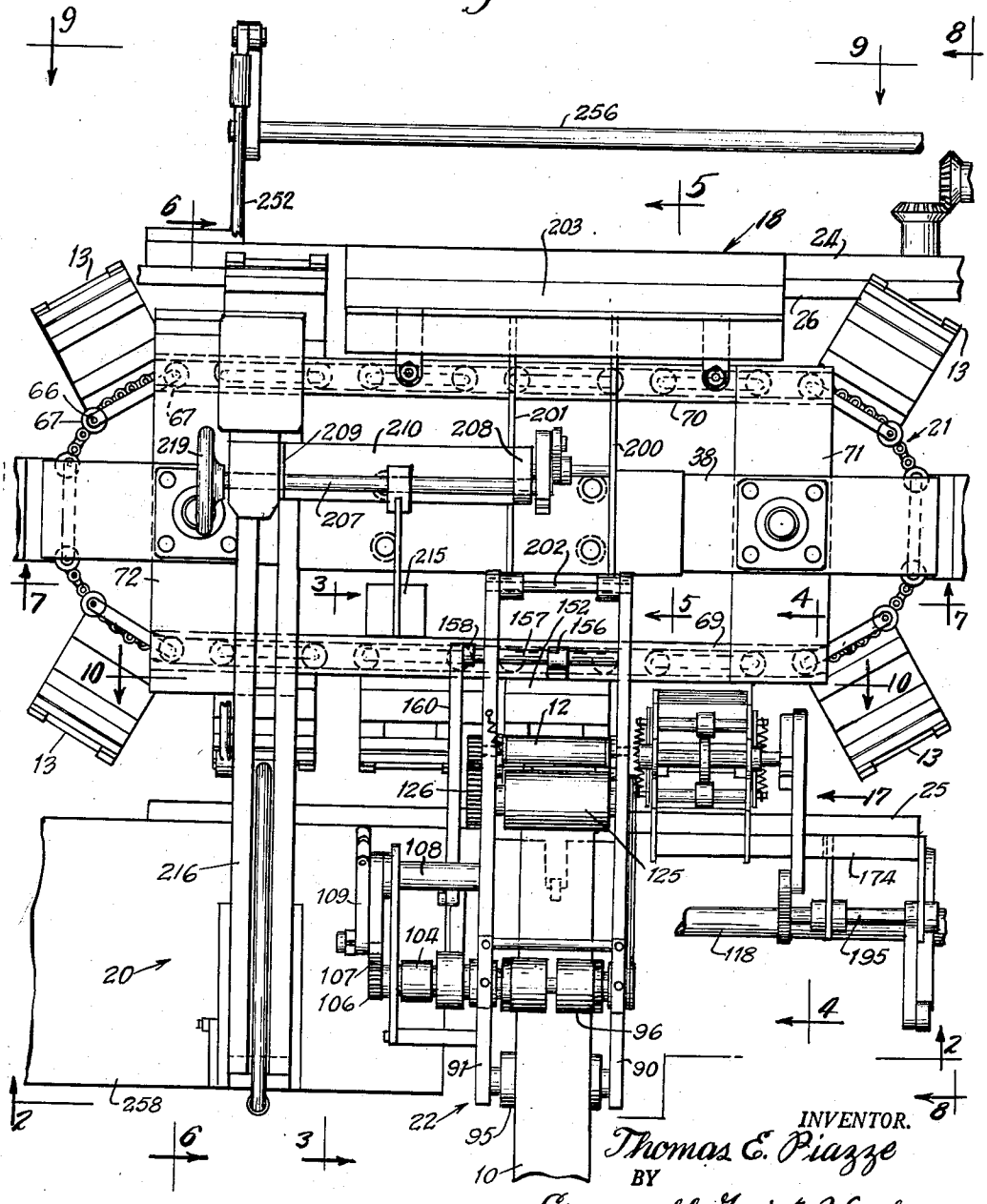
July 6, 1954 T. E. PIAZZE 2,682,910

CONTAINER MAKING MACHINE

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