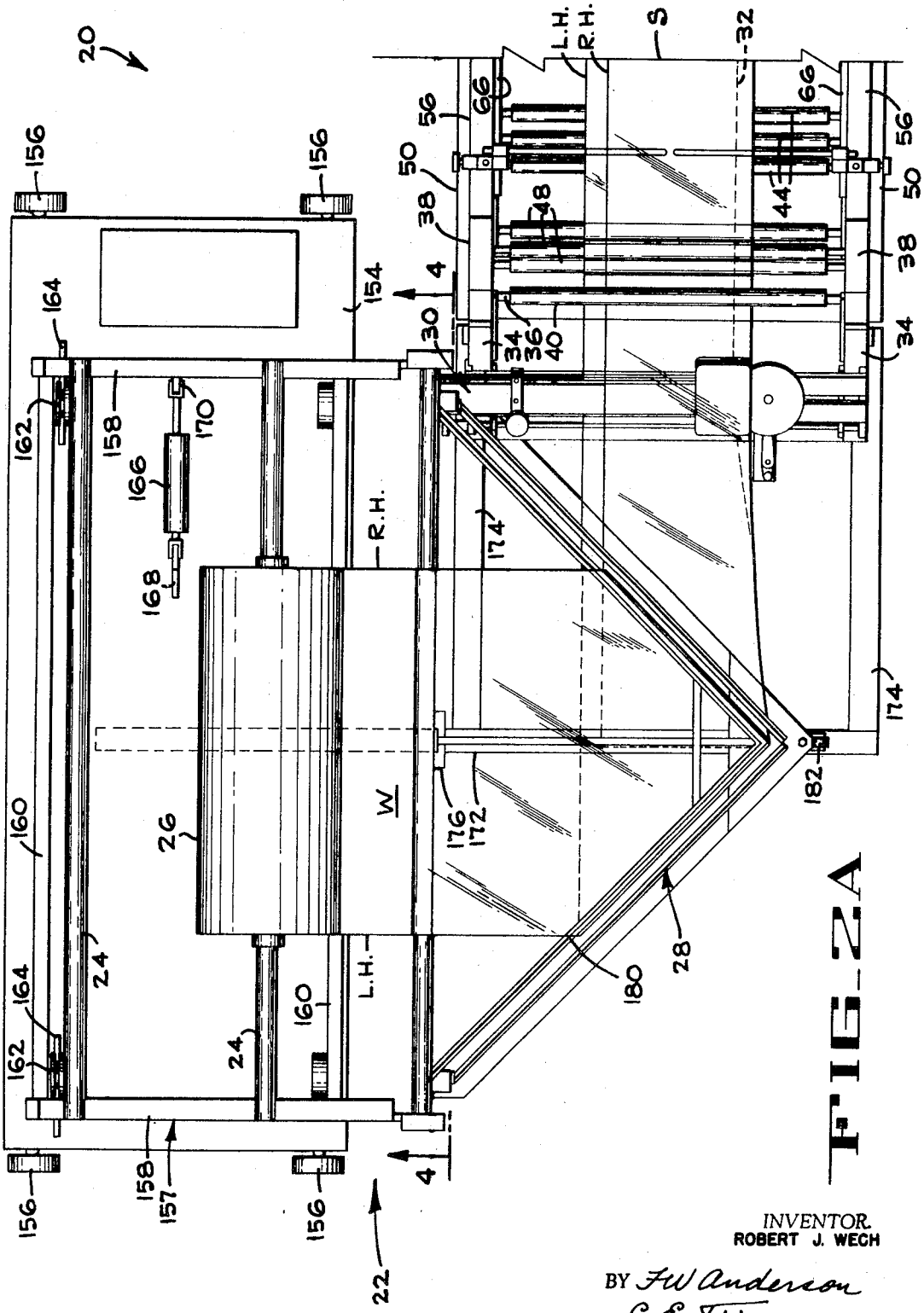


FIG. 2A

INVENTOR.
ROBERT J. WECH

BY F.W. Anderson
C.E. Tripp

ATTORNEYS

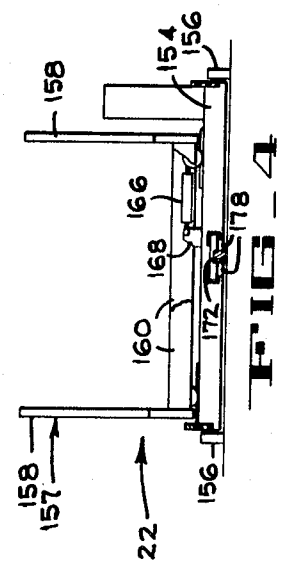


FIG. 4

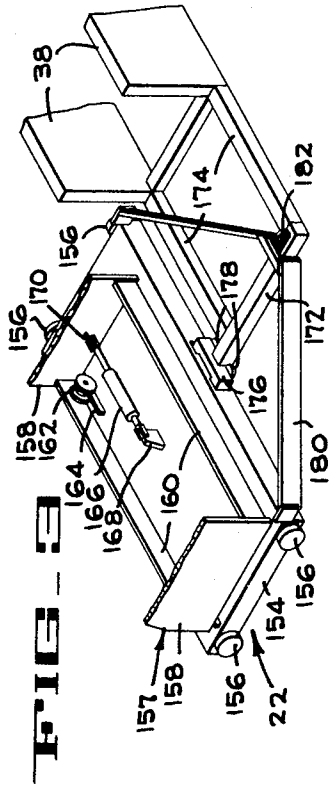


FIG. 3

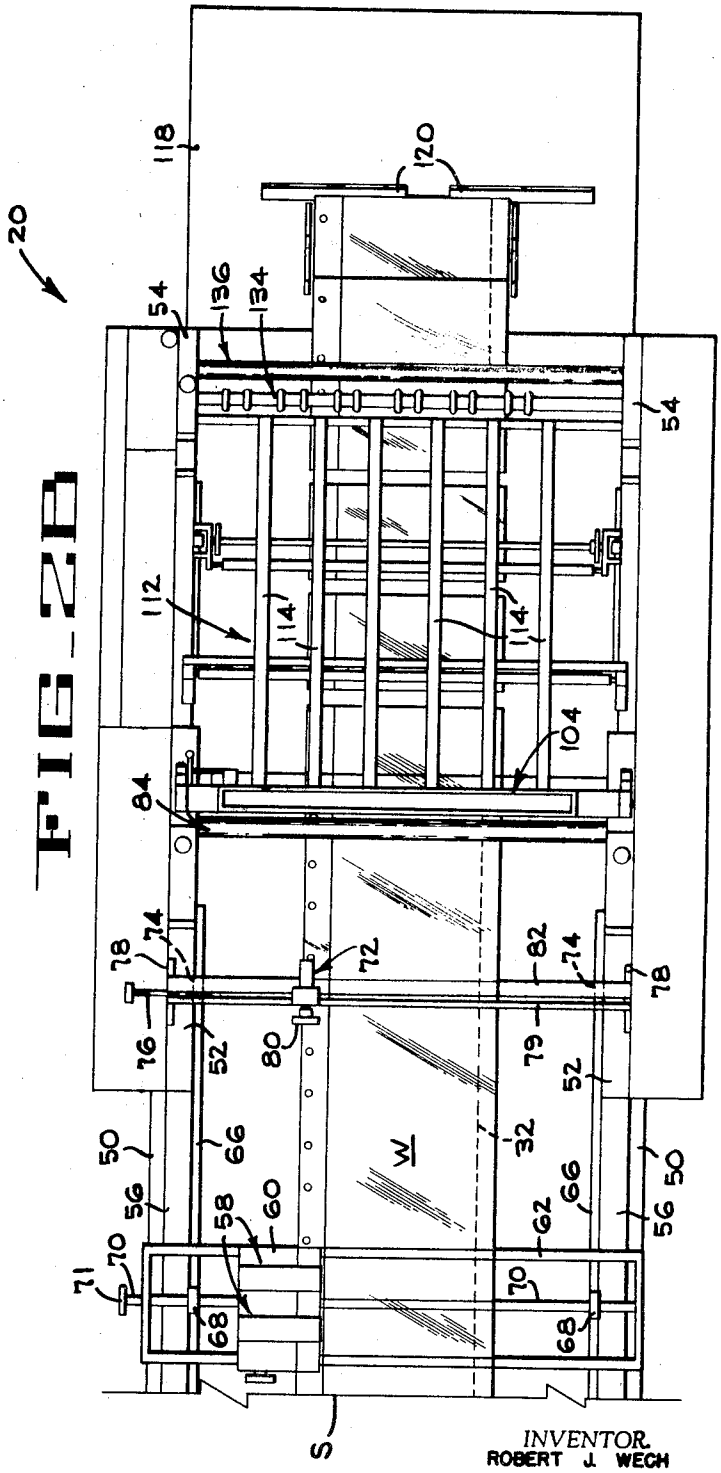


FIG. 2B

INVENTOR.
ROBERT J. WEGH

BY F W Anderson
C. E. Tripp
ATTORNEYS

BAG MACHINE

This is a division of 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 bagging 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

Therefore in accordance with one feature of the present invention a web or film unwind stand is provided with the ability to maintain a fixed relationship with the infeed frame of the bag machine for purposes of insuring accurate alignment of the stand with the bag machine. Such a condition is necessary to insure proper tracking of the film through the bag machine and to prevent the creation of wrinkles in the web. In making side weld bags the unwind stand is supplied with a roll of film whose width determines the depth of the bag to be produced. It is conventional practice to train the web over a V-shaped folding board, hereinafter sometimes referred to as a V-board or folding board, which constrains the web to fold upon itself before being received by drive rolls mounted on the infeed frame of the bag machine. As will be made evident the unwind stand must be positioned so that the axis of the parent roll of stock is exactly or substantially exactly parallel to the longitudinal median of the bag machine. Stated another way the longitudinal median of the film must unwind so that it defines an angle of 90° to the path the folded film takes through the bag machine. In achieving this objective the present invention provides a very rigid locating frame connected to the infeed frame of the bag machine. The locating frame is provided with a member establishing a guideway or rail which is engaged by roller guides carried by the V-board and the base frame of the unwind stand. Such construction allows movement of the unwind stand normal to the longitudinal median of the bag machine and thus insures that the above described relationship is maintained irrespective of the width of the film or whether the machine is used as a double lane machine.

