April 19, 1966 G. J. BURSAK 3,247,045

WEB FEEDING MECHANISM FOR CONTINUOUS WEB CONVERTING MACHINES

Filed Sept. 26, 1960 4 Sheets-Sheet 1

Fig. 1

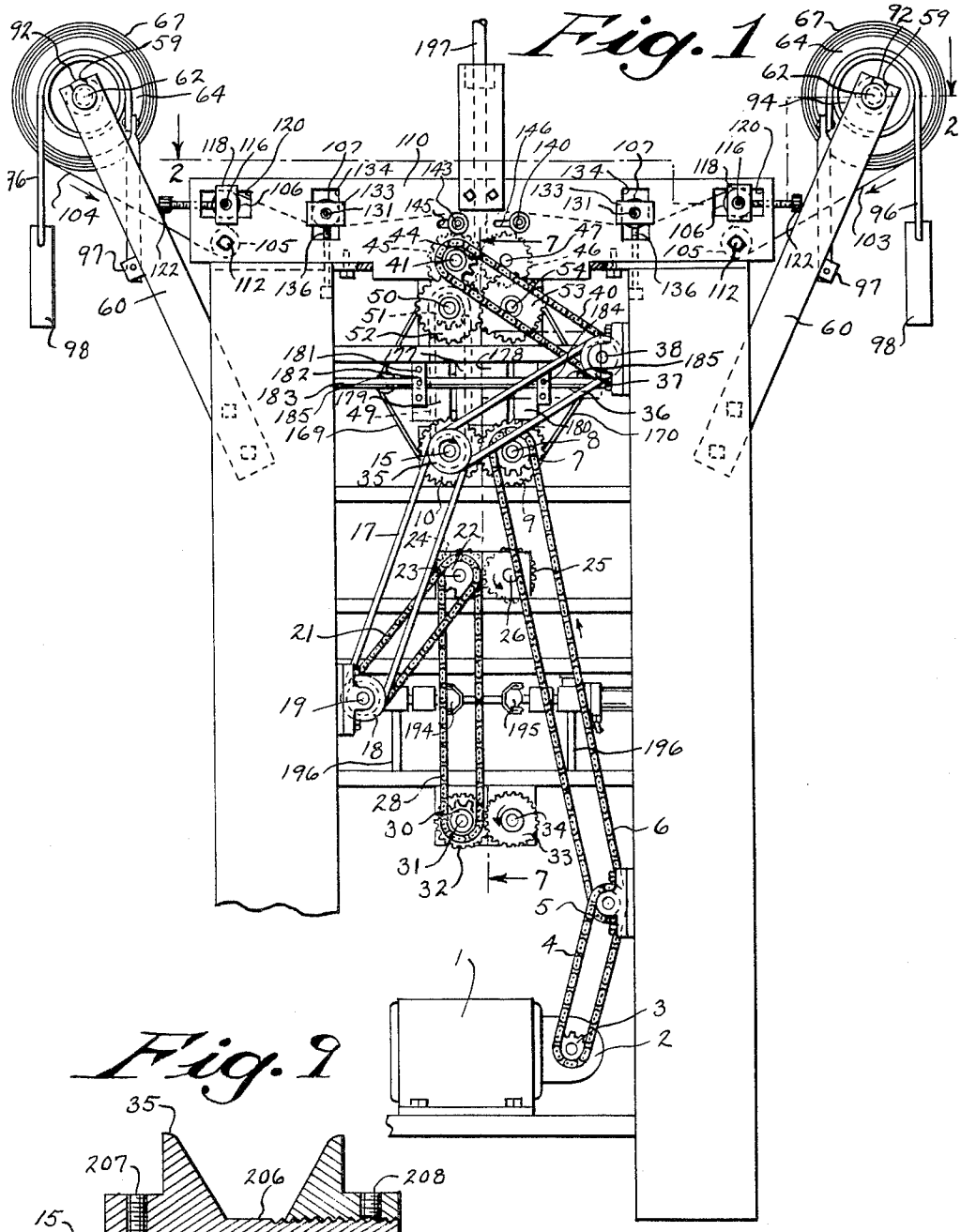
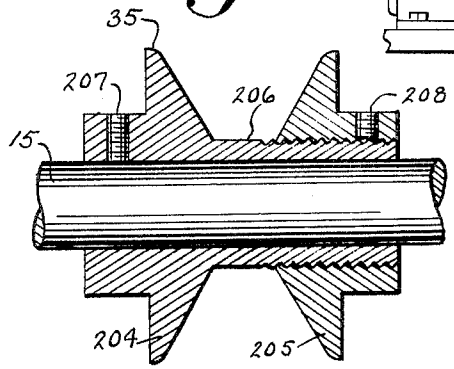