Fig-1



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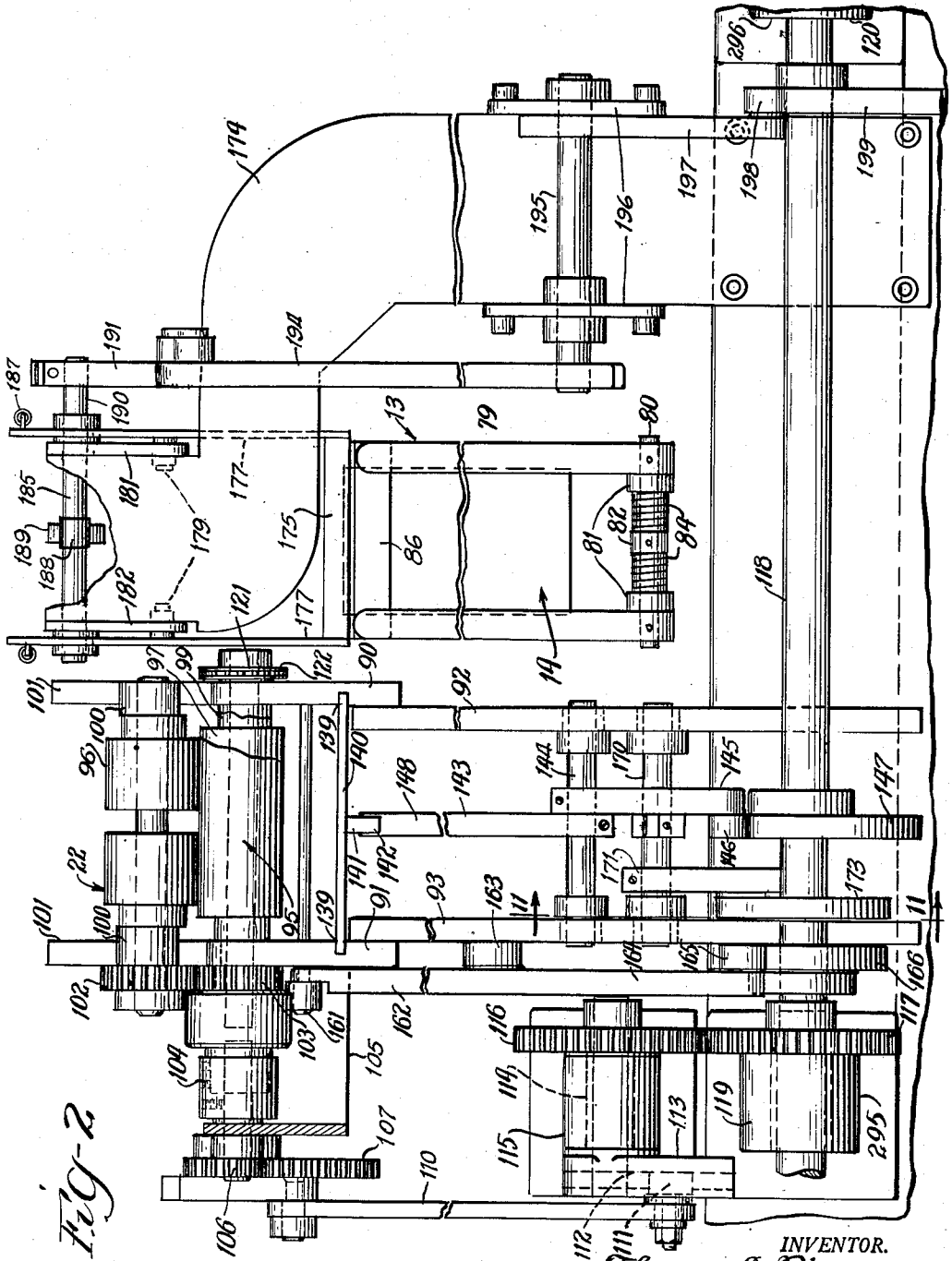


