June 28, 1960 T. E. PIAZZE 2,942,529

BAG MAKING MACHINE AND METHOD

Filed May 8, 1957 7 Sheets-Sheet 1

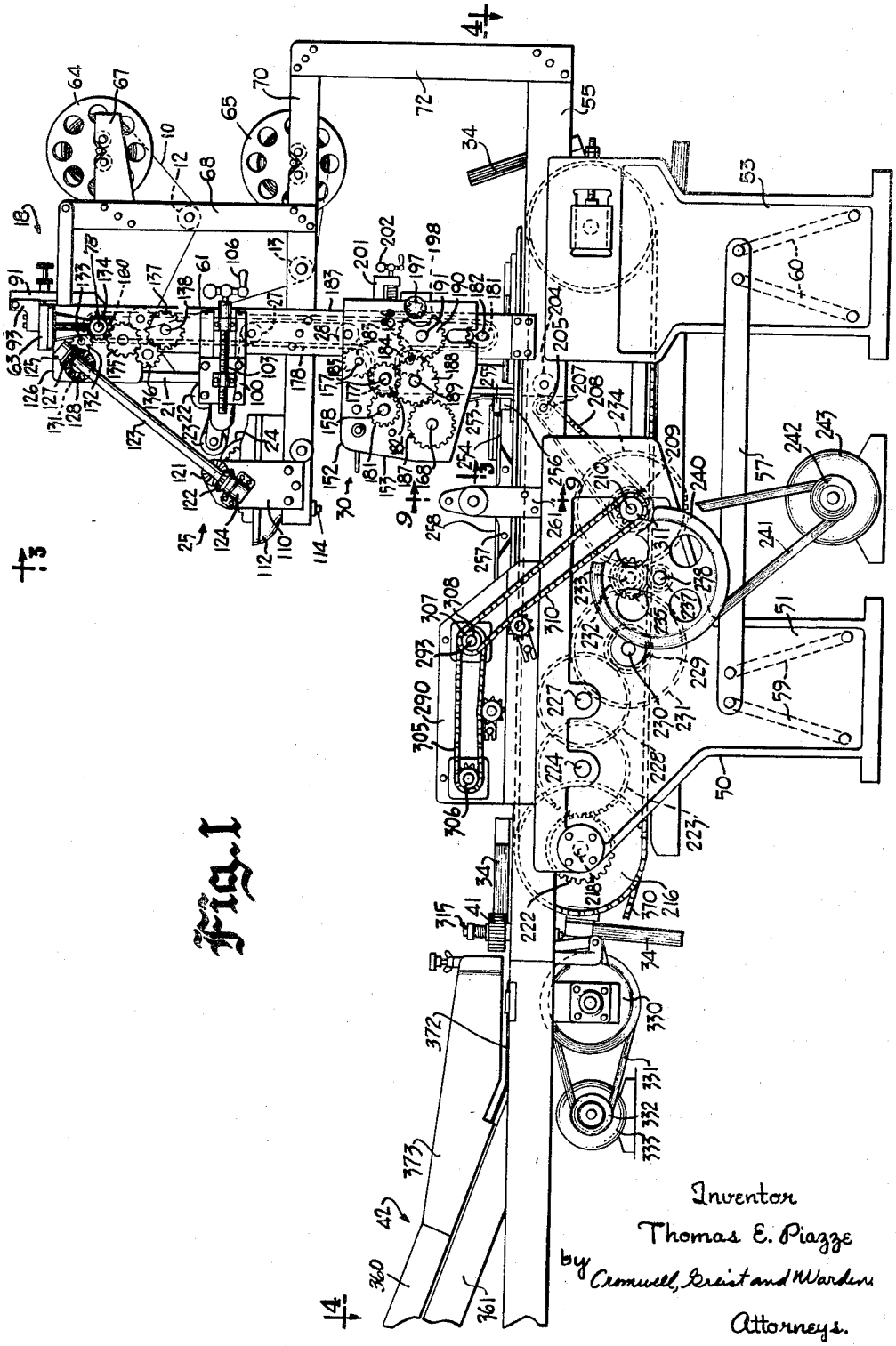

FIG. 1

Inventor
Thomas E. Piazze
by Cromwell, Greist and Warden
Attorneys.

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7 Sheets-Sheet 2

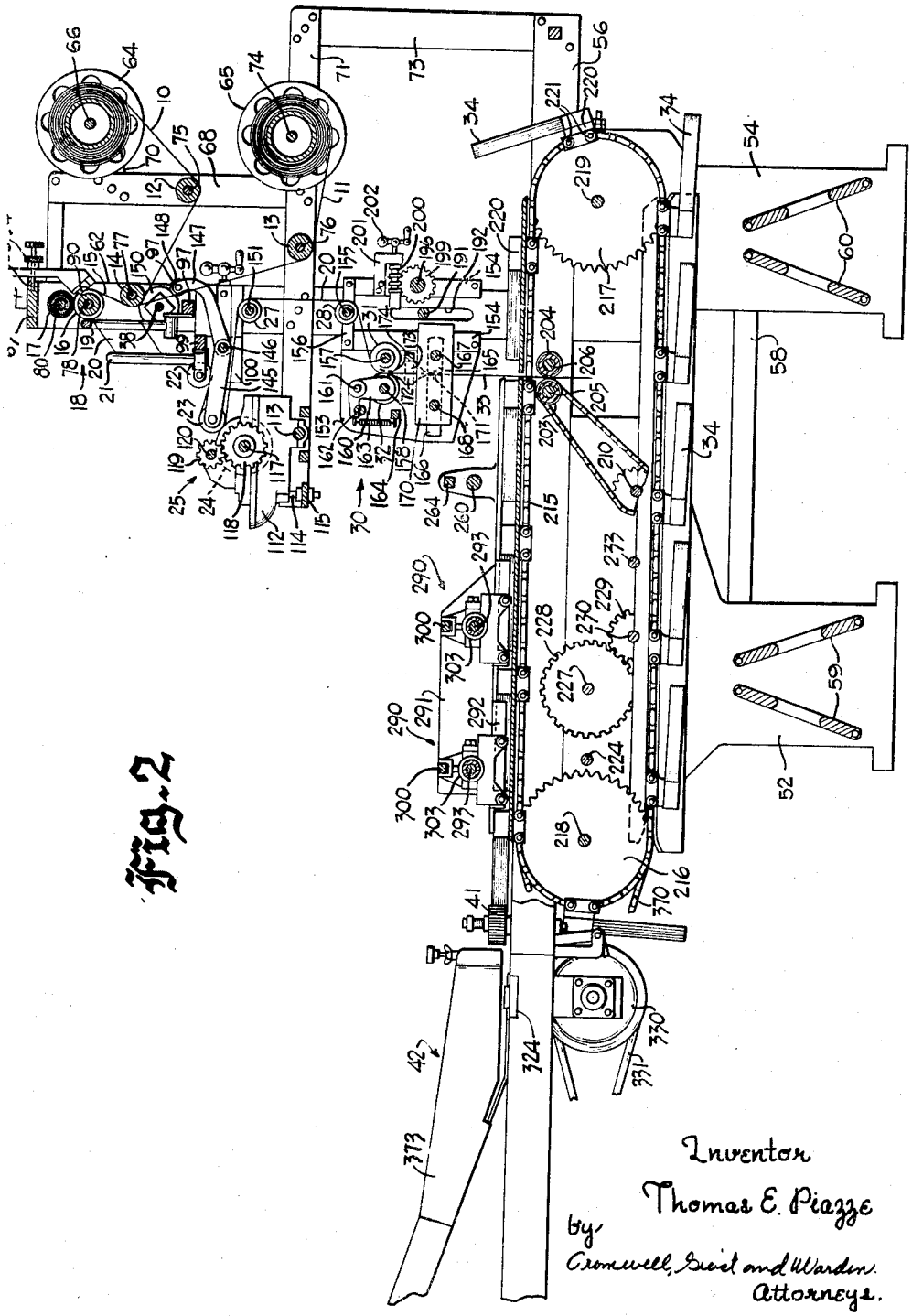

FIG. 2

Inventor
Thomas E. Piazze
by
Cromwell, Greist and Warden.
Attorneys.