Fig. 9



INVENTOR
GEORGE J. BURSAK

BY Arnold J. Ericsen

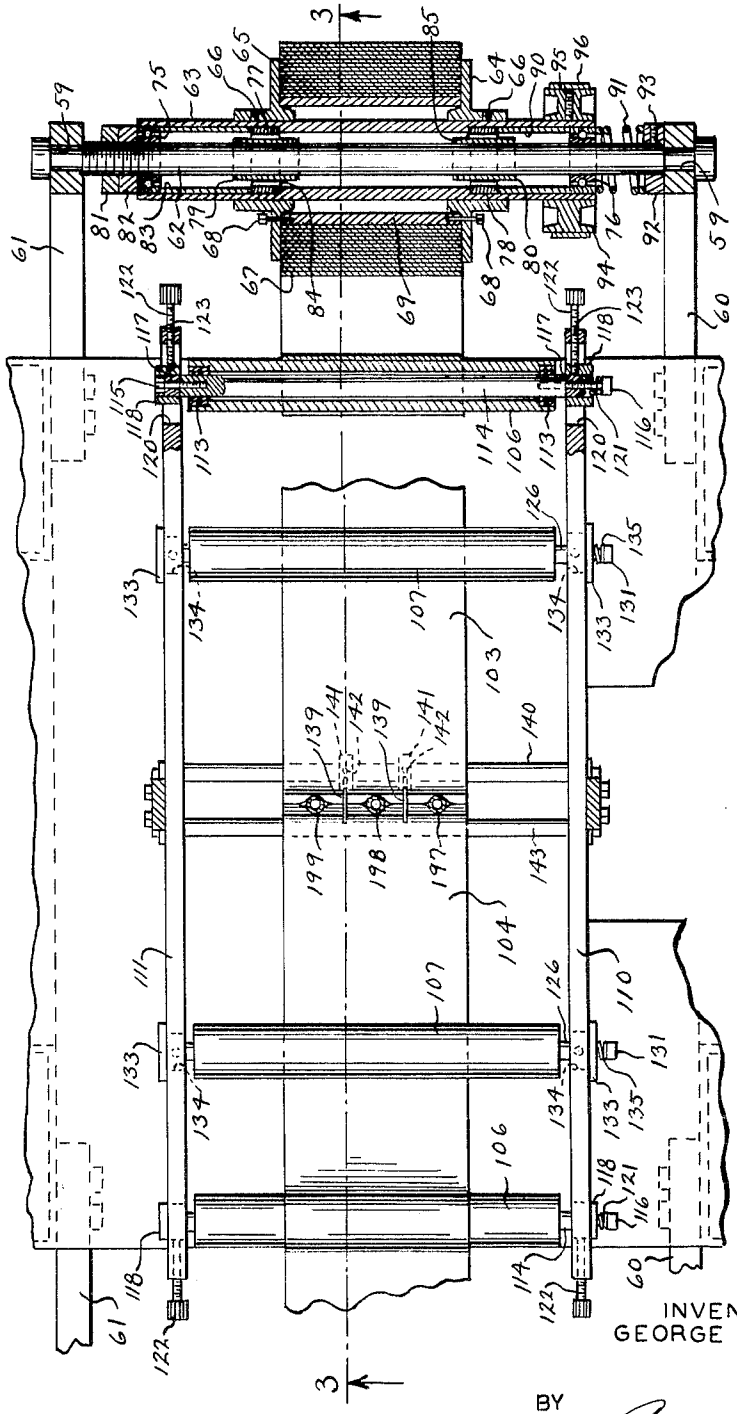
ATTORNEY

April 19, 1966 G. J. BURSAK 3,247,045

WEB FEEDING MECHANISM FOR CONTINUOUS WEB CONVERTING MACHINES

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Fig. 2



INVENTOR
GEORGE J. BURSAK

BY

ATTORNEY

April 19, 1966 G. J. BURSAK 3,247,045

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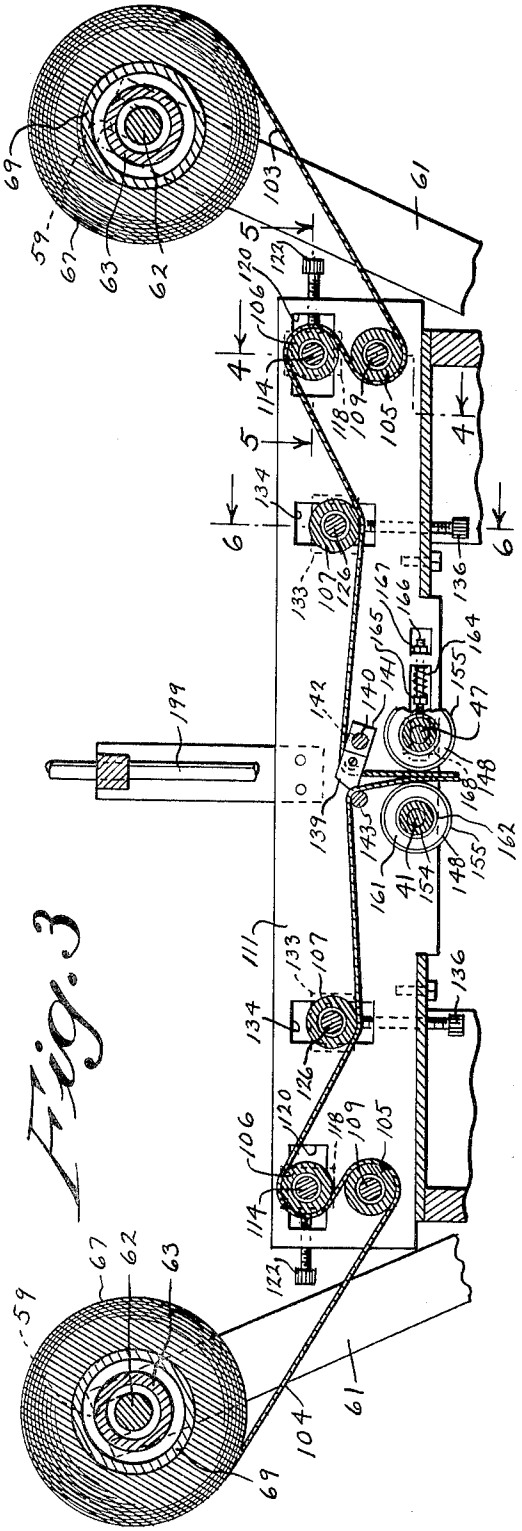