Fig-2

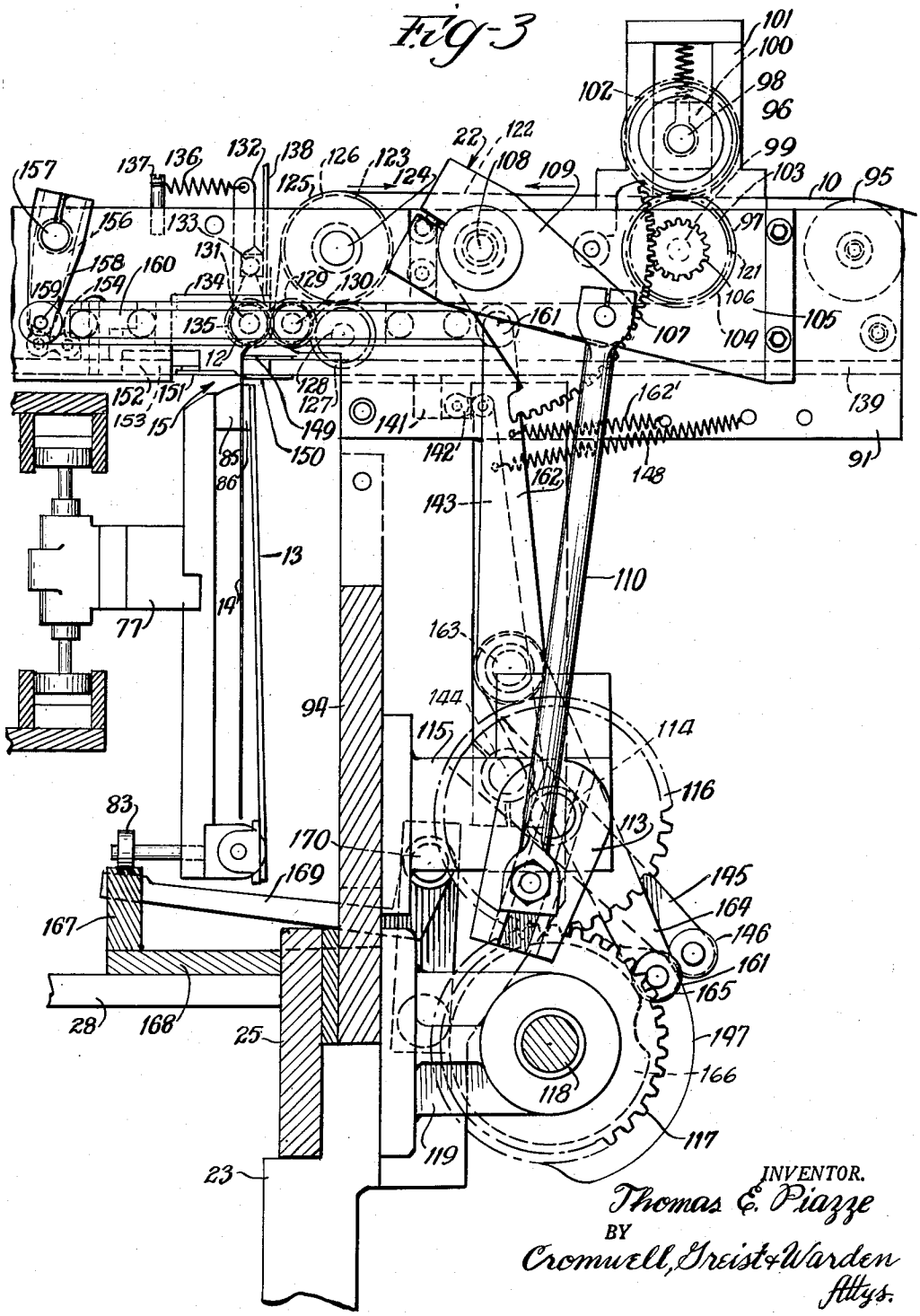
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CONTAINER MAKING MACHINE