June 28, 1960 T. E. PIAZZE 2,942,529

BAG MAKING MACHINE AND METHOD

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Fig. 3

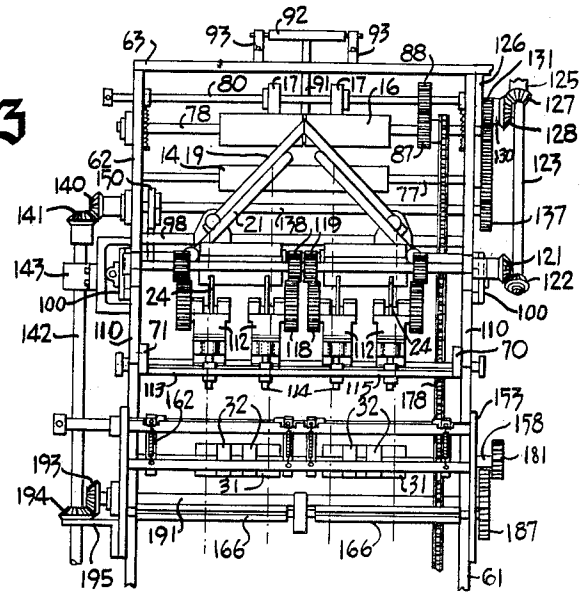
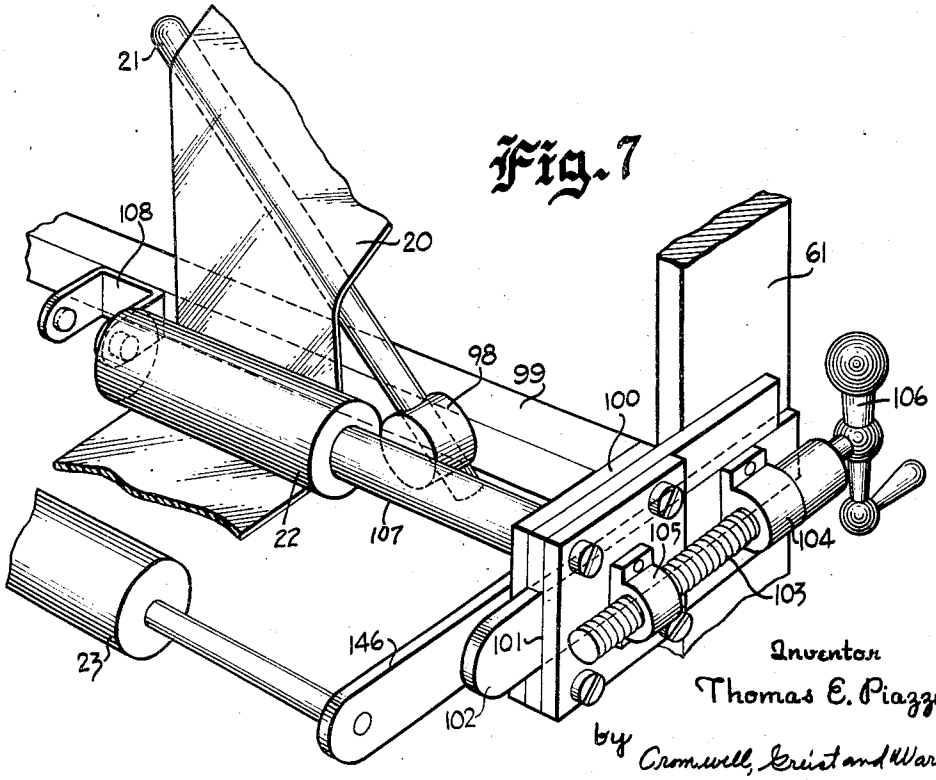


Fig. 7



Inventor
Thomas E. Piazze
by Cromwell, Greist and Warden.
Attorneys

June 28, 1960 T. E. PIAZZE 2,942,529

BAG MAKING MACHINE AND METHOD

Filed May 8, 1957 7 Sheets-Sheet 4

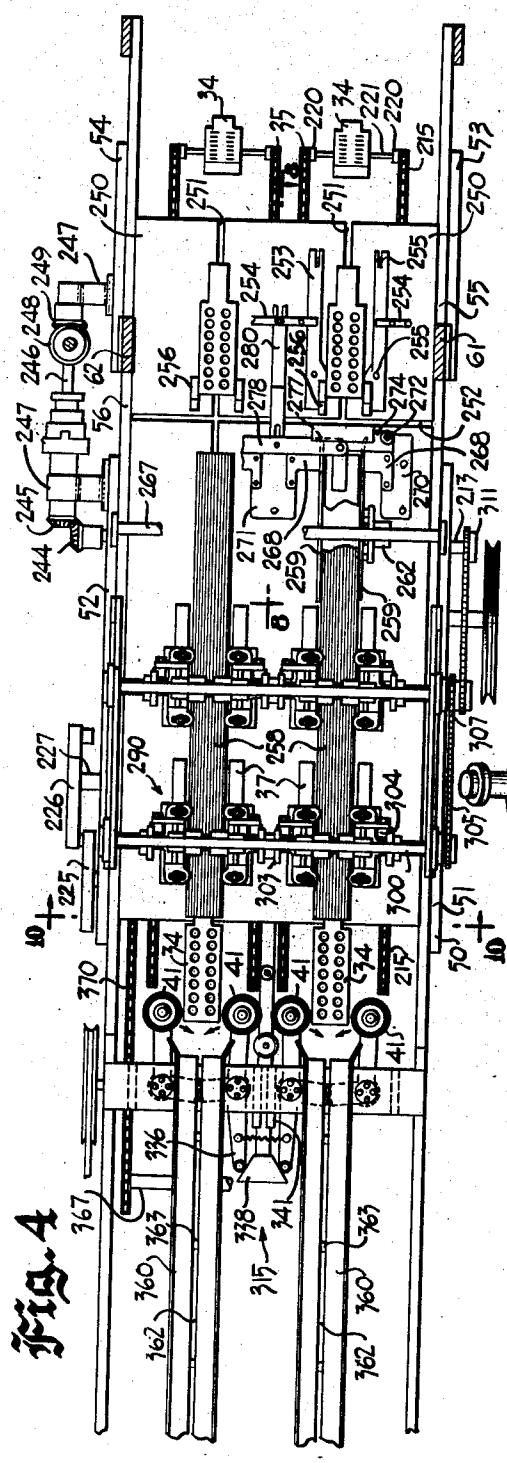


Fig. 4

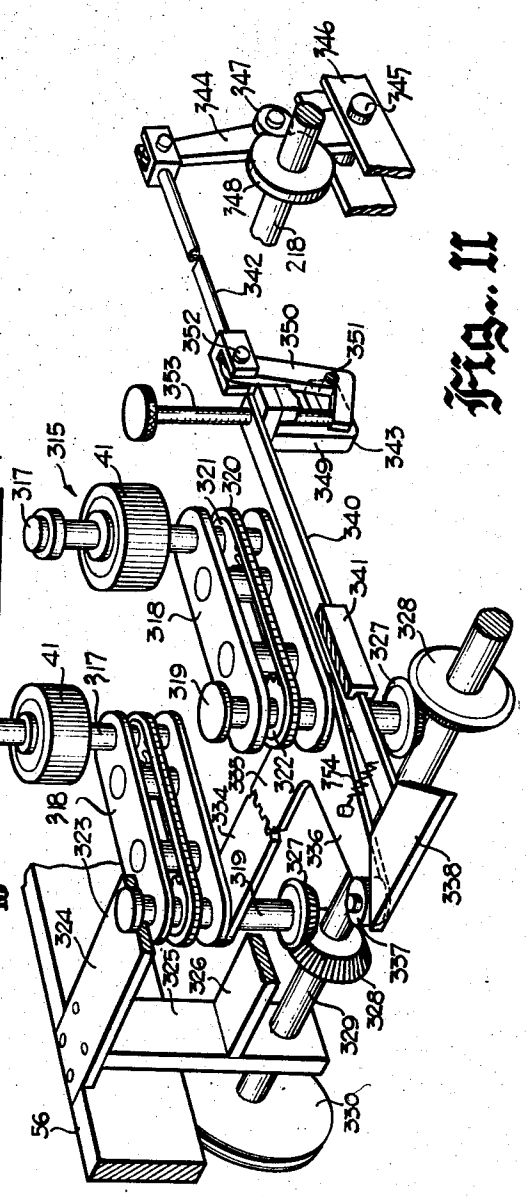


Fig. 11

Inventor
Thomas E. Piazze
by Cromwell, Greist and Warden.
Attorneys.

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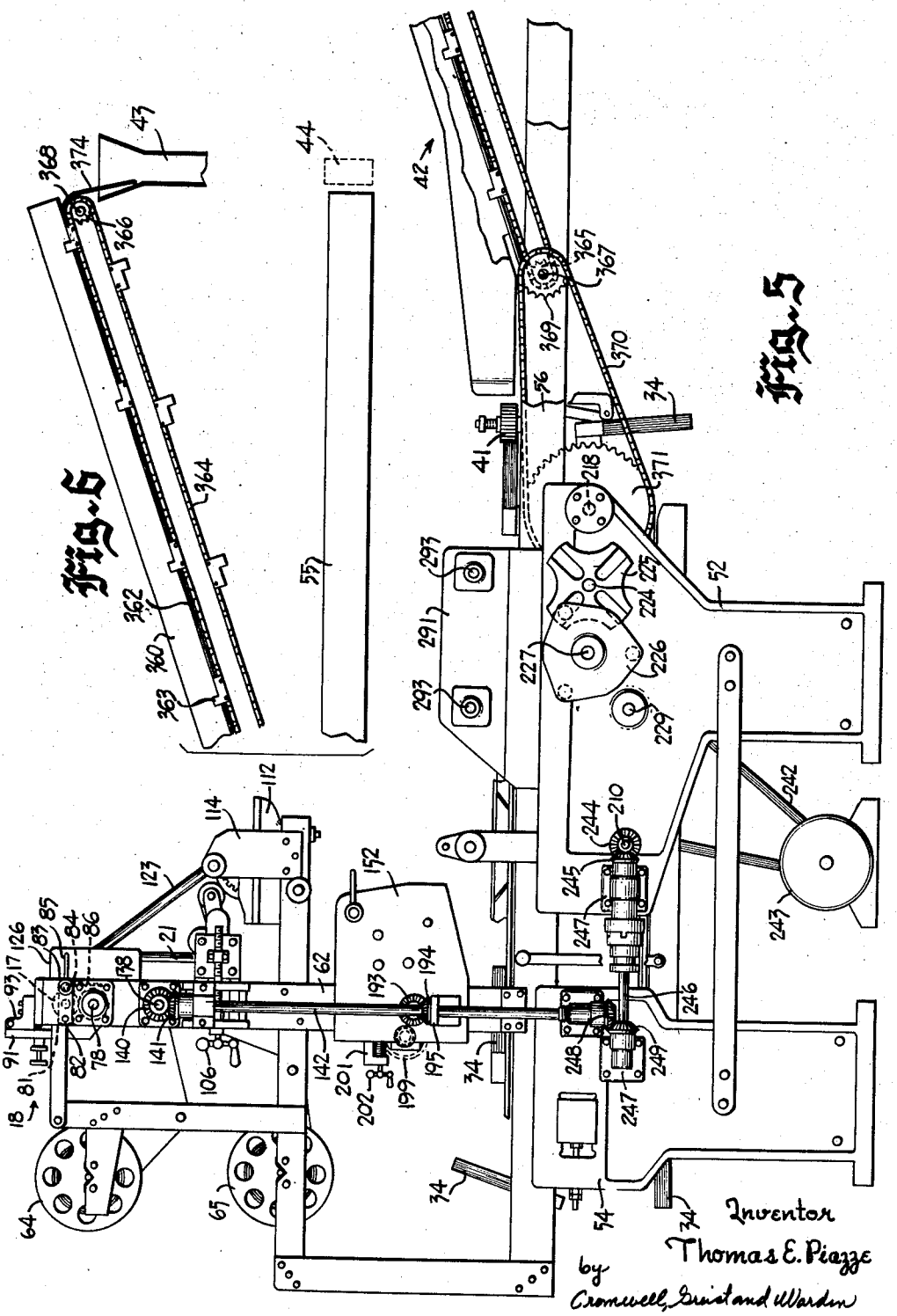