Fig. 3

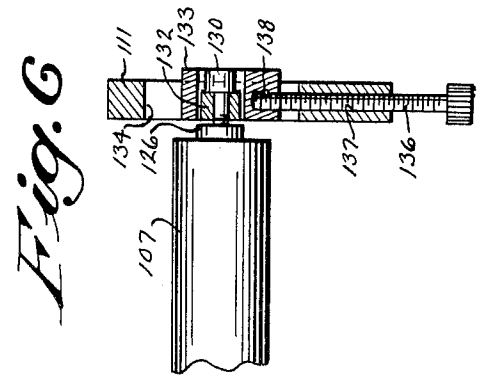


Fig. 6

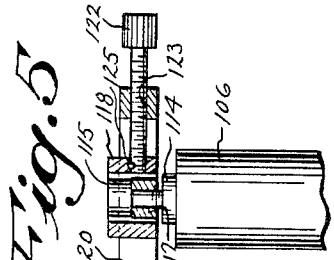


Fig. 5

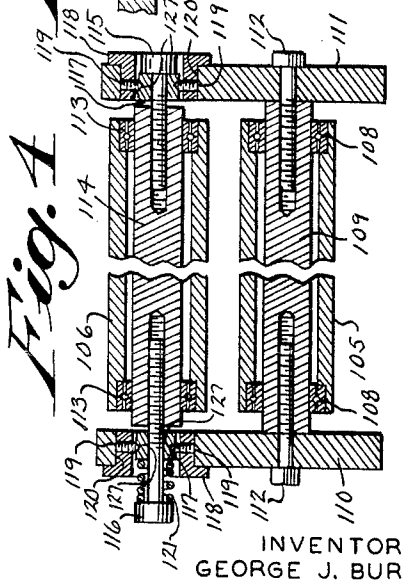


Fig. 4

INVENTOR
GEORGE J. BURSAK

BY

Arnold J. Enisen

ATTORNEY

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Fig. 7

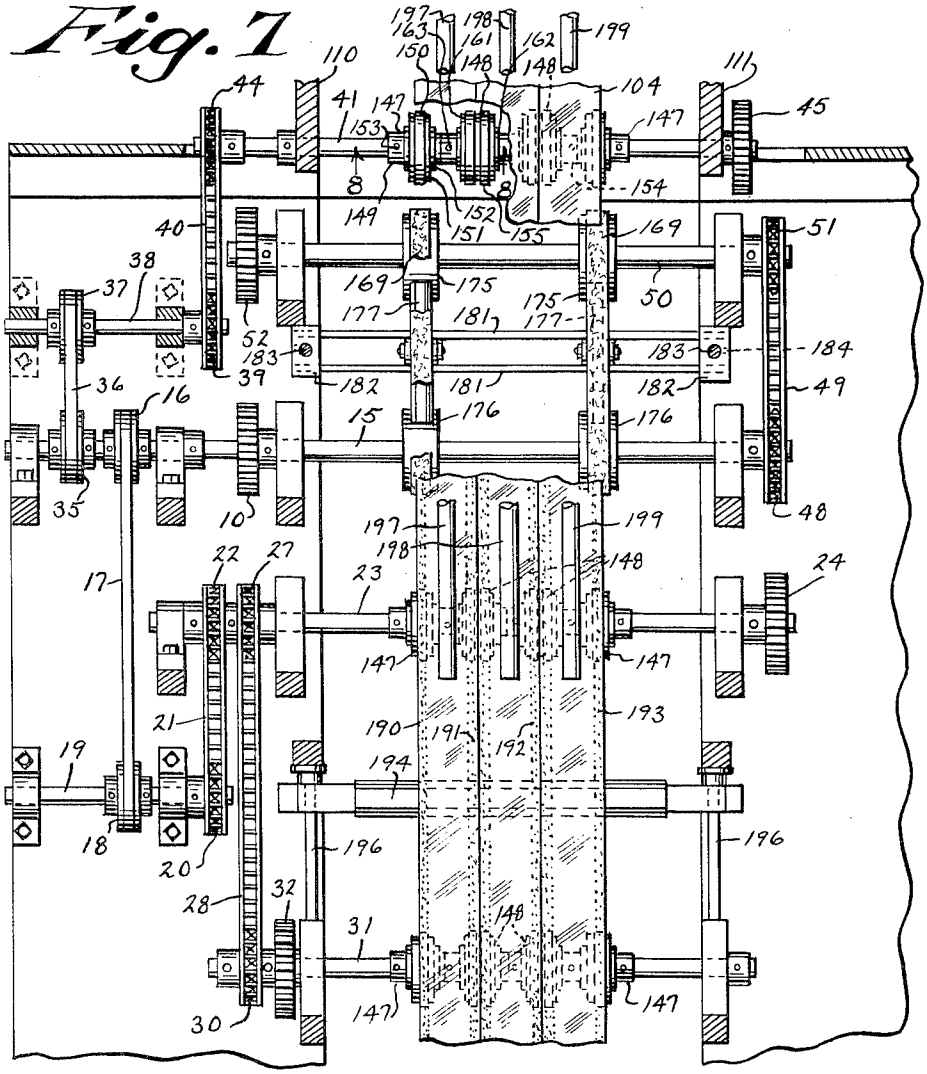
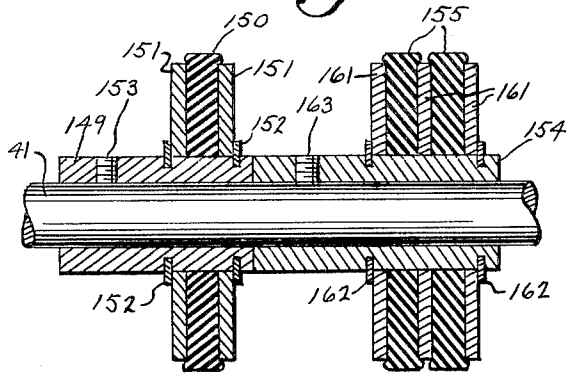



Fig. 8




INVENTOR
GEORGE J. BURSAK

BY Arnold J. Ericsen

ATTORNEY

United States Patent Office 3,247,045 Patented Apr. 19, 1966

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3,247,045

# WEB FEEDING MECHANISM FOR CONTINUOUS WEB CONVERTING MACHINES

George J. Bursak, Milwaukee, Wis., assignor of one-fourth to Mauritz Ritz, River Hills, Wis.

Filed Sept. 26, 1960, Ser. No. 58,482
6 Claims. (Cl. 156—367)

This invention relates to feeding of a flexible web for the purpose of guiding such web through an apparatus, such as a packaging machine for converting continuous webs into packages as the webs are fed through the machine, or for any apparatus capable of performing converting operations upon a continuously fed flexible web. More particularly, this invention relates to a feeding mechanism comprised of the combination of an axially adjustable web mandrel, laterally and vertically adjustable feeding rollers, and a plurality of speed adjustable draw rollers.

Flexible packaging machines that convert continuous sheets of heat sealable materials such as polyethylene and other materials, both laminated and unlaminated, into either filled or unfilled packages as a continuous operation, required careful feeding of the flexible webs for securing a uniform product. One of the requirements is to introduce the package forming web into the heat sealing elements of the machine in proper alignment so as to insure that the marginal edge seal or seals of the web will be complete.

In meeting the requirement of proper alignment of the web material, it is necessary to have supporting web mandrels that can be adjusted axially while the machine is in operation. The present invention provides a web mandrel that may be adjusted for proper alignment of the web material without the necessity of stopping operation of the converting apparatus.