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Fig-3



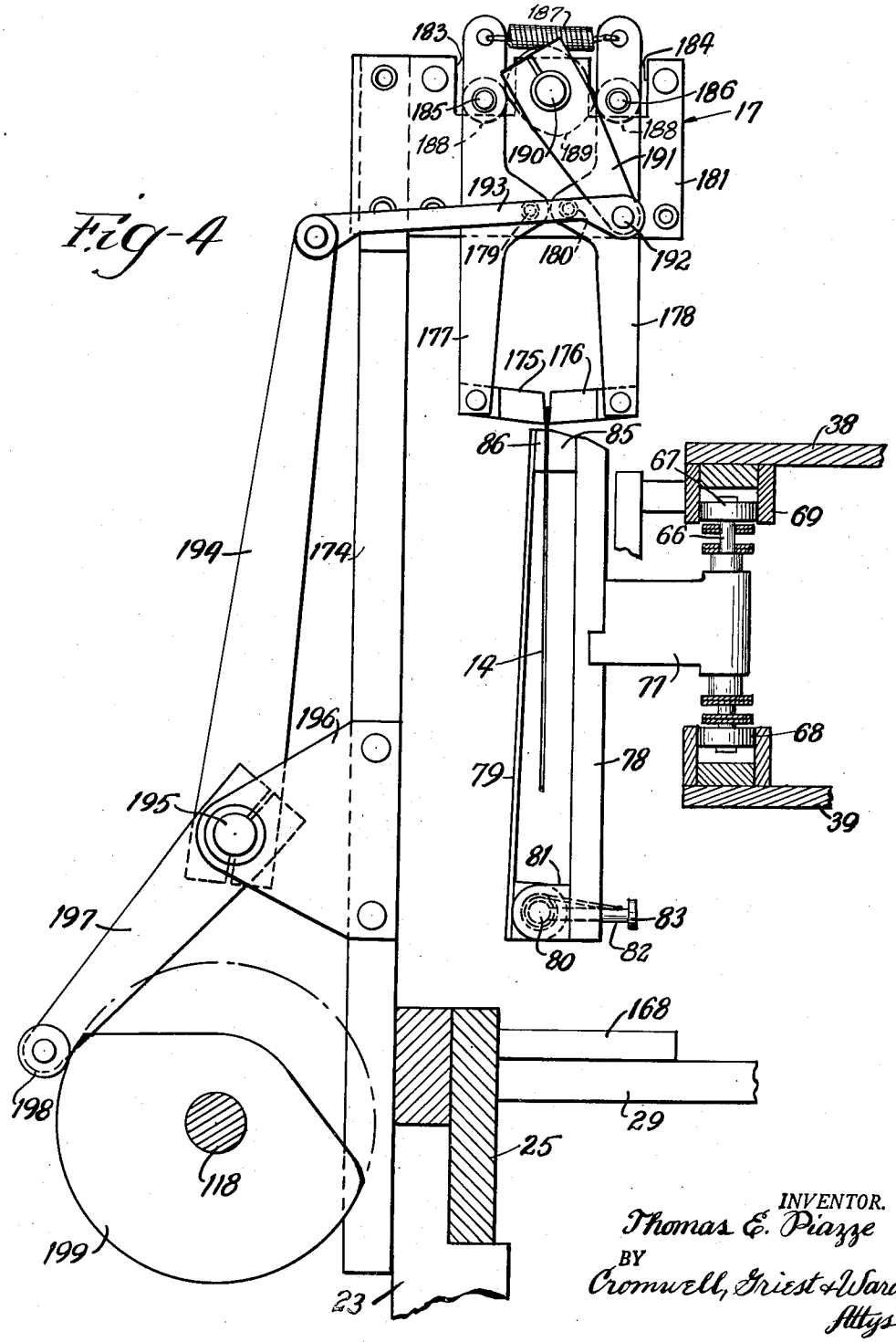
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Fig-4