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BAG MAKING MACHINE AND METHOD

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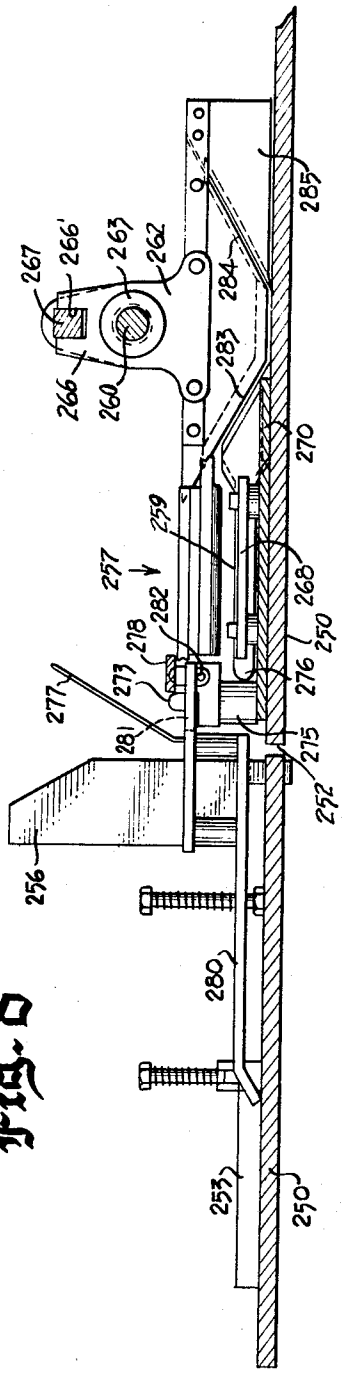

Fig. 8

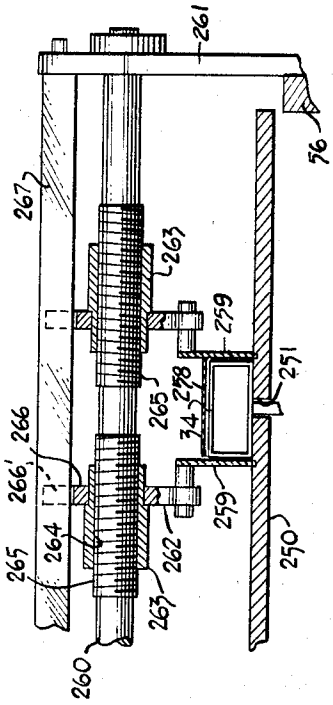

Fig. 9

Inventor
Thomas E. Piazze
by Cromwell, Greist and Warden
Attorneys.

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BAG MAKING MACHINE AND METHOD

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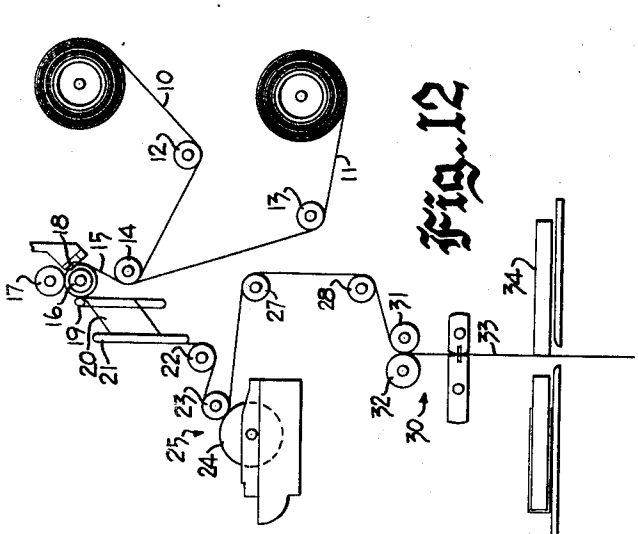


Fig. 12

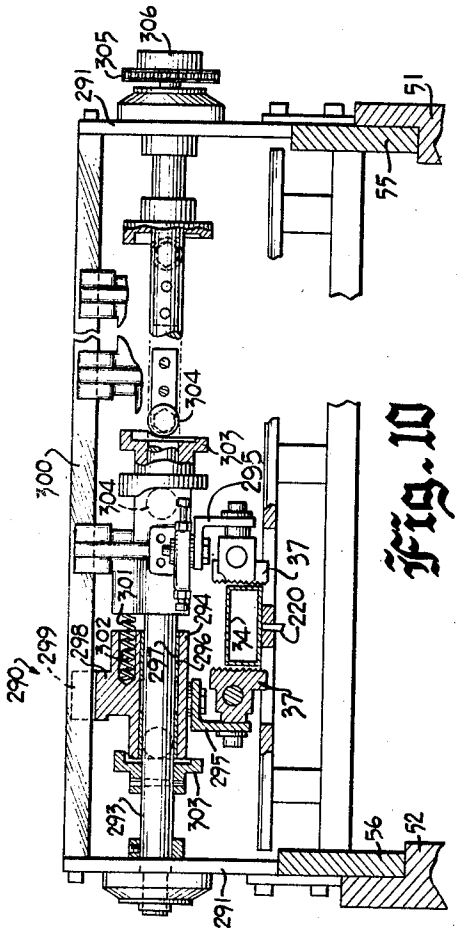
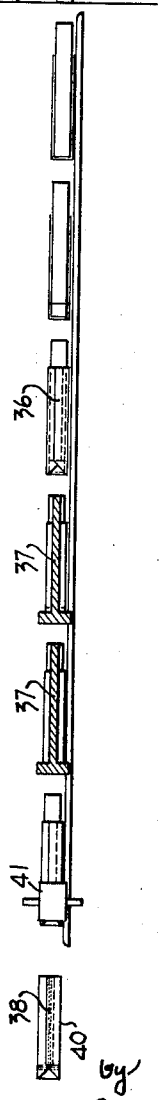


Fig. 10



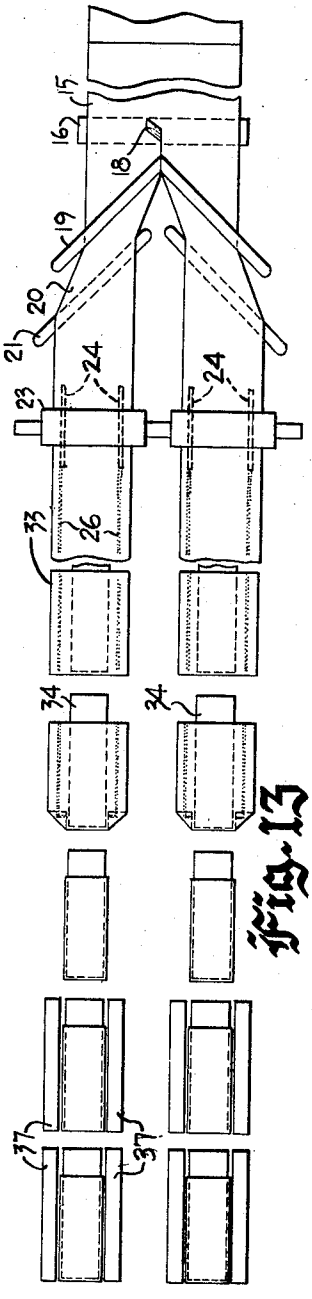


Fig. 13

Inventor
Thomas E. Piazze
by
Cromwell, Greist and Warden.
Attorneys.

United States Patent Office 2,942,529
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2,942,529

BAG MAKING MACHINE AND METHOD

Thomas E. Piazze, Mount Vernon, Ohio, assignor to Continental Can Company, Inc., New York, N.Y., a corporation of New York

Filed May 8, 1957, Ser. No. 657,853

11 Claims. (Cl. 93—12)

This invention relates to packaging and is particularly concerned with improvements in a machine for automatically fabricating from a single web of pliable sheet material open ended bag type containers which are adapted to receive goods to be packaged.