A second requirement to secure a uniform product is to introduce the flexible webs into the heat sealing elements of the packaging machine with uniform movement across the surface of the web or webs and with a rate of travel that will not cause wrinkling or stretching. To provide uniform smoothness and proper rate of travel, it is necessary to have a feed mechanism that can be adapted to meet variations in web characteristics. A web, for example, may taper in thickness across its width. Such taper may occur at the time of manufacture, or can set up during storage. When stored in an upright position, the material may flow to the bottom to such an extent that the thickness at the lower end of the roll may increase slightly, with a corresponding decrease in the opposite end. Furthermore, when the web material is laminated, irregular web thickness is frequently caused by variations in the thickness of the adhesive. In the present invention a series of laterally and vertically adjustable rollers are provided at the introduction of the web to a machine. By setting the position of such rollers and by threading the webs about the rollers, compensation for web variation is made. The compensation also provides for alignment of the webs as they enter a machine whereby wrinkling of the webs due to uneven advance toward and through the machine is minimal.

For satisfactory operation of a continuous web packaging machine it is further desirable to feed the web through and past the seam, or seal, forming elements with a positive drive. Such a drive is incorporated into the present invention. A positive drive engages webs at the entry and at the exit of each heat sealing element

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for steadying the web travel and for relieving the sealing elements from the necessity of motivating the travel of the webs. A preferred form for the drive consists of mating drive rolls on each side of the webs with the webs being led through the nips of the rolls, each roll being comprised of one or more pliable discs held between end plates with the periphery of each disc mating with the periphery of an opposing disc to form the roll nips. By the use of discs of relatively narrow material, a series of laterally spaced filled packages can be led between the rolls while the webs are contacted at their side margins.

The use of rolls with positive drives at spaced points along the web path relieves the heat sealing means whereby the webs are relieved of tension loading while being heated and in a flowable condition. In certain cases there are even flexible packaging materials which, when heated, will shrink rather than expand. To properly employ such material for flexible packages, it is necessary to provide means for adjusting the speed at which the web material enters and leaves the heat sealing means. The present invention provides adjustable pulleys in the driving mechanism of consecutive rolls, thereby compensating for expansion or contraction of the material as it is sealed. Furthermore, the effective length of the sealed opposed webs decreases after the packages have been filled. The adjustable pulleys are also adapted to compensate for this variation in effective length.

It is, therefore, an object of this invention to provide an improved feed for introducing flexible webs to a converting machine.

It is another object of this invention to provide a feed mechanism for flexible webs that compensates for irregularities in the web.

It is still another object of this invention to provide a feed mechanism for continuous flexible webs that presents a web of uniform tautnesss across its width to facilitate the use of the web in manufacturing packages therefrom.

It is a further object of this invention to eliminate stretching and wrinkling in continuous webs as they are fed to a converting machine.

It is still a further object of this invention to provide means for properly aligning opposed webs as they are fed to a converting machine, without the necessity of stopping operation.

It is also an object of this invention to provide for relieving the heat sealing elements of a packaging machine from the function of advancing the packaging material through the machine.

It is also an object of this invention to provide for relieving the heat sealable packaging material in a packaging machine from tension loading while it is softened and under the influence of the sealing elements of the machine.

In the drawings:

FIG. 1 is a side elevation of a continuous belt, heat sealing packaging machine embodying the present invention;

FIG. 2 is a sectional view taken on the line 2—2 of FIG. 1;

FIG. 3 is a sectional view of the mechanism taken on the line 3—3 of FIG. 2;

FIG. 4 is a sectional view of the adjustable rollers, side members, and bearing blocks, taken on a line 4—4 of FIG. 3;

FIG. 5 is a sectional view of the bearing blocks and side members taken on the line 5—5 of FIG. 3;

FIG. 6 is another sectional view of the bearing blocks and side members taken on a line 6—6 of FIG. 3;

FIG. 7 is a sectional view of the draw rollers and heat sealing means taken on the line 7—7 of FIG. 1;

FIG. 8 is a sectional view of the draw roller assemblies taken on the line 8—8 of FIG. 7;

FIG. 9 is an elevational view, partly in section, illustrating the adjustable arrangement of the pulleys for driving the draw rolls.

Referring now to the drawings, and particularly to FIG. 1, a drive motor **1** is preferably provided with a variable speed drive mechanism **2**. An axially supported drive sprocket **3** is driven from the variable speed mechanism **2** and meshes with sprocket chain **4** extending upwardly to mesh with an idler sprocket assembly **5**. Idler sprocket assembly **5** also meshes with a sprocket chain **6** extending upwardly to mesh with driven sprocket **7** mounted on a rotatable shaft **8** which further supports a gear **9**. The gear **9** meshes with a similar, oppositely positioned gear **10** (see FIG. 7) supported on a through shaft **15** to provide rotatable motion to the shaft **15** along with members attached thereto. For instance, an adjustable pulley **16** is driven by the gear **10** and the shaft **15** as a means of driving the belt **17** which in turn rotatably engages the adjustable pulley **18** supported on a shaft **19**. The rotatable shaft **19** further rotatably supports the sprocket **20** which meshes with a sprocket chain **21** meshing with the sprocket **22** mounted on the shaft **23** to provide rotatable motion to the shaft **23** along with members attached thereto. Included on the shaft **23** is a rotatably supported gear **24** (see also FIG. 7) which meshes with a similar, oppositely positioned gear **25** supported on a shaft **26** to provide rotatable motion to the shaft **26** along with members attached thereto. Also included on shaft **23** is a sprocket **27** which meshes with the sprocket chain **28** meshing with the sprocket **30** mounted on the shaft **31**. Rotatably supported on shaft **31** is a gear **32** which meshes with a similar, oppositely positioned gear **33** mounted on a shaft **34** to provide rotatable motion to the shaft **34** along with its attached members.

With reference to FIGS. 1 and 7, the shaft **15** also rotatably supports an adjustable pulley **35** which drives the belt **36**, thereby rotating another adjustable pulley **37** mounted on the shaft **38**, which includes a rotatably supported sprocket **39**. A sprocket chain **40** meshes with the sprocket **39** and drives the shaft **41** by meshing with sprocket **44** which is rotatably mounted on the shaft **41**. Included on the shaft **41** is a gear **45** which meshes with a similar, oppositely positioned gear **46** mounted on a shaft **47** to provide rotatable motion to the shaft **47** along with members attached thereto. Shaft **15** further supports sprocket **48** which meshes with sprocket chain **49**, which in turn transmits rotation to the shaft **50** by meshing with a sprocket **51** supported by shaft **50**. Gear **52** is mounted on shaft **50** and meshes with a similar, oppositely positioned, gear **53** supported on shaft **54**.