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Fig-5

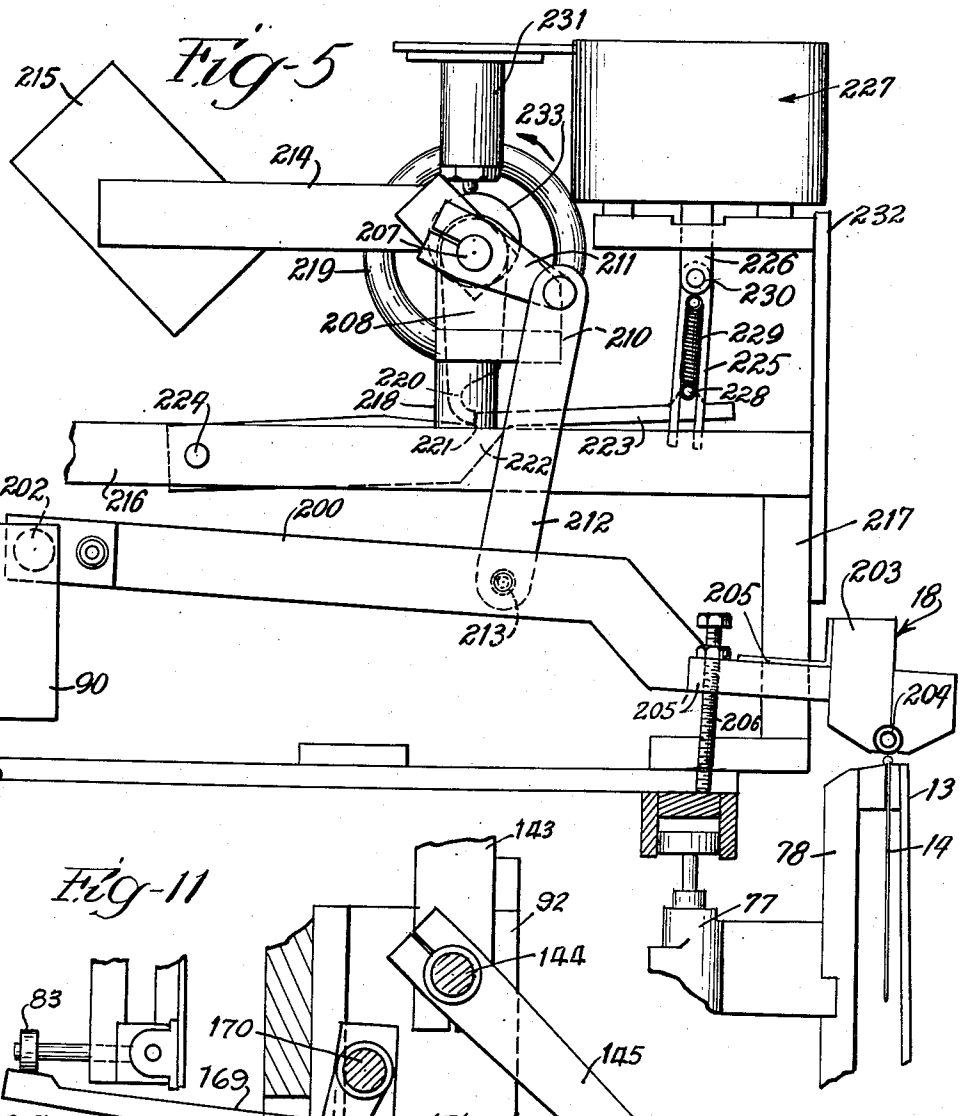
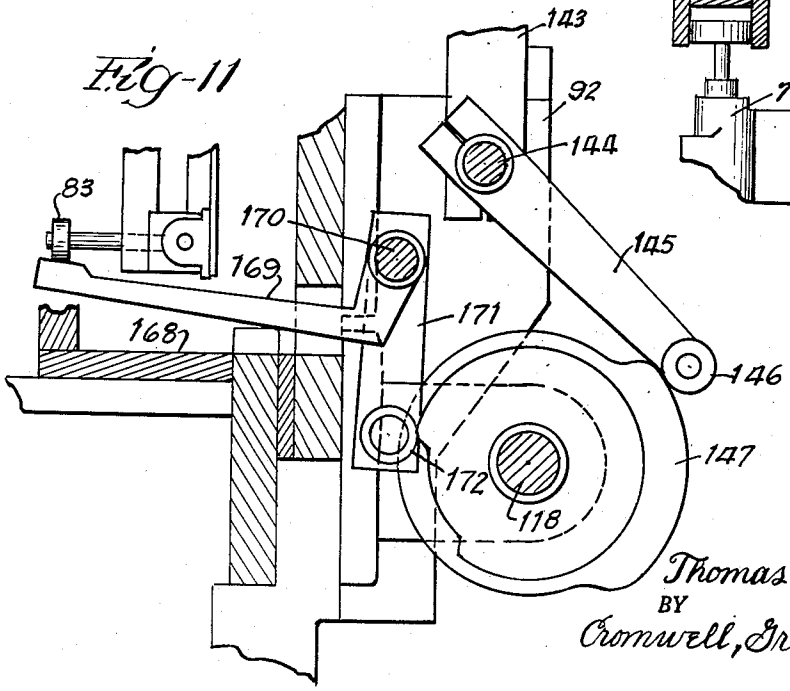