It is a general object of the invention to provide an improved mechanism for feeding a continuous web of heat sealable bag forming film material in a predetermined path, for slitting the web to divide it into web portions of smaller width, for cutting bag forming sections from the web portions as they are fed to parallel lines of bag forming mandrels which are mounted on a single conveyor and which have associated therewith mechanism for folding the bag forming sections around the mandrels, mechanism for heat sealing overlapped marginal portions to form longitudinal side seams and mechanism for removing the open ended bags from the mandrels and for delivering the same to a pocketed conveyor on an adjoining bag filling machine.

It is a more specific object of the invention to provide a bag making machine in which two lines of bag forming mandrels are mounted on a single conveyor so that the mandrels are advanced in unison and the bag forming material is delivered into proper position in the paths of the mandrels by a web feeding and guiding apparatus having incorporated therein a slitter for dividing a single web longitudinally into separate web sections and an adjustable web guiding and separating mechanism for controlling the advancing movement of the web sections so that they are properly aligned relative to the paths of movement of the lines of mandrels and bag forming sections which are simultaneously positioned for engagement by the mandrels in the respective lines, mechanism being provided for cooperation with the mandrels as they are advanced through the machine to form the bag sections around the mandrels and effect the sealing of overlapped seam forming portions thereof.

It is another object of the invention to provide a bag making machine wherein successive pairs of bags are simultaneously formed on two lines of bag forming mandrels which are carried in parallel paths on a single conveyor and wherein improved mechanism is provided for dividing a single web of bag forming sheet material and for advancing the divided web sections into the paths of the mandrels and which mechanism includes apparatus for laterally adjusting the divided webs in order to properly align the same for engagement by the mandrels.

It is still another object of the invention to provide an automatic bag making machine in which one or more webs are fed in superimposed or overlapped relation through a slitting and dividing mechanism which is positioned on the machine and adapted to be adjusted to enable the separate webs to be adjusted laterally for proper alignment relative to the paths of movement of lines of bag forming mandrels which are mounted on a single carrying conveyor and advanced simultaneously in parallel, laterally spaced paths.

It is a further object of the invention to provide in a

machine of the type described an improved mechanism for folding sheets of bag forming material around successive conveyor carried mandrels and for effecting a seal between overlapped wall forming marginal portions of the material.

It is a still further object of the invention to provide in a bag forming machine wherein sheets of bag forming material are folded around successive forming mandrels and overlapped seam forming portions of the material are sealed, an improved mechanism for stripping the completed bags from the forming mandrels and for transferring the same to an associated bag filling machine.

It is another object of the invention to provide in a bag forming machine of the type described wherein bags are formed in successive pairs on dual lines of traveling mandrels, improved transfer mechanism for removing successive pairs of the completed bags from the forming mandrels and for transferring the bags in paired relation to a pocketed conveyor of an adjoining bag filling machine.

These and other objects and advantages of the invention will be apparent from a consideration of the machine and method for manufacturing bags which is shown by way of illustration in the accompanying drawings wherein:

Figure 1 is a side elevation of a bag forming machine having incorporated therein the principal features of the invention;

Figure 2 is a vertical longitudinal section through the machine shown in Figure 1;

Figure 3 is a partial vertical transverse section on the line 3—3 of Figure 1;

Figure 4 is a horizontal transverse section on the line 4—4 of Figure 1, with portions broken away;

Figure 5 is a partial elevation showing a portion of the side of the machine opposite that shown in Figure 1, to an enlarged scale, and with portions broken away;

Figure 6 is a partial elevation of the adjoining portion of the side of the machine shown in Figure 5, also to an enlarged scale and with portions broken away;

Figure 7 is a detail perspective, to an enlarged scale, of a portion of the web control mechanism;

Figure 8 is a partial section, to an enlarged scale, taken on the line 8—8 of Figure 4;

Figure 9 is a cross section, taken on line 9—9 of Figure 1;

Figure 10 is a cross section, taken on line 10—10 of Figure 4, on an enlarged scale;

Figure 11 is a detail perspective, on an enlarged scale, of a portion of the mechanism for stripping the bags from the mandrels at the completion of the forming operation; and

Figures 12 and 13 are schematic views illustrating the successive operations in the manufacture of the bags.

The method and machine of the present invention will be best understood by referring first to Figures 12 and 13 of the drawings wherein the successive operations performed in the manufacture of the bags are shown schematically.

The bags may be formed from either single or multiply material drawn from a single supply roll or a plurality of rolls. In the form illustrated, two webs **10** and **11** are employed which are fed under guide rolls **12** and **13**, respectively, and brought together in superimposed relation at the roll **14** to form a compound web **15**. The web material **10**, which forms the outer walls of the bags, is preferably a flexible transparent heat sealable film material such as cellophane, "Mylar," "Pliofilm, polyethylene, or similar plastic, while like film materials or any other web material **11**, which may be desired as a liner for the bag, may be combined therewith, to form the composite web **15**. The web **15** is

passed between the rollers **16** and **17** and slit longitudinally by a slitting device **18** having a knife located to bear against the roller **16**. As the split web passes over the roller **16**, the two web portions **20**, into which the supply web is divided, are separated by an inverted V-shaped guide bar **19**. From the two arms or legs of the bar **19** the webs **20** travel to a pair of laterally spaced adjustable guide bars **21**, which are arranged in generally parallel spaced relation to the two legs of the bar **19**. The two webs **20** are advanced from the guide bars **21** to the bag forming devices by identical mechanisms. If an adhesive is required for sealing the material being used each web **20** then passes beneath a guide roller **22** and around roller **23** which forms a movable back-up roller for cooperating with laterally spaced adhesive applying discs or rollers **24** of an adhesive applicator mechanism **25** which applies laterally spaced stripes or lines **26** (Figure 8) of a quick drying heat sealing adhesive along opposite side margins of the web. From the glue mechanism **25** the web passes over a pair of vertically spaced guide rolls **27** and **28** and downwardly in a vertical path to a transverse severing mechanism **30**. The severing mechanism **30** has a pair of cooperating draw rolls **31** and **32** associated therewith which guide the web **20** between the transverse cutting elements. The two webs **20** are severed simultaneously to provide web sections **33** of identical length for delivery to the bag forming mechanism. The bag forming mechanism comprises two lines of rectangular forming mandrels **34** arranged in spaced relation and in longitudinal alignment on a supporting conveyor **35** for intermittent advancing movement in parallel horizontal paths. Each successive mandrel **34** picks up a bag forming section **33** of the web material, as the latter is fed into its path, engaging the inside surface intermediate the ends of the bag section, and advances through folding mechanisms with the sheet **33** being folded around the same so that the marginal side edge portions **36** which carry the glue lines **26** are overlapped on the side faces of the mandrels **34**. From the folding mechanism the respective mandrels **34** advance to a double row of heat sealers **37** which are arranged in paired relation and reciprocated to press against the opposite side faces of the mandrels **34** and form a T-shaped seam **38** in the overlapped marginal edge portions **36** of the bag forming sheet which form the side walls of the completed bag **40**. As the mandrels **34** advance beyond the two rows of heat sealers **37**, the successive mandrels pass between cooperating pairs of stripping rollers **41** which are rotated in the same direction as the movement of the mandrels and at a relatively higher speed and which are reciprocated to engage with the side faces of the mandrels so that they strip the completed bags **40** from the mandrels and deliver the same to an inclined discharge or transfer mechanism **42** (Figure 6) terminating at a vertical chute **43** through which the bags pass to a conveyor **44** of a filling and closing machine (not shown) in which the bags **40** are filled with goods and the top margins are folded and sealed.

The machine for fabricating the bags which is illustrated in Figures 1 to 11 comprises an upright supporting frame **50** (Figures 1 to 6) having a base structure including two pairs of plate-like, upright, laterally spaced, forward and rearward side frame members **51**, **52** and **53**, **54**, with the members **51**, **53** and **52**, **54** on each side being connected at the top by longitudinally extending side plates **55** and **56**, respectively, and also, at a lower point, by longitudinally extending side brace bars **57** and **58**. Suitable cross frames or plates **59** and **60** are provided between each pair of the base plates **51**, **52** and **53**, **54**.

An upright top frame or superstructure is supported on the base frame **50** which includes vertically extending uprights **61** and **62**. The latter are secured at their bottom ends to the side rails **55** and **56** and connected at the top by a cross plate **63** to form an inverted U-shaped cross frame which is braced by horizontal and vertical frame members as hereinafter referred to.