Resting in slots **59** of cantilever supporting members **60** and **61** are mandrel shafts **62** (see FIGS. 2 and 3). The supporting members are secured in any conventional manner to the frame of the apparatus.

Encircling the mandrel shaft **62** is a quill shaft **63** which has two flanged collars **64** and **65** slidable thereon and attached to it by means of set screws **66**. A spool **67** of web material is placed between the removable collars **64** and **65** and screws **68** are forced into the paper mandrel **69**, thereby rotatably securing the spool **67** of web material to the quill shaft **63**. The collars **64** and **65** can be adjusted axially, to receive therebetween various widths of web material, by means of the set screws **66**. The quill shaft **63** with the attached spool **67** rotates about the mandrel shaft **62**, as web material is drawn from the spool, by means of oppositely disposed thrust bearings **75** and **76** and needle bearings **77** and **78**. Rotatably mounted on shaft **62** are hardened steel sleeves **79** and **80** of greater axial length than the respective needle bearings **77** and **78** and which provide the inner race therefor. The position of the quill shaft **63** may be adjusted axially along the mandrel shaft **62** to establish the proper alignment of the web material as it feeds into the sealing means.

To adjust the axial position of the quill shaft **63**, the nuts **81** and **82** are turned in a direction appropriate to the adjusting movement desired. In the preferred embodiment, to move the quill shaft **63** in the direction of the supporting member **60** (see FIG. 2) as the nuts **81** and **82** are turned clockwise on the right-hand screw thread portion of the shaft **62**, they will transmit the axial movement to the thrust bearing **75**. This movement is transmitted by the thrust bearing **75** to a sleeve **83** positioned adjacent to the inner circumference of the quill shaft **63**, and then to the quill shaft **63** through the needle bearing **77** abutting against a shoulder **84** of the quill shaft **63**. The needle bearing **77** is slidable on the laterally extending sleeve **79**. The movement is further transmitted by the quill shaft **63** through the opposite needle bearing **78** by the shoulder **85**, and thence to the sleeve **90**. The sleeve **90** abuts against the thrust bearing **76** and moves it to compress the spring **91**, thereby allowing the quill shaft **63** to move axially to the desired position. To move the quill shaft **63** along with its supported spool **67** in the direction of supporting member **61**, the nuts **81** and **82** are rotated counterclockwise, thereby permitting the quill shaft **63** to be moved in the direction of supporting member **61** by the force of the compressed spring **91**.

The compressive force on the spring **91** may be adjusted by moving the collar **92** axially along shaft **62** by means of the set screw **93**.

To prevent the spools **67** of web material from rotating at a tangential speed greater than the speed with which the web material is drawn into the heat sealing device, as hereinafter described, the quill shaft **63** is provided with a braking mechanism. Referring to FIGS. 1 and 2, a brake drum **94** is rotatably secured to the quill shaft **63** by means of a set screw **95**. A belt **96** is secured at one end by attachment to an anchoring plate **97** which is in turn secured to a respective supporting member **60** or **61** by any conventional means. The belt **96** is placed along the periphery of the brake drum **94** and a weight **98** is attached to the opposite end of the belt **96**, thereby providing a restraining force on the free rotation of the quill shaft **63**. Obviously, other restraining means (not shown) may be used in conjunction with the brake drum **94**.

Referring to FIGS. 2 and 3, webs **103** and **104** of heat sealable material are drawn through a series of rollers **105**, **106** and **107**. The entry roller **105** is rotatably supported at its respective ends by a pair of bearings **108**. The shaft **109** is journaled in the respective bearings **108** and is supported between side members **110** and **111** by means of bolts **112** (see FIG. 4) which are journaled through respective bores in the side members **110** and **111**. Roller **106** is rotatably supported at its respective ends by a pair of bearings **113**. Shaft **114** is journaled in the respective bearings **113**, and is adjustable laterally, as hereinafter described, at its respective ends to provide for proper alignment of the webs **103** and **104**. The shaft **114** is supported between side members **110** and **111** by means of screws **115** and **116** which are journaled through bores in collars **117**. Collars **117** are supported within flanged blocks **118** by pointed screws **119** resting in pivot points **127** provided in the collars **117** to provide for a pivot support at each end of shaft **114**. Similar results may be obtained by placing conventional spherical bearings in the blocks **118**. The blocks **118** ride in re-

spective slots 120 in the side members 110 and 111. Screw 116 is provided with a spring 121 which holds the shaft 114 is supported between side members 110 and 111 when screw 116 is tightened. To adjust either end of roller 106 laterally within the limits of the respective slot 120, one or both of the screws 122 are turned in a direction consistent with the type and amount of adjustment desired. Since screws 122 are threaded through bores 123 of the side members 110 and 111, and journaled into bores of the blocks 118 where the screws 122 are held by pins 125, such turning of the screws 122 will move the respective ends of the shaft 114 within the slots 120 (see FIG. 5). Because of the pivotable supports at its respective ends, shaft 114 can be positioned askew of the side members 110 and 111 without binding.

The roller 107 is rotatably supported at its respective ends on a shaft 126 by means of bearings (not shown) in a like manner as rollers 105 and 106 are rotatably supported on shafts 109 and 114, respectively. The shaft 126 is supported between side members 110 and 111 by screws 130 and 131 which are journaled through bores in collars 132. Collars 132 are pivotably supported within flanged blocks 133 in a like manner as collars 117 are supported within blocks 118. These blocks 133 ride in the respective slots 134 in the side members 110 and 111. Screw 131 is provided with a spring 135 which holds the shaft 126 in stationary position when the screw 131 is tightened. Roller 107 is adjustable vertically at its respective ends by turning one or both of the screws 136 (see FIG. 6) in the appropriate direction. Screws 136 are threaded through the bores 137 of side members 110 and 111 and into the bores of blocks 133 where they are pinned to the block 133 by pins 138. While the preferred embodiment provides for slots 120 to be longitudinally positioned in the side members 110 and 111 and for slots 134 to be transversely positioned, the same adjustments can be provided by having slots 120 transversely positioned and slots 134 longitudinally positioned.