Fig-11



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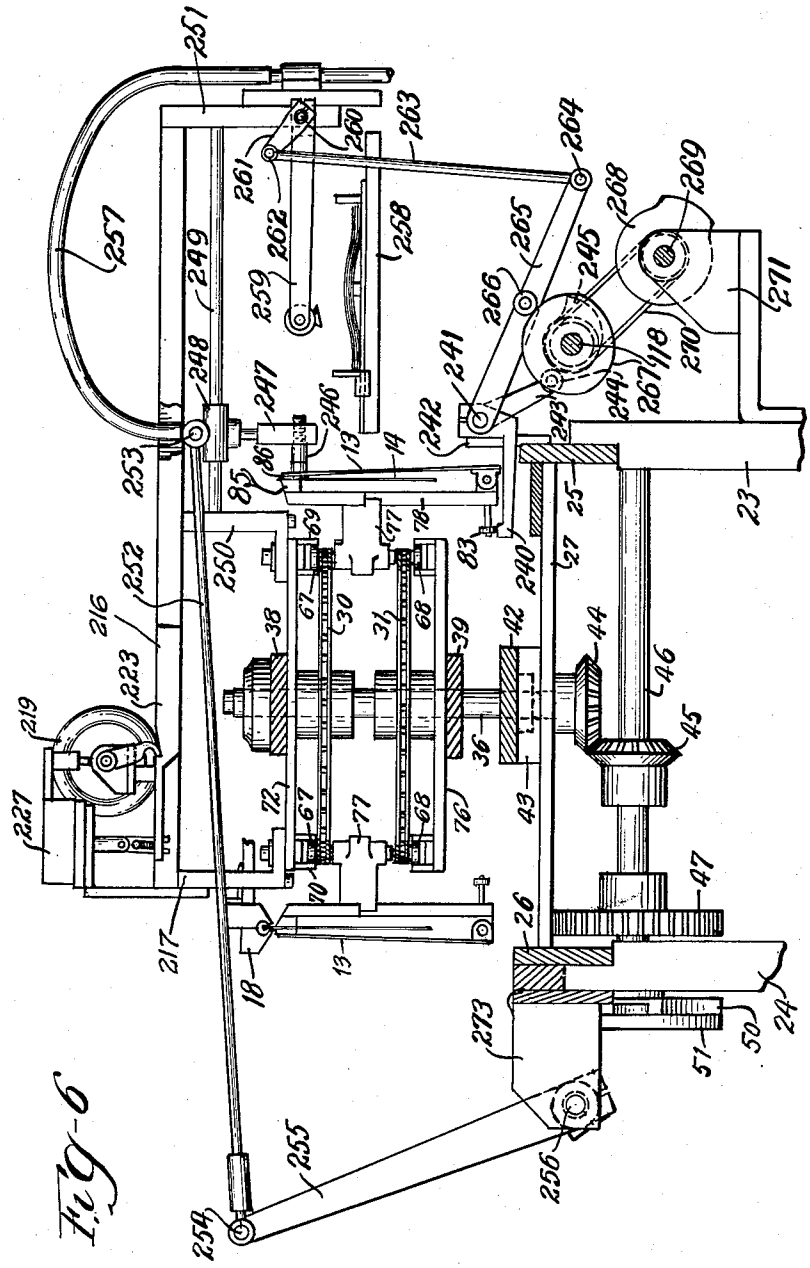


Fig. 6.

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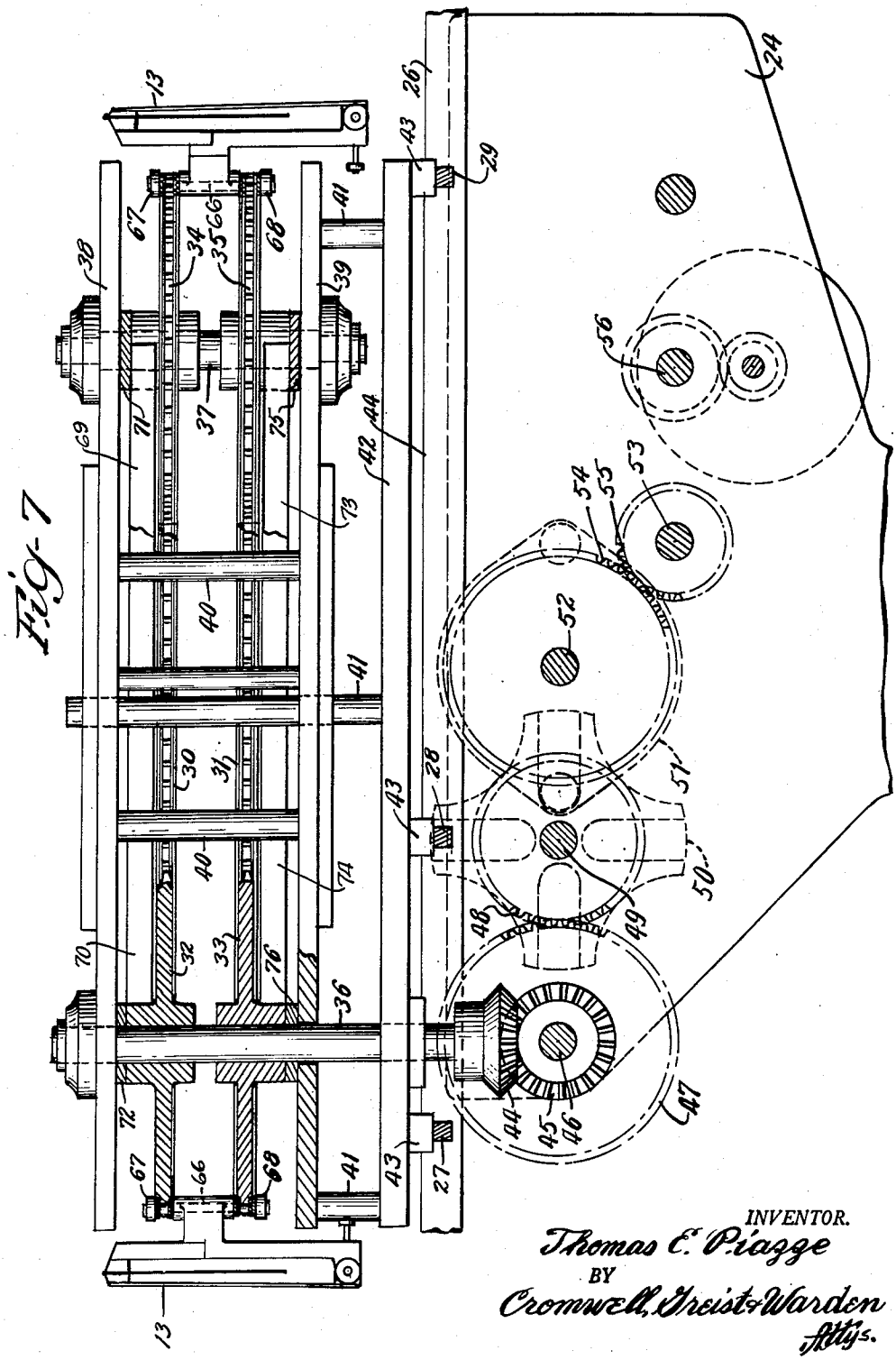