Supply rolls of the web materials **10** and **11** are supported on subframe members at the rearward end of the machine by means of two reels **64** and **65**. The upper reel **64** which carries the web material **10** is supported on a cross shaft **66** which is carried at its ends on horizontal bracket members **67** extending from transversely spaced inverted L-shaped side frame members **68** which are connected at their upper ends to the vertical side frame members **61** and **62** of the superstructure and at their lower ends to transversely spaced longitudinally extending side frame members **70** and **71** which are secured intermediate their ends to the vertical side frame members **61** and **62**. The side frame members **70** and **71** are connected at their rearmost ends to the corresponding ends of the bottom side plates **55** and **56** by the vertical brace bars **72** and **73**. The lower reel **65** which carries the web material **11** is suported on a cross shaft **74** which is mounted at its ends on the longitudinal side frame plates **70** and **71**. The web **70** passes from the reel **64** under the guide roller **12** which is supported on the cross shaft **75** having its ends journaled in the upright side frame members **68** while the liner web **11** passes from the reel **65** under the guide roller **13** which is mounted on the cross shaft **76** having its ends journaled in the longitudinal side rail members **70** and **71**. The two webs **10** and **11** are brought together beneath the guide roller **14** which is mounted on the cross shaft **77** having its ends journaled in the upright side plates **61** and **62** of the superstructure. From the roller **14** the compound web **15** passes upwardly and between the rollers **16** and **17** which form part of a web feeding and longitudinal slitting mechanism **18**. The lowermost roller **16** which supports the web **15** while it is slit is mounted on the driven cross shaft **78** which has its ends journaled in the upright side frame plates **61** and **62**. The cooperating roller **17**, which may be sectional as shown, is mounted on a cross shaft **80** above the roller **16**. The shaft **80** is journaled at its ends in support plates or arms **81** which are pivoted at **82** on the upright side frame members **61** and **62**. The shaft supporting arms **81** engage at their free ends with a cross bar **83** which is mounted in eccentric support members **84** in the side frame plates **61** and **62** with one end of the bar **83** extending beyond the side frame plate **62** and provided with an operating handle **85**. A tension spring **86** extends between the free end of each support arm **81** and a point on the respective frame member **61**, **62** below the same so that the support arms **81** are normally urged by springs **86** to hold the roller **17** in engagement with the web on the roller **16** while rotation of the bar **83** through operation of the handle **85** moves the roll **17** away from the roll **16** and out of web feeding relation. The two shafts **78** and **80** are driven in unison by connecting gears **87** and **88** while the shaft **78** is driven by mechanism which will be described subsequently.

A longitudinal slitting mechanism **18** for the web **15** is arranged for cooperation with the roller **16** which comprises a slitting knife or blade **90** mounted on the lower end of a depending bracket arm **91**. The bracket arm **91** is connected at its upper end to a relatively small cross shaft **92** which has its ends journaled in upstanding laterally spaced brackets **93** on the top cross frame member **63**. The bracket arm **91** is held in position by a locking and adjusting screw **94** (Figure 2) which has its inner end engaged in a threaded bore **95** in the edge of the top cross frame member **63**, so that the position of the knife **90** may be adjusted relative to the surface of the web supporting roll **16**, the latter having a peripheral groove or slot for receiving the knife or blade **90**. The knife **90** slits the web **15** into two web portions **20** which, in the form of the machine shown, are of equal width. The two web portions or sections **20**, as they leave the rolls

16 and 17, pass beneath an inverted V-shaped guide bar or frame 19 which is arranged in a vertical plane immediately in front of the roller 16 with the lower end of each leg thereof secured to an upstanding bracket plate 96 carried on a supporting cross bar 97 which is fixed between the two side frame plates 61 and 62. From the guide bar 19 the two webs 20 pass over the upper surface of independently mounted inclined guide rods or bars 21 which are arranged in transversely spaced relation and extend diagonally upwardly and inwardly towards each other in a vertical plane which is offset forwardly of the plane of the guide bar 19. The guide bars 21 are identical, except for the direction in which they are inclined, and are positioned somewhat below the fixed guide bar 19. Duplicate mechanisms are provided for guiding the webs 20 to glue applying mechanisms 25 and to web feeding and severing mechanisms 30 and thence downwardly to the two lines of bag forming mandrels 34 on the conveyor 35, which is supported in the base portion of the main frame of the machine.

Each guide bar 21 (Figure 7) is mounted at its lower end on a pivot bracket 98 carried on a cross bar 99 which extends between a pair of guideway forming brackets 100 positioned at opposite sides of the machine. Each of the bracket members 100 comprises vertically disposed plate members arranged in face engagement and providing a guideway 101 which receives a guide rail 102 secured on and projecting forwardly of each of the upright frame members 61 and 62. An adjusting screw 103 is rotatably mounted in a bearing 104 fixed on the guide rail 102 with its outer end in threaded engagement in a bracket member 105 on the guideway forming bracket 100, the screw 103 being provided at its end with an operating handle 106 so that axial rotation of the screw 103 moves the bracket member 100 in a horizontal direction toward and from the respective upright frame member 61 or 62, thereby adjusting the horizontal position of the guide bar 21 and the distance between the bar 21 and the fixed guide bar 19.

From the guide bar 21 the web 20 passes downwardly and beneath the guide roller 22 which is mounted on a cross shaft 107 journaled at one end in the end bracket member 100 and at the other end in one arm of a U-shaped supporting center support bracket 108 mounted on the cross bar 99. From the roller 22 the web passes in a forward direction to the adhesive or glue applying mechanism 25.

The major portion of the glue applying mechanism 25 is supported on bracket plates 110 and 111 which are secured in upstanding relation on the horizontal frame members 70 and 71 at opposite sides of the machine. Two pairs of glue pots 112 are supported on a cross shaft 113 which extends between the side plates 110 and 111 with the forward end of each of the pots 112 resting on an adjustable screw or pin 114 in a cross bar 115 also extending between the side plates 110 and 111. Each of the glue pots 112 has mounted therein a blade-like glue applying disc or wheel 24 on a cross shaft 117 which is provided with a gear 118 located exteriorly of the glue pot 112 and adapted to engage with a pinion 119 on a drive shaft 120 journaled at its opposite ends in the side plates 110 and 111. The drive shaft 120 is extended beyond the side plate 110 and carries a beveled gear 121 which is in engagement with a cooperating gear 122 on a diagonally upwardly extending drive shaft 123. The diagonal drive shaft 123 is mounted in a bearing support 124 at its lower end and a similar bearing support 125 at its upper end, which bearing supports extend from the side frame plate 110 of the glue mechanism at the lower end and a vertically extending support plate 126 at the upper end, respectively, the support plate 126 being attached to the outside face at the top of the upright frame member 61. The drive shaft 123 is provided at its upper end with a bevel gear 127 which is engaged in driving relation with a cooperating bevel gear 128 on a stub shaft 130 mounted on the support plate 126. The stub shaft 130 carries a pinion 131 which engages with an intermediate idler gear 132 on an idler shaft 133. The idler gear 132 engages with a pinion 134 on the drive shaft 78 which carries the roller 16. The pinion 134 is driven through the connecting idler gears 135 and 136, which are suitably mounted on the support plate 126, by the drive gear 137 on the end of the drive shaft 138. The drive shaft 138 extends across the machine and is journaled in the upright side plates 61 and 62 with its opposite end extended beyond the side plate 62 and carrying a beveled gear 140 which engages in driving relation with a cooperating bevel gear 141 on the upper end of a vertical drive shaft 142, the latter being supported in vertically spaced upper and lower bearing brackets 143 and 144 which are mounted on the face of upright frame member 62 and the base side frame member 54, respectively.

The adhesive for forming the longitudinal seams in the side walls of the bag is applied in strips or lines 26 adjacent the opposite side edges of the web 20 by intermittent engagement of the traveling web with the glue discs 24. The web 20 passes beneath the guide roll 22 and moves forwardly therefrom and around the roller 23 which is mounted on the ends of a pair of supporting arms 145 (Figure 2) which are secured at their other ends to a cross shaft 146 journaled in the inside plates of the end guideway brackets 100. At one side of the machine the cross shaft 146 carries a rock arm 147 provided with a cam roller 148 on its free end which is engaged with the circular cam 150 on the drive shaft 138 for intermittently reciprocating the roller 23 toward and from the glue discs 24, resulting in the application of the lines 26 of glue to the web as it passes around the roller 23.

The web 20 passes from the roller 23 of the applying mechanism 25 over the guide roller 27 which is mounted on a cross shaft 151 extending between the side frame plates 61 and 62. From the guide roller 27 the web 20 passes downwardly and around the guide roller 28 which is mounted on a vertically adjustable cross frame 152 on which the transverse cutting or web severing mechanism 30 is carried. The cross frame 152 comprises transversely spaced side or end frame plates 153, each of which is provided with vertically extending guideway forming members 154 on the inner faces and providing a vertical sliding connection between the frame plates 153 and the main side frame plates 61 and 62 of the frame superstructure. The guide roller 28 is supported on a shaft 155 which extends between bracket plates 156 secured at the top of the end frame plates 153. The web 20 passes from beneath the guide roller 28 forwardly and downwardly between the feed rollers 31 and 32 which are supported on cross shafts 157 and 158. The feed roller 31 is in two sections, one for each web 20 and the cross shaft 157 is journaled between the side plates 153. The feed roller 32 is also sectional and also the supporting shaft 158 is mounted on the lower ends of depending arms of a pair of bell crank members 160 which are supported on the cross shaft 161 extending between the frame plates 153 with the other arm of each crank member 160 extending forwardly of the support shaft 161 and adapted to engage with or rest on a stop bar 162 extending between the side frame plates 153. The bell crank members 160 are each urged in a counterclockwise direction about the supporting cross shaft 161 by a tension spring 163 which is connected at one end to the free end of the horizontal arm of the bell crank member and at the other end to a fixed cross bar 164 also extending between the side frame plates 153. The springs 163 urge the roller 32 against the roller 31 while the stop bar 162 limits the movement of the same, with the pressure between the roller sections which engage each web 20 being independently adjustable. The feed rollers 31 and 32 deliver each web 20 to a pair of trans-

versely extending cooperating cutting or severing devices 165 and 166. Each pair of the severing devices is rotatably mounted on cross shafts 167 and 168 extending between bracket plates 170 mounted on the side frame plates 153 and at the center of the cross frame 152. The web severing devices 165 and 166 carry a knife and anvil members indicated at 171. The web 20 is guided from the feed rollers 31 and 32 to the severing devices 165 and 166 by vertically extending cooperating guide plates 172 and 173 which are mounted on a cross rail or bar 174 secured between the side frame plates 153. The guide members 172 and 173 are arranged in vertical and longitudinal planes on opposite sides of the path of movement of the web 20 with their edges engaging the web between the same to stiffen and hold the web while the same is severed by the transverse cutting elements 171. The feed rollers 31 and 32 are preferably provided with circumferential grooves to accommodate the upper ends of the guide plates 172 and 173. The center support plate 170 for the shafts 167 and 168 may be secured on the cross bar 174. The shafts 157 and 158 which carry the feed rollers 31 and 32 are connected together in driving relation by interengaging gears 175 and 176 on the respective shafts. The feed roller shaft 157 is provided with a drive sprocket 177 located inside the side frame plate 153 which engages with an endless driving chain 178. The chain 178 has its upper end supported on a sprocket 180 on the drive shaft 78 at the upper end of the main frame of the machine. The chain 178 in supported at its lower end on an idler sprocket 181 on a stub shaft 182 adjustably mounted near the bottom of the side frame plate 61. The chain 178 also engages two spaced idler sprockets 183 and 184 which are mounted on stub shafts 185 and 186 inside the frame plate 153 and adjacent the sprocket 177 so that they hold the chain in engagement with the sprocket 177 and vertical adjustment of the frame 152 does not affect the driving relationship between the chain 178 and the sprocket 177.