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**, considered together along the break line S, illustrates the bag machine in plan view,

FIG. **3** is a partial perspective of the unwind stand on reduced scale showing its connection to the infeed frame of the bag machine,

FIG. **4** is a section taken substantially along the line **4—4** of FIG. **2A** showing a front elevation of the unwind stand on reduced scale, and of a simplified character, further illustrating the unwind stand guiding system.

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 frames **78**. On the upright legs of the L frames **78** a transverse bar **79** is secured. Slidably mounted on the bar **79** is a 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 observed, 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 mid portion 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**.

Unwind Stand

FIGS. **2A**, **3** and **4** show the novel unwind stand of the present invention which, as mentioned above, is structurally unified with the bag machine to insure proper tracking of the web regardless of its position along a line which is normal to the longitudinal median of the bag machine. Referring to FIGS. **3** and **4** it will be observed that the unwind stand comprises a platform **154**, of generally rectangular configuration, rotatably mounting wheels **156** which allow the platform to be moved as desired. The platform has mounted on its upper surface a frame structure **157** having opposed side plates **158** interconnected by parallel, laterally extending, bars **160**. Rollers **162**, running in tracks **164**, mount the frame structure **157** for lateral movement relative to the platform **154**. Such movement is required to maintain one edge of the film fixed with respect to a reference point so that bags of consistent dimensions are produced. Such lateral movement on the frame structure **157** is effected by a conventional edge guide, preferably of the pneumatic hydraulic type, which controls the extension and retraction of a hydraulic cylinder **166** connected, as shown in FIG. **3**, to the platform **154** by a bracket **168** and to one of the side plates **158** by a clevis connection **170**. The hydraulic cylinder is extended or retracted by the edge guide sensing control (not shown) so as to keep one margin of the film located in a predetermined position with respect to the platform **154**.

The unwind stand **22** is joined to the bag machine so that it is allowed to move in a direction transverse to the longitudinal median of the bag machine and in a direction normal thereto thus serving to position the folded web transversely to the bag machine. This is particularly important where the bag machine is associated with two unwind stands which feed folded roll stock to the bag machine, which as a result, produces two bags each time the seal and cutter bar is reciprocated. To insure movement of the unwind stand in the mentioned normal direction, a guide rail **172** is rigidly connected to the infeed frame members **38** by structural members **174**. On the platform there is rigidly connected a slotted block **176** rotatably carrying rollers **178** which are in rolling engagement with the opposed vertical surfaces of the guide rail **172**. An A frame **180** connected to the platform **154** carries a roller **182** in rolling engagement with the upper surface of the guide rail **172**. As shown on FIG. **2A** the guide rail **172** extends a sufficient distance laterally of the bag machine to allow positioning of the unwind stand at any desired operating position.

While it is not shown, the platform **154** can be rolled by a crank mechanism to position the unwind stand as desired. Regardless of the transverse location of the unwind stand it will always maintain its normal relationship with the longitudinal axis of the bag machine by virtue of the guide rail **172** and the rollers **178** and **182** which constrain the unwind stand to maintain its desired attitude. To minimize construction cost, the rollers **178** and **182** can be replaced with guide pins slidable along the guide rail **172**.

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. A bag machine comprising means for supporting a supply roll of film to unwind about an axis which is parallel to the longitudinal median of such bag machine, a folding board for folding the film on or near its longitudinal median and for directing the folded film to follow a line parallel to the longitudinal median of the bag machine, said bag machine having an infeed frame adjacent said folding board, a guide frame interconnecting said film roll supporting means and said infeed frame to maintain a relationship of 90° between the longitudinal median of the bag machine and the transverse center of the film roll, and means on said film roll supporting means and on said folding board in contact with said guide frame for constraining the film roll supporting means and the folding board to maintain the 90° relationship as they are adjusted transversely relative to the longitudinal median of the bag machine.

2. The apparatus according to claim 1 wherein said constraining means comprises rollers on said film roll supporting means and a roller on said folding board in rolling engagement with a guide rail, said rollers being disposed to roll along the upper and side surfaces of said guide rail.

3. An apparatus for maintaining a fixed relationship between a web roll supporting stand and the frame of a bag machine which produces bags from the web unwound from said roll, said web roll supporting stand mounts the web roll on a rotatable unwind shaft whose axis is parallel to the longitudinal median of said bag machine, the improvement comprising a rigid structure interconnecting the said supporting stand and said bag machine frame, means on said interconnecting frame defining a guide rail located normal to the longitudinal median of said bag making frame, and means, rigidly connected to said supporting stand and in rolling engagement with said guide rail at longitudinally spaced points for permitting movement of said supporting stand therealong while maintaining its normal orientation relative to the bag machine.

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