Fig. 7

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CONTAINER MAKING MACHINE

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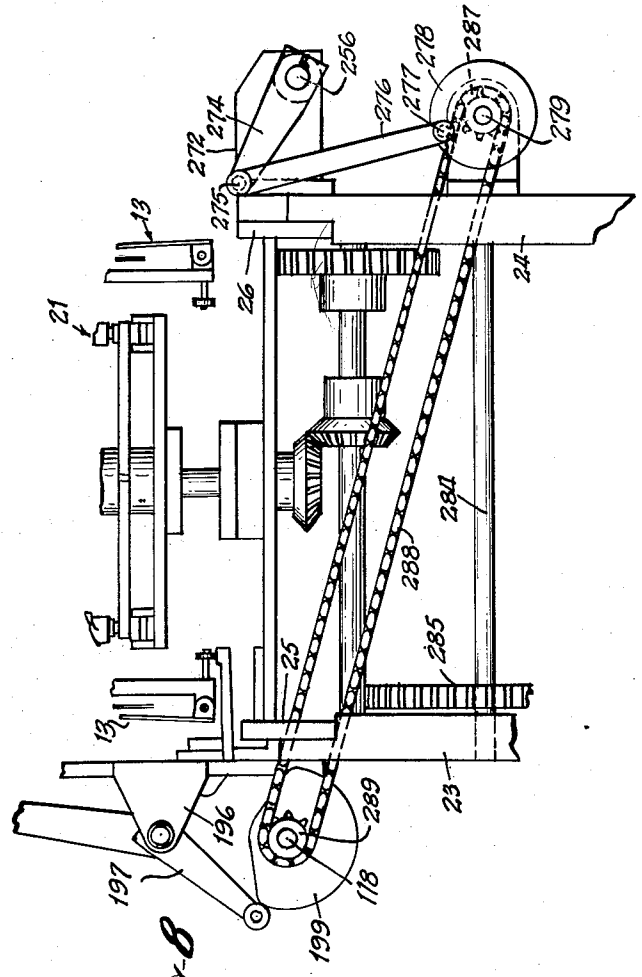