The cutting or web severing devices 164 and 165 are preferably constructed in accordance with my prior patent, Piazze No. 2,551,335, and details thereof which are not shown herewith will be found therein. The rotating member 166 is provided on the end of its supporting shaft 168 with a gear 187 which engages in driving relation with a gear 188 on a stub shaft 189 on the outside of the side frame plate 153. The gear 188 engages in driving relation with a gear 190 mounted on the end of a cross drive shaft 191 which has its ends journaled in the side plates 153 and extends across the machine with the vertical frame members 61 and 62 being sloted at 192 to permit vertical movement of the shaft relative thereto. The drive shaft 191 is provided on its one end with a beveled gear 193 which engages in driving relation with a bevel gear 194 mounted on a bracket 195 extending from the frame side plate 153 and having a sliding keyed connection with the vertical drive shaft 142.

The cross frame 152 is adjustable vertically on the side frame plates 61 and 62 of the superstructure by means of mechanism which comprises a cross shaft 196 extending between the plates 153 and pinions 197 on its ends which engage with rack formations 198 on the rearwardly facing edges of the vertical side frame plates 61 and 62. At one end the cross shaft 196 carries a worm wheel 199 and a worm 200 is mounted in a bracket 201 on the frame plate 153 and provided with an operating handle 202 for controlling the raising and lowering of the cross frame 152. This arrangement permits adjustment of the length of bag forming section or sheet 33 which is cut from the web 20 by the transverse severing mechanism 30.

As the leading end of the web 20 is fed downwardly between the successive mandrels 34 on the intermittently traveling conveyor 35, the lower or leading end of the web is received between a pair of felt covered rollers 203 and 204 which are supported on the cross shafts 205 and 206 extending between the longitudinal frame members 55 and 56 below the top run of the conveyor 35. The cross shaft 205 carries, inside the frame member 55, a sprocket 207 which is connected by a drive chain 208 with a drive sprocket 209 on a cross shaft 210 journaled between the side frame members 51 and 52 and constituting one of the principal drive shafts for the machine.

The mandrel carrying conveyor 35 comprises laterally spaced pairs of endless chains 215 which are carried at opposite ends on forward and rearward sprocket members 216 and 217, the latter being supported on cross shafts 218 and 219 which are journaled in the front and rear main side frame members 51, 52 and 53, 54, respectively. The mandrels 34 are each secured between a pair of chains 215 by a bracket member 220 at the trailing end of the mandrel and a pair of chain connecting transverse rods or bars 221 so that the mandrels extend forwardly of their attachment to the chains and are carried in a generally horizontal plane along the top run of the conveyor; the two lines of the mandrels traveling in parallel paths which are spaced transversely of the machine.

The conveyor supporting shaft 218 carries a gear 222 inside the upright side frame member 51 which is in engagement with a gear 223 on a cross shaft 224 journaled in the side frame members 51 and 52 and having on its opposite end the driven member 225 of a Geneva drive. The drive member 226 of the Geneva drive is mounted on the outer end of another cross shaft 227 which carries inside the side frame member 52 a drive gear 228 engaging with a pinion 229 on a cross drive shaft 230 journaled between the side frame members 51 and 52. The drive shaft 230 carries on its other end, inside the frame member 51, a gear 231 which is in driving relation with a pinion 232 on the main drive shaft 233. The pinion 232 is also in driving relation with a gear 234 on the cross drive shaft 210. The main drive shaft 233 carries outside the frame member 51 a gear 235 which is in driving relation with a pinion 237 on a stub shaft 238 journaled in the side frame member 51 and having on its outer end a pulley 240 connected by a belt 241 with the drive pulley 242 on the motor 243 mounted beneath the machine.

The drive shaft 210 carries at its other end, outside the side frame member 52, a bevel gear 244 (Figure 5) which engages in driving relation with a cooperating bevel gear 245 on a relatively short horizontal drive shaft 246 which is supported in longitudinally spaced brackets 247 on the outside faces of the side frame members 52 and 54. The shaft 246 carries a bevel gear 248 which engages in driving relation with a bevel gear 249 on the bottom end of the vertical drive shaft 142.

The mandrels 34 are supported along the upper run of the conveyor 35 on transversely extending table forming plate members 250 which are slotted at 251 to provide a passage or guideway from the brackets 220 which connect the mandrels 34 with the chains of the conveyor 35. The plate members 250 are also slotted transversely at 252 to provide a passageway for the bag forming web sections 33. Each successive mandrel 34 engages the leading end thereof with a bag forming web section 33 as it advances across the transverse slot 252 in which the bag sections are positioned.

The mandrels 34 in each line thereof are held in proper alignment as they approach the transverse slot 252 by longitudinally extending laterally spaced side guide members 253 (Figures 1, 4 and 8) disposed on opposites of the slot 251. The guide members 253 are each held in position by a spring pressed clamp 254 and longitudinally spaced upstanding positioning pins 255. The guide members 253 terminate at upstanding side wing portions 256 which are located adjacent the guide slot 252 and opposite the entrance to a folding chute 257.

The folding chute 257 comprises a horizontally ex-

tending top plate 258 and laterally adjustable vertically extending side folder plates 259 which are carried on a cross shaft 260. The cross shaft 260 is journaled in upright side bracket members 261 secured on the side frame members 55 and 56 and extends across the machine to support the folding chute elements for both lines of mandrels 34. The side folder plates 259 are mounted on bracket members 262 (Figures 8 and 9) which have a hub portion 263 provided with a threaded bore 264 which receives a threaded portion 265 of the supporting cross shaft 260. The threaded shaft portions 265 are right and left hand for each pair of brackets 262 so that rotation of the shaft 260 adjusts the axial position of the brackets 262 and moves the side folder plates 259 toward and from the longitudinal guide slot 251 for the mandrels 34. Each bracket member 262 has an upwardly extending portion 266 which is sloted at 266' for receiving in sliding engagement therewith the fixed cross bar 267 which extends between the upright side bracket members 261 for holding the bracket members 262 against rotation about the shaft 260, while permitting axial movement thereon.

At the rear or entrance end of the folding chute 257, the side folder plates 259 are provided with laterally extending L-shaped bracket plates 268 which are secured at their outer extremities to horizontally disposed support plates 270 and 271 adapted to rest on the top surface of the support plate 250. The plates 270 and 271 are provided with upstanding posts 272 and 273 which carry a cross bar 274 forming the top folder bar for the entrance to the folding chute. Spacer sleeves 275 are provided on the pins 272 and 273 to space the bar 274 the proper distance above the plate 250, which forms the floor of the chute, to permit the mandrels 34 to pass between the same, the edge of the plate 250 at the transverse slot 252 forming the bottom folder for the chute. Each bag forming sheet 33 is, of course, folded over the leading end and the top and bottom faces of the mandrel 34 as it advances into the chute while the bottom folds at the sides of the mandrel are made by the end edge portions 276 of the side plate members 259 as the mandrel 34 enters the folding chute between the same. The cross bar 274 carries an upwardly extending guide plate 277 for directing the successive bag forming sheets 33 downwardly into the slot 252. It also supports one end of the top plate 258 which extends the length of the chute 257. The folding chutes 257 for the two lines of mandrels are held in proper spaced relation by a connecting cross bar 278 extending between and connected to the tops of the top folder bars 274, while the entire mechanism is held against transverse movement by a longitudinally extending spring pressed clamping bracket member 280 which is anchored on the support plate 250 and has a slotted end 281 engaging with a depending pin 282 in the center of the connecting bar 278. The side folder plates 259 are provided with diagonal downwardly and upwardly extending slots 283 and 284, respectively, for successively folding the laterally projecting wall forming marginal portions of the bag forming sheet 33 into overlapping relation against the side faces of the mandrel 34 in a well known manner.

The mechanism is adapted to be adjusted for mandrels of a different size. The guide members 253 are adapted to be replaced with like members accommodating a mandrel having a different width. The top folder bars 274 and the top plate 258 may be raised by shims or washers provided on the pins 272 and 273 and portions 285 of the side folder plates 259 are adapted to be removed and replaced by like folder members of different size while the main portions of the side folder members are adjustable with the supporting brackets 262 by rotation of the supporting cross shaft 260, to vary the width of the chute 257.