In the preferred embodiment, web 103, after passing through the series of rollers 105, 106 and 107, passes over a plurality of knife blades 139 spaced laterally along rod 140. Referring to FIG. 2, two such knife blades 139 in their respective holders 141 are shown for the purpose of illustration. Each knife blade holder 141 is provided with a set screw 142 so that the holders 141 may be shifted along the rod 140 to vary the lateral space. The knife blades 139 cut the web 103 as it passes over them, and also cut the web 104 as it passes over the rod 143, when so desired. By adjusting the knife blade holders 141 so that the knife blades 139 are inclined vertically, only one web 103 may be cut. This permits a convenient means for providing a series of laterally spaced, connected packages which may be supplied as a unit and readily separated from one another as desired. The singly slit web permits a tear quick for the opposed web. Rods 143 and 140 are supported at their respective ends in slots 145 and 146 in side members 110 and 111.

Referring to FIG. 7, rotatably mounted on shafts 41, 23 and 31 are a plurality of draw roller assemblies 147 and 148. For purpose of illustration only, a pair of draw roller assemblies 147 and a pair of draw roller assemblies 148 are shown on each of said shafts 41, 23 and 31. The number of draw roller assemblies required is determined by the number of cut sections of web material being processed. Each draw roller assembly 147 is comprised of a quill shaft 149 with a resilient washer 150 of a material such as rubber or the like, sandwiched between washers 151 held in fixed axial position on the quill shaft 149 by lock rings 152 (see FIG. 8). The draw roller assembly 147 is removably secured to the respective shaft by a set screw 153. Each draw roller assembly 148 is comprised of a quill shaft 154 and two resilient washers 155 respectively sandwiched between three washers 161 held in fixed axial position on the quill shaft 154 by lock rings 162, and removably secured to the respective shaft by set screw 163.

The webs 103 and 104 are drawn through the draw roller assemblies 147 and 148 attached to shaft 41 and oppositely disposed, similarly constructed, coacting roller assemblies (not shown) mounted on shaft 47. Shaft 47, and members attached thereto, rotates at the same speed, but in the opposite direction, as shaft 41 and is driven by gear 46 meshing with gear 45 which rotates as shaft 41 is driven by sprocket chain 40 meshing with sprocket 44. Sprocket chain 40 is driven by meshing with sprocket 39 which is rotated as shaft 38 is rotated by the pulley 37, driven by belt 36. The belt 36 is in turn driven by pulley 35 mounted on shaft 15 which is driven by gear 10 meshing with gear 9. The pulleys 35 and 37 are adjustable, in a manner hereinafter described, so that small variations may be made in the speed transmitted by belt 36. The draw roller assemblies mounted on shafts 47 and 41 are held in coacting, impinging relationship by spring 164 biasing shaft 47 inward at its respective ends. Springs 164 abut against portions of side members 110 and 111 at one end, and against nuts 165 threaded on bolt 166 at the opposite end. Bolts 166 are journaled through bores in side members 110 and 111 and held in lateral position by nuts 167. Bolts 166 are further journaled into reentrant bores in blocks 168 and held by pins (not shown). The pressure exerted by spring 164 can be varied by adjusting nuts 165.

After being drawn through the draw roller assemblies 147 and 148 mounted on shafts 47 and 41, the webs 103 and 104 are impinged in opposed relationship between a plurality of spaced pairs of oppositely rotating heat sealer conveyor belts or bands. Referring to FIG. 7, only two such conveyor belts 169 and 170 are shown by way of illustration. The number of such belts necessary is determined by the number of longitudinal seals to be formed. As shown in the view of FIG. 7, each belt 169 is rotatably supported at its upper end upon a respective adjustable rotor 175, which is slidably supported for relative axial spacing with a like rotor or rotors, and which may be fastened for concurrent rotation with the shaft 50 after being adjusted to desired axial spacing, by means of Allen type set screws (not shown) or other key means. The lower end of each belt 169 is supported by rotors 176 secured to and rotatable with shaft 15 in like manner as the rotors 175, and are likewise adjustable for desired axial spacing. Coacting with belts 169 are belts 170 (see FIG. 1) supported at their upper and lower ends by axially spaced, adjustable rotors (not shown) oppositely positioned to, and similarly constructed, rotors 175 and 176 and rotatably mounted on shafts 8 and 54, respectively. Any number of rotors 175 and 176 may be added to the shafts 8, 50, 15 and 54, respectively, to provide additional longitudinal heat seals.

It will be apparent that rotation of the sprocket chain 6 will be transmitted to the shaft 8, and from there to the shaft 15 by the meshing of gears 9 and 10. The rotation of shaft 15 will be transmitted to shaft 50 by sprocket chain 49. Shaft 54 will be driven by the meshing of gears 52 and 53, thereby driving the belts 169 and 170 at a constant relative speed.

As viewed in FIGS. 1 and 7, the opposed webs 103 and 104, positioned between the coacting belts 169 and 170, are then sandwiched between oppositely positioned pairs of heat blocks 177 and 178, respectively.

The heat blocks 177 are spring biased toward the heat blocks 178 by springs (not shown) and are supported by supporting blocks 179 and 180, respectively. Supporting blocks 179 and 180 are each slidably supported for axial adjustment on a pair of tracks 181, which in turn are supported at their respective ends in blocks 182 slidably attached to cross bars 183 by means of set screws 184. Also attached to each support block 179 and 180 is a rotatable flanged idler 185 which is adapted for adjusting the tension in belts 169 and 170, in a manner more

fully disclosed and described in my copending application Serial No. 725,902, filed on April 2, 1958, now Patent No. 3,011,934 for Continuous Belt Feed, Heat Sealing Apparatus. It is to be noted that any desired number of supporting blocks 179 and 180 with their attached heat blocks 177 and 178 may be added to the tracks 181.