Fig-8

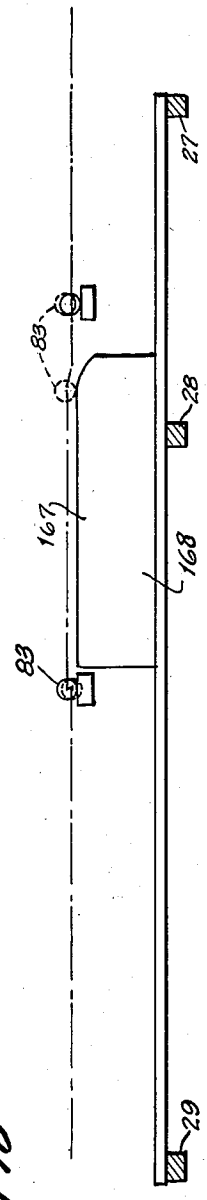


Fig-10

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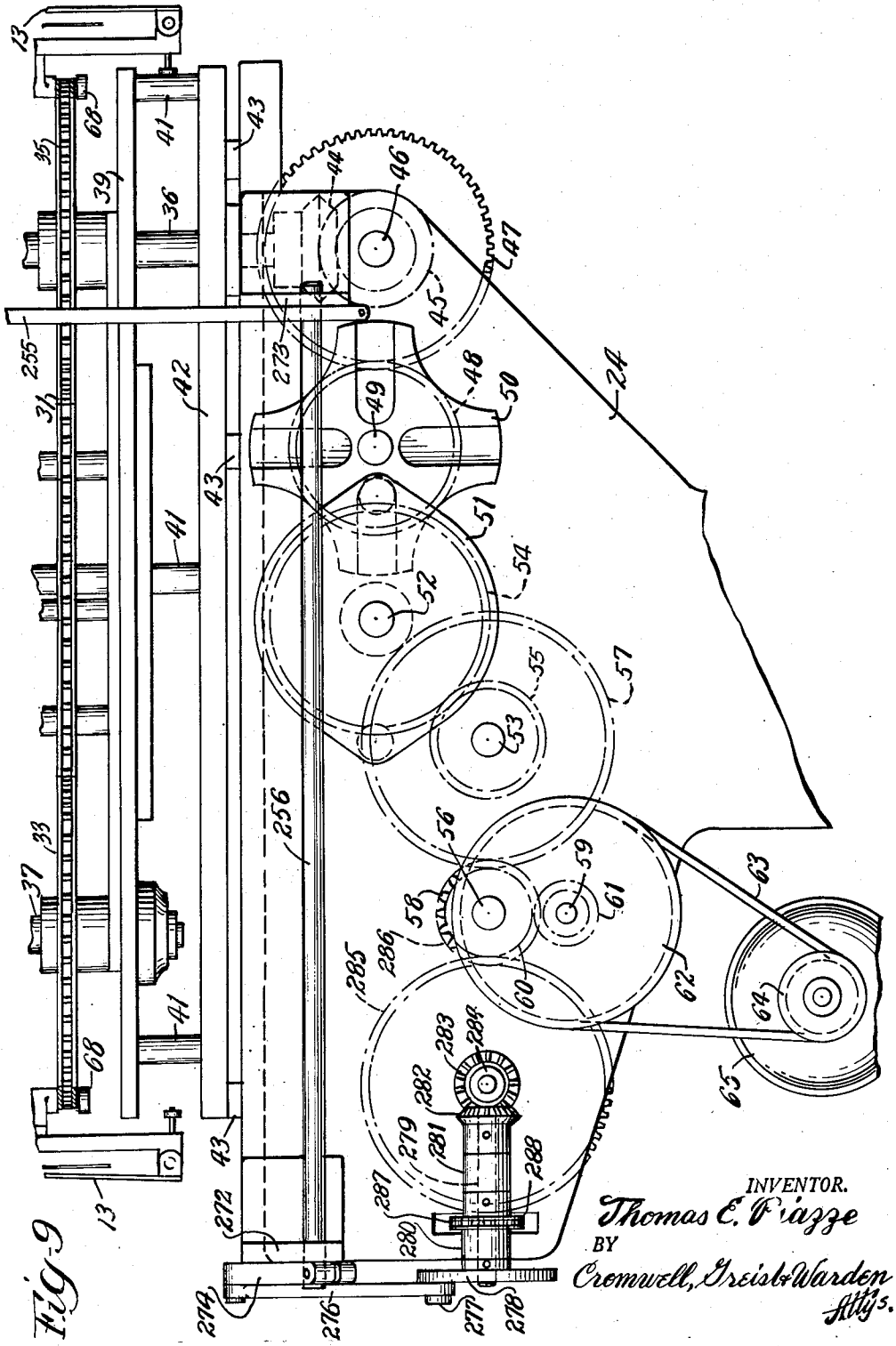