As the mandrels 34 advance beyond the folding chute 257 they pass through a heat sealing mechanism 290

(Figures 1, 2, 4 and 10) which activates the adhesive in the lines 26, now buried between the folded over marginal portions of the bag forming sheet 33, and forms the T-shaped seal 38. The heat sealing mechanism 290 is mounted on a subframe which comprises upright side frame plates 291 extending above and attached to the longitudinal side frame plates 55 and 56 of the main frame of the machine, adjacent the end of the upper run of the conveyor 35, which support two transversely extending lines of heat sealing members 37 which are arranged on transversely extending longitudinally spaced shafts 293 journaled at their ends in the upright side plates 291. Each of the heat sealing members or bars 37 is provided with a suitable electrical resistance element for heating the same and each is attached in depending relation beneath a main supporting bracket 294 by angle brackets 295. The main supporting bracket 294 has a hub forming portion 296 with a bore 297 which receives the cross shaft 293 so that the brackets 294 are mounted for rotation therein of the support shaft 293 and are slidable axially thereof. Each of the brackets 294 has an upstanding flange portion 298 which is slotted or grooved at 299 to receive a cross bar 300 which extends in fixed relation between the top edges of the side plates 291 and prevents the brackets 294 from swinging about the supporting shaft 293 while permitting adjustment of the same axially of the shaft. The sealing bars 37 and their supporting brackets 294 are arranged in pairs which are in opposed relation on opposite sides of the paths of the two lines of mandrels 34. The brackets 294 of each pair thereof are urged away from each other by a compression spring 301 having its ends seated in sockets 302 provided therefor in opposed faces of the brackets. Circular plate cam members 303 are secured on the shaft 293 adjacent the opposite faces of each of the brackets 294 and cooperating cam rollers 304 are mounted on the brackets 294 so that rotation of the shaft and the cams 303 reciprocates the brackets 294 of each pair and the sealing members 37 carried thereby toward the mandrels 34 against the force of the compression spring 301 for engaging the folded over bag forming material to form the seal 38.

The two shafts 293 are connected together in driving relation by a drive chain 305 and sprockets 306 and 307 which are mounted on the shafts. The one shaft 293 carries a second sprocket 308 which is connected by a driving chain 310 with a sprocket 311 on the cross drive shaft 210. Rotation of the shafts 293 reciprocates intermittently the two lines of heat sealing members 237 with the operation of the shafts being synchronized with the movement of the conveyor 35 so that the overlapped wall forming portions of the bag forming material are subjected to the pressing action of the heat sealing members 37 at successive intervals to activate the adhesive and form the bag seams 38.

The mandrels 34 pass from the heat sealing mechanism 290 to a mechanism 315 (Figures 1, 2, 4 and 11) for removing the completed bags 40 from the mandrels. The bag removing mechanism 315 comprises a pair of laterally spaced stripper rolls 41 which are mounted on vertically disposed shafts 317 journaled in the free ends of laterally spaced frame-like, double plate, arm members 318. The arm members 318 are pivotally mounted at their opposite ends on upstanding shafts 319. The vertically disposed shafts 317 and 319 of each arm member 318 are rotatably supported or journaled in the vertically spaced plates thereof and are connected in driving relation by a chain 320 and sprockets 321 and 322 on the respective shafts. The arm supporting shafts 319 are supported in spaced relation in a cross frame 323 at the end of the machine which comprises a transversely extending top plate 324, depending end plates 325, and a bottom cross plate 326. The top plate 324 is secured at its ends to the main side frame plates 55 and 56. The shafts 319 are journaled in the vertically spaced

frame plates 324 and 326 and carry at their lower ends bevel gears 327 which engage in driving relation with cooperating bevel gears 328 on a cross drive shaft 329 journaled between the ends of the depending end frame plates 325. The drive shaft 329 is extended at one end and provided with a drive pulley 330 which is connected by a belt 331 with the drive pulley 332 of an independent drive motor 333. The mandrel stripping rolls 41 are driven in unison at a relatively high rate of speed by their chain and gear connection with the drive motor 333.

The stripper rolls 41 of each pair thereof are also swung toward and from the mandrels 34 which pass between them about the shafts 319 as pivot points by an actuating mechanism which comprises a segment arm 334 extending from one arm 318 at the end which is on the shaft 319 and a cooperating segment arm 335 on the other arm 318 which has a forwardly extending cam arm forming portion 336 with a cam roller 337 mounted on the end thereof. The cam roller 337 is positioned for engagement with one of the oppositely disposed diagonal edges of a horizontal cam plate 338. The cam plate 338, which is of generally truncated triangular form, is reciprocated longitudinally of the machine so that the two oppositely disposed diagonal edges engage the cam rollers 337 for operating the two sets of stripper rolls 41. The two stripper mechanisms 315 are operated simultaneously and strip the bags 40 from the mandrels 34 as the mandrels in the two lines move to the end of the top run of the conveyor 35, the stripper rolls 41 being positioned relative to the path of the mandrels 34 to engage with the completely formed bags near the bottom of the side walls thereof. The cam plate 338 for reciprocating the stripper rolls is mounted on one end of an elongate bar 340 which extends longitudinally of the machine and is supported in guideway forming brackets 341 mounted below the cross frame member 324. The bar 340 is connected at its other end to one end of an operating rod 342 by a stroke adjusting device 343. The operating rod 342 is pivotally connected at its other end to the upper end of a cam arm 344 which has its lower end pivoted on a pin 345 carried on supporting frame members 346 below the shaft 218 and carries a cam roller 347 intermediate its top and bottom ends which is adapted to engage with the cam plate 348 on the center of the cross shaft 218. The stroke adjusting device 343 comprises a bracket member 349 depending below the end of the bar 340 and a bell crank 350 pivoted to the lower end thereof at 351. The vertical arm of the bell crank 350 is pivotally connected at 352 to the end of the rod 342 while the horizontal arm of the bell crank 350 extends beneath the lower end of a vertical adjusting screw 353 which is carried in the bracket 349 so that rotation of the screw 353 varies the combined length of the bar 340 and rod 342 and controls the stroke of the cam plate 338. The cam rollers 337 are held against the operating cam plate 338 by a tension spring 354 secured at opposite ends to the cam arms 336 so that reciprocation of the cam plate 338 swings the stripper rollers of each pair thereof toward and away from each other and into and out of engagement with the successive mandrels 34.

The stripper mechanisms 315 deliver the completed bags from the mandrel lines to a bag transfer mechanism 42 which comprises a pair of upwardly inclined conveyor chutes 360 which are supported on an inclined frame structure 361 extending above and supported on the side rails 55 and 56 beyond the stripper mechanisms 315. The chutes 360 are laterally spaced and in longitudinal alignment with the path of travel of the two lines of mandrels 34. Each of the chutes 360 is in the form of an upwardly opening channel with a longitudinally extending center slot 362 for receiving bag engaging fingers 363 projecting from an endless conveyor chain 364. The chain 364 is supported on end sprockets 365 and 366 which are mounted on cross shafts 367 and 368 extending between the side members of the frame 361, at the bottom and top thereof. The lower cross shaft 367 carries at its end adjacent the side frame plate 56 a sprocket 369 which is connected by a driving chain 370 with a sprocket 371 on the cross conveyor shaft 218 to drive the bag transfer conveyor chains 364 in synchronism with the movement of the mandrel conveyor 35. A curved bottom plate 372 and upstanding side guide plates 373 are provided at the bottom of each of the conveyor chutes 360 to guide the bags as they are stripped from the mandrels 34 by the stripper rolls 41. At the upper end of each transfer chute 360 a curved support plate 374 is provided to guide the bags into the upwardly opening mouth of a hopper or vertical chute 43 which delivers the bags to a pocketed conveyor 44 on a filling and closing machine.

In operation the machine is initially adjusted for the size of the bag to be produced and supply rolls of the desired bag forming materials 10 and 11 are mounted on the reels 64 and 65. The leading ends of the webs 10 and 11 are threaded through the slitting, glue applying and transverse severing mechanisms to the slot 252. The machine is then set in motion and the various mechanisms operate as described to automatically form a double line of flat bottom bags 40 on the mandrels 34 of the conveyors 35 and to deliver the same to the feeding or transfer hopper 43 which deposits them in the pocketed conveyor 44 of a filling and closing machine.

The machine is adapted for fabricating bags from a variety of materials. Preferably, heat sealable films, lacquer coated on both sides, are employed. When the bags are formed from double webs both sheets are provided with heat sealable coatings which will result in fusing of the contacting faces when the seals are effected in the face-to-back relationship. When laminated materials are used, the inner and outer faces are provided with heat sealable coatings which will produce a fused seal. With some materials, the application of adhesive is unnecessary because of the heat sealing characteristics of the material and use of the adhesive applicator mechanism 25 may be eliminated.

While specific materials and particular details of construction have been referred to in describing the illustrated form of the bag making machine, it will be understood that other materials and variations in the details of construction may be resorted to within the spirit of the invention.

I claim:

1. In a machine for forming bags in successive pairs from a single width continuous web of flexible film material, a traveling conveyor, bag forming mandrels mounted on said conveyor for moving in parallel paths, mechanism along said paths for folding bag forming sheets about said mandrels and forming seals therein and means for delivering the bag forming sheets from the web of film material into the paths traversed by the mandrels, said sheet delivering means comprising means for feeding a single web of the film material, means for slitting the web longitudinally, an inverted V-shaped bar mounted in the path of the slit web, means for guiding the slit web beneath said car so as to engage the slit portions with the legs of said bar and separate the slit portions laterally, a pair of guide bars mounted in spaced relation to said V-shaped bar, which guide bars are arranged parallel with the legs of the V-shaped bar and in an offset plane, means to guide the slit portions of the web over said guide bars in laterally separated parallel paths to the mandrels, and means to individually adjust said guide bars toward and from said V-shaped bar to vary the length of the path traveled by the separate slit portions.