Thus, continual rotation of the belts 169 and 170 conveys the webs 103 and 104 past the opposed respective heat blocks 177 and 178 for applying laterally spaced longitudinal seals along the edges 190, 191, 192 and 193 of the opposed webs 103 and 104 (see FIG. 7). The longitudinally sealed, opposed webs 103 and 104 are then drawn between draw roller assemblies 147 and 148 attached to shafts 23 and 31 and oppositely disposed, similarly constructed, coacting roller assemblies (not shown) rotatably mounted on shafts 26 and 34, respectively. While being drawn therebetween, the opposed webs 103 and 104 are provided with a cross seal by oppositely positioned sealing bars 194 and 195, guided for vertical movement by posts 196 which are journaled into bores in respective ends of said sealing bars 194 and 195. The draw roller assemblies 147 and 148 mounted on shafts 26 and 34 are spring biased inwardly against the coacting draw roller assemblies mounted on shafts 23 and 31 in the same manner as hereinbefore described for shafts 47 and 41. Shafts 47, 26 and 34 are pivotably supported at their respective ends in a like manner as shafts 114 and 126 are supported, to prevent binding as their ends are repositioned by means of the spring 164. It is to be noted that when shaft 15 rotates, belt 17 transmits such rotation to shaft 19, and then sprocket chain 21 transmits it to shaft 23 which in turn transmits the rotation to shaft 31 by means of sprocket chain 28, to provide constant relative speed therebetween.

A plurality of filler tubes 197, 198 and 199 extend downwardly between the opposed webs 103 and 104 to provide a means of concurrently filling a package as the package has been sealed. The number of filler tubes required is determined by the number of packages simultaneously formed from the single width of web material. It is desirable to provide the lower termini of the filler tubes 197, 198 and 199 in the proximity of the position where a cross seal is to be applied to the packages in order to simultaneously fill the packages immediately after the cross seal has been applied thereto.

It is one aspect of the present invention to provide a novel means of varying the speed at which the opposed webs 103 and 104 are drawn through each series of coacting draw roller assemblies 147 and 148 to compensate for variations in web thickness, and to prevent stretching and slacking of the webs as they pass the heat sealing elements. To accomplish this, the pulleys 16, 18, 35 and 37 are adjustable for small variations in their respective circumferences. Referring to FIG. 9, each of the pulleys 16, 18, 35 and 37 is comprised of two flanges 204 and 205. Flange 205 is threaded to telescopically receive a meshing threaded portion of the sleeve 206 of the flange 204. The pair of flanges 204 and 205 are held in the desired spaced position on a shaft by set screws 207 and 208, respectively, and are made rotatable with said shaft by conventional key means. By varying the lateral spacing between the flanges 204 and 205, the effective diameter of the pulley is changed, thereby varying the speed at which the belt is driven. To vary the speed at which the shafts 47 and 41, with their respective attached draw roller assemblies 147 and 148, will rotate in relation to the speed of the belts 169 and 170, either pulley 35 or 37 may be adjusted. To vary the speed at which the shafts 23, 26, 31 and 34 with their respective draw roller assemblies 147 and 148, will rotate in relation to the speed of the belts 169 and 170, either pulley 16 or 18 may be adjusted.

The above described elements of this invention cooperate in the following manner:

After the spool 67 of web material has been placed between the flanged collars 64 and 65 and secured to the quill shaft 63 by means of the screws 68, the web material is fed through the machine. Initial alignment of the web material to properly position it within the sealing means is made by adjusting the quill shaft 63 by turning the nuts 81 and 82 in the appropriate direction.

The webs 103 and 104 are drawn from the spools 67 and are threaded through the rollers 105, 106 and 107. If it appears that either of the webs 103 and 104 are being drawn into the machine with unequal tension across their respective widths, proper adjustment of the rollers 106 and 107 will correct this situation. For example, if web 103 is not taut enough at its edge adjacent side member 110 due to unequal web thickness, the first adjustment would be made by moving that end of roller 106 which is supported in side member 110 in a direction away from roller 107. This would produce an equal tension across the width of web 103 but would have the further effect of causing the web 103 to creep in the direction of side member 111. To realign the web after equalizing the tension, that end of roller 107 which is supported in side member 110 would be, in the preferred embodiment, moved downward. In a like manner, other adjustments in the web tension are possible.

The webs 103 and 104 pass from the roller 107 past the knife blades and through the coacting draw roller assemblies 147 and 148 attached to the shafts 41 and 47. Then the webs pass through the coacting belts 169 and 170 and through the draw roller assemblies 147 and 148 attached to the shafts 23 and 26. The coacting draw roller assemblies 147 and 148 provide the force necessary to lead the opposed webs 103 and 104 past the longitudinal heat sealing means, thereby relieving the belts 169 and 170 from this function to prevent stretching of the webs 103 and 104 while they are at elevated temperatures. The webs 103 and 104 are then drawn past the transverse sealing bars 194 and 195 and through the coacting draw roller assemblies mounted on shafts 31 and 34. Within a preset timing period, the sealing bars 194 and 195 are drawn together, under pressure, into sealing position and then the sealing bars 194 and 195 move downwardly with the webs 103 and 104, guided by posts 196. When the sealing bars 194 and 195 reach the limit of descent, they are pulled away from the webs 103 and 104 and repositioned to repeat the transverse sealing cycle. The structure and operation of the transverse sealing bars 194 and 195, which form no part of the present invention, are more fully disclosed and described in my copending application Serial No. 725,902, filed on April 2, 1958, for George J. Bursak. Again the coacting draw roller assemblies provide the force necessary to lead the opposed webs 103 and 104, thereby relieving the sealing bars 194 and 195 from this function.

The effective length of the opposed webs 103 and 104 may either increase or decrease as the webs are fed through the heat sealing means. To compensate for this change, it is possible to vary the speed at which the respective pairs of coacting draw roller assemblies 147 and 148 lead the webs 103 and 104 past the sealing stage. For example, if the webs 103 and 104 should stretch from the application of heat by the heat blocks 177 and 178, belts 169 and 170 must be made to rotate at a greater speed than shafts 41 and 47 with their attached draw roller assemblies 147 and 148. To accomplish this, pulley 37 may be adjusted to increase its effective diameter by decreasing the spacing between flanges 204 and 205, or pulley 35 may be adjusted to decrease its effective diameter by increasing the spacing between flanges 204 and 205. Also, shafts 23 and 26 with their attached draw roller assemblies 147 and 148 must be made to rotate at a greater speed than the belts 169 and 170. To accomplish this, the effective diameter of pulley 16 may be increased, or the effective diameter of pulley 18 may be decreased. While it has not been found necessary in the preferred embodiment, it is within the scope of this invention to

provide, if so desired, adjustable pulleys mounted on shafts **23** and **31** to replace the sprockets **27** and **30** to provide means for adjusting the speed between shafts **23** and **31** and their attached draw roller assemblies **147** and **148**. Also, while the preferred embodiment provides for two adjustable pulleys in each pair of pulleys, it is possible to obtain similar results with only one adjustable pulley in each pair of pulleys.