2. In a machine for forming bags in successive pairs from a single width continuous web of flexible film material, a traveling conveyor, bag forming mandrels mounted in parallel lines on said conveyor, mechanism mounted along said conveyor for folding bag forming

sheets about said mandrels and forming seals therein, and means for delivering bag forming sheets from the web of film material transversely of the conveyor and into the paths traversed by the mandrels, said sheet delivering means comprising means for feeding a single web of the film material, means for slitting the web longitudinally, a bar having an inverted V-shaped edge positioned in the path of the slit web, means for guiding the slit web over said V-shaped edge to separate the slit web portions laterally, a pair of guide bar members spaced from said V-shaped edge which guide bar members are arranged generally parallel with the leg portions of the V-shaped edge and in a plane which is in parallel spaced relation with said V-shaped edge, said slit web portions passing beneath the legs of said V-shaped bar and over said guide bar members, means to guide the slit portions of the web in separate paths from said guide bar members to the mandrels, and means to individually adjust said guide bar members relative to said V-shaped edge and said conveyor to vary the length of the path traveled by the separate slit web portions.

3. In a machine for forming bags in successive pairs from a single width continuous web of flexible film material, an upright frame, a traveling conveyor mounted on said frame, bag forming mandrels mounted on said conveyor for movement in two parallel paths, means for delivering bag forming sheets of film material into the paths traversed by the mandrels and for providing said sheets with lines of heat activatable adhesive thereon, means for folding the sheets around the traveling mandrels with marginal portions overlapping in seam forming relation and with the lines of adhesive between the folded over marginal portions, and heat sealing devices comprising driven cross shafts extending across the conveyor, brackets slidingly mounted on said cross shafts, each of said brackets carrying a heat sealing iron, said brackets being arranged in pairs to position the sealing irons on opposite sides of the paths of the mandrels, spring means for urging the brackets apart and cooperating cam means on said cross shafts and said brackets for intermittently moving said brackets toward each other in the direction of the axis of the cross shafts to engage the sealing irons against the sides of the mandrels.

4. In a machine for forming flexible containers in successive pairs from a web of sheet material, a supporting frame, a traveling conveyor mounted on said frame, container forming mandrels mounted in two parallel lines on said conveyor, means for delivering container forming sections of the sheet material into the paths traversed by the lines of mandrels and for providing said sections with lines of heat activatable adhesive, means for folding the sections around the mandrels with marginal portions overlapping in seam forming relation and with the lines of adhesive between the folded over marginal portions, and a heat sealing mechanism comprising driven cross shafts mounted on said frame and extending transversely of the conveyor, brackets slidingly mounted in paired relation on said cross shafts, each of said brackets having a heat sealing iron, said brackets being arranged in laterally spaced relation whereby to position the sealing irons of each pair thereof on opposite sides of the paths traversed by the lines of mandrels, spring means for urging the brackets of each pair thereof away from each other in the direction of the axis of the supporting cross shaft, and cooperating cam means on said cross shafts and said brackets for intermittently moving the brackets of each pair thereof toward each other to engage the sealing irons against the sides of successive mandrels, as the latter are advanced by said conveyor.

5. In a machine for forming flexible containers, a supporting frame, a traveling conveyor mounted on said frame, container forming mandrels mounted on said conveyor, means for delivering successive sheets of container forming material into the path traversed by the mandrels with said sheets having lines of heat activatable adhesive thereon, means for folding the sheets around the mandrels with marginal portions overlapping in seam forming relation and with the lines of adhesive between the folded over marginal portions, and a heat sealing mechanism comprising a driven cross shaft extending transversely of the conveyor, brackets slidingly mounted on said cross shaft, each of said brackets carrying a heat sealing iron, said brackets being arranged to position the sealing irons on opposite sides of the path of the mandrels, spring means for urging the brackets apart, and cooperating cam means on said cross shaft and said brackets for intermittently moving said brackets toward each other to engage the sealing irons against the sides of successive mandrels as they are advanced by the conveyor.

6. In a machine for forming flexible containers, a supporting frame, a traveling conveyor mounted on said frame, bag forming mandrels mounted on said conveyor, means for delivering sheets of bag forming material into the path traversed by the mandrels, said sheets having lines of heat activatable adhesive thereon, means for folding the sheets around the mandrels with marginal portions overlapping in seam forming relation and with the lines of adhesive between the folded over marginal portions, and a heat sealing mechanism comprising a cross shaft extending transversely of the conveyor, brackets slidingly mounted on said cross shafts, each of said brackets carrying a heat sealing iron, said brackets being arranged to position the sealing irons on opposite sides of the path of the mandrels, compression spring means extending between said brackets for urging the brackets apart, and means for intermittently moving said brackets toward each other against the force of said spring means so as to engage the sealing irons against the sides of successive mandrels advanced by said conveyor.

7. In a container forming machine having a supporting frame and a series of container forming mandrels of generally rectangular cross section mounted in paired double line relation on a traveling conveyor supported on said frame and means for forming flexible sheets of material around the leading ends of the mandrels and sealing overlapped marginal portions thereof, a mechanism for stripping the formed containers from the mandrels at the end of said conveyor comprising a cross frame, spaced vertical drive shafts on said frame, horizontal arms swingingly mounted on said shafts, vertical driven shafts mounted on the free ends of said arms and having friction rollers on the upper ends thereof, said drive shafts and said driven shafts being connected for simultaneous rotation, said arms being arranged to position said friction rollers on opposite sides of the path of said mandrels, means for intermittently swinging said arms toward each other in timed relation to the movement of the conveyor to engage the friction rollers with successive mandrels and means for driving said shafts at a rate of speed sufficient to strip the containers from the mandrels.

8. In a machine for forming flexible containers wherein a series of rectangular mandrels are mounted in dual line arrangement on an endless traveling conveyor and cooperating means is provided for delivering sheets of container forming material simultaneously into the paths of the mandrels in the separate lines thereof and for forming containers on the mandrels, a container delivery mechanism which comprises stripper rolls mounted on swingable arm members and arranged in paired relation along the lines of mandrels, mechanism for simultaneously swinging the arms of each pair of mandrels toward each other to engage the stripper rolls with opposite sides of a mandrel, means to rotate the stripper rolls at a higher rate of peripheral speed than the speed of advance of the

mandrels, and container delivery conveyors aligned with the lines of mandrels beyond the stripper rolls for receiving containers stripped from the mandrels.

9. A web feeding and slitting mechanism comprising an upright supporting frame, a pair of feed rollers having a slitting knife associated therewith for dividing a web longitudinally, a web separating member having an inverted V-shaped edge which is positioned to extend in a generally vertical plane across the path of the slit web adjacent said feed rollers so that adjacent slit portions of the web are separated as the web is passed under said V-shaped edge, guide members positioned in laterally spaced relation and generally parallel to said V-shaped edge for engaging beneath the separate slit portions as they advance beyond said V-shaped edge, and means for individually adjusting the lateral position of said guide members relative to said V-shaped edge to vary the length of the paths traversed by the separate slit portions between said V-shaped edge and a predetermined point spaced therefrom.

10. A web feeding, slitting and guiding mechanism comprising an upright frame structure having spaced vertical side members, a pair of feed rolls mounted between said side frame members, a slitting device associated with said feed rolls for longitudinally slitting the web, a cross bar between said side frame members beneath said feed rolls, an inverted V-shaped web separating device positioned in a substantially vertical plane with the lower ends of its legs mounted on said frame cross bar and with the apex at the upper end thereof adjacent said feed rolls so as to receive the slit web with the separate portions of the web engaging beneath the legs of the separating device on opposite sides of the apex, a carriage supported on said side frame members below said V-shaped device and adjustable horizontally toward and from the vertical plane of said separating device, a pair of guide bars pivotally secured at their lower ends on said carriage and extending upwardly in generally parallel relation to the legs of said V-shaped member, and a pair of horizontally disposed guide rollers on said carriage adjacent the lower ends of said guide bars beneath which the slit webs are adapted to advance along parallel paths.

11. In a machine for forming bags in successive pairs from a single width continuous web of flexible film material, an upright supporting frame, means on an upper portion of the frame for feeding the web continuously, means for slitting the web longitudinally, means for guiding the split portions into separate laterally spaced, parallel, vertical paths with the web portions traveling in substantially the same plane, means to adjust the guiding means for advancing the slit web portions in parallel paths, means for applying lines of adhesive to the slit portions, means for simultaneously severing bag forming sections of the same predetermined length from each of the slit portions, a conveyor mounted on said frame, bag forming mandrels on said conveyor which are advanced in parallel paths extending generally transverse of the paths of advance of said bag forming sections, stationary folding members on said frame forming a folding chute for receiving said mandrels and for simultaneously folding said bag forming sections about the mandrels, heat sealing devices on said frame for engaging with the mandrels to activate the adhesive and seal overlapped longitudinal seam forming portions of said bag forming sections, and means for simultaneously stripping the pairs of completed bags from the mandrels.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 2,942,529 June 28, 1960

Thomas E. Piazze

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 4, line 20, for "suported" read -- supported --; column 12, line 61, for "car" read -- bar --.

Signed and sealed this 10th day of January 1961.

(SEAL)
Attest:

KARL H. AXLINE
Attesting Officer

ROBERT C. WATSON
Commissioner of Patents