While the converting machine is operating, realignment of the webs may be necessary because of improper winding of the spool **67** of web material. This is accomplished, without halting operation, by adjusting the quill shaft **63**. Also, rollers **106** and **107** may be adjusted while the machine is operating to correct for unequal web tension which may appear.

While the present invention has particular adaptability to continuous belt, heat sealing machines, it will be apparent that it may be employed on all machines which process continuous, flexible webs.

I claim:

**1.** In a feed for a continuous, flexible web packaging machine having a power source, and longitudinal and transverse heat sealing means, the combination comprising: an axially adjustable web supporting mandrel, said mandrel being restrained from free rotation by braking means; means for axially adjusting said mandrel along a non-rotatable mandrel shaft; a pair of spaced side frames lying in planes generally perpendicular to said mandrel shaft; a rotatable entry roller journaled at its ends for bearing support in said frames; a first web adjustment roller rotatably borne by and spaced between said frames and carried at its respective ends by bearing blocks movable in slots provided in said frames; first adjustment means for each of said bearing blocks adapted to individually move the blocks and retain the same in set position; a second web adjustment roller rotatably borne by and spaced between said frames and carried at its respective ends by bearing blocks movable in slots, provided in said last named frames, transversely relative to the movement of said first adjustment roller; second adjustment means for each of said bearing blocks adapted to individually move the blocks and retain the same in set position; a first pair of oppositely disposed, coacting draw rollers preceding said longitudinal heat sealing means; a second pair of oppositely disposed, coacting draw rollers, disposed between said longitudinal and transverse heat sealing means; a third pair of oppositely disposed, coacting draw rollers, succeeding said transverse heat sealing means; means for transmitting power from said power source to each of said pairs of draw rollers; and speed adjustment means for adjusting the speed of at least one of said pairs of draw rollers relative to the other pairs of draw rollers.

**2.** In a feed for a continuous, flexible web packaging machine having a power source, and longitudinal and transverse heat sealing means, the combination comprising: an axially adjustable web supporting mandrel, means for axially adjusting said mandrel along a mandrel shaft; a first pair of oppositely disposed, coacting draw rollers preceding said longitudinal heat sealing means; a second pair of oppositely disposed, coacting draw rollers, disposed between said longitudinal and transverse heat sealing means; a third pair of oppositely disposed, coacting draw rollers, succeeding said transverse heat sealing means; means for transmitting power from said power source to each of said pairs of draw rollers; and speed adjustment means for adjusting the speed of said first pairs of draw rollers relative to said second and third pairs of draw rollers.

**3.** In a feed for a continous, flexible web packaging machine having a power source, and longitudinal and transverse heat sealing means, the combination comprising: web supporting means; a pair of spaced side frames; a rotatable entry roller journaled at its ends for bearing support in said frames; a first web adjustment roller rotatably borne by and spaced between said frames and carried at its respective ends by bearing blocks movable in slots provided in said frames; first adjustment means for each of said bearing blocks adapted to individually move the blocks and retain the same in set position; a second web adjustment roller rotatably borne by and spaced between said frames and carried at its respective ends by bearing blocks movable in slots, provided in said frames, transversely relative to the movement of said first adjustment rollers; second adjustment means for each of said last named bearing blocks adapted to individually move the blocks and retain the same in set position; a first pair of oppositely disposed, coacting draw rollers mounted on a first driven shaft and preceding said longitudinal heat sealing means; a second pair of oppositely disposed, coacting draw rollers, mounted on a second driven shaft between said longitudinal and transverse heat sealing means; a third pair of oppositely disposed, coacting draw rollers, mounted on a third driven shaft succeeding said transverse heat sealing means; means for transmitting power from said power source to each of said driven shafts; and speed adjustment means for adjusting the speed of at least one of said driven shafts relative to the other drive shafts.

**4.** In a feed for a continuous, flexible web packaging machine having a power source, and longitudinal and transverse heat sealing means, the combination comprising: web supporting means; a first pair of oppositely disposed, coacting draw rollers mounted on a first driven shaft and preceding said longitudinal heat sealing means; a second pair of oppositely disposed, coacting draw rollers, mounted on a second driven shaft between said longitudinal and transverse heat sealing means; a third pair of oppositely disposed, coacting draw rollers, mounted on a third driven shaft succeeding said transverse heat sealing means; means for transmitting power from said power source to each of said driven shafts; and speed adjustment means for adjusting the speed of at least one of said driven shafts relative to the other drive shafts.

**5.** In a feed for a continuous, flexible web packaging machine having a power source, and longitudinal and transverse heat sealing means, the combination comprising: an axially adjustable web mandrel; means for axially adjusting said mandrel along a mandrel shaft; a pair of spaced side frames; a first web adjustment roller rotatably borne by and spaced between said frames; first adjustment means for individually moving each end of said first adjustment roller in a longitudinal direction relative to said frames; a second web adjustment roller rotatably borne by and spaced between said frames; second adjustment means for individually moving each end of said second adjustment roller in a transverse direction relative to the movement of said first adjustment roller; a first pair of oppositely disposed, coacting draw rollers preceding said longitudinal heat sealing means; a second pair of oppositely disposed, coacting draw rollers, disposed between said longitudinal and transverse heat sealing means; a third pair of oppositely disposed, coacting draw rollers, succeeding said transverse heat sealing means; means for transmitting power from said power source to each of said pairs of draw rollers; and speed adjustment means for adjusting the speed of said first pair of draw rollers and said second and third pairs of draw rollers relative to each other.

**6.** The combination of claim **5** in which the speed adjustment means is comprised of: a first pair of pulleys adapted for varying the speed between said first pair of draw rollers and said longitudinal heat sealing means; a second pair of pulleys adapted for varying the speed between said longitudinal heat sealing means and said second and third pairs of draw rollers, each of said first and second pairs of pulleys having at least one of said pulleys adjustable and comprised of a pair of spaced flanges with their interior surfaces tapered, and means for changing the spacing between said pair of flanges; a first

flexible belt engaged around said first pair of pulleys; and a second flexible belt engaged around said second pair of pulleys.


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EARL M. BERGERT, *Primary Examiner.*

CARL F. KRAFFT, *Examiner.*

D. J. DRUMMOND, *Assistant Examiner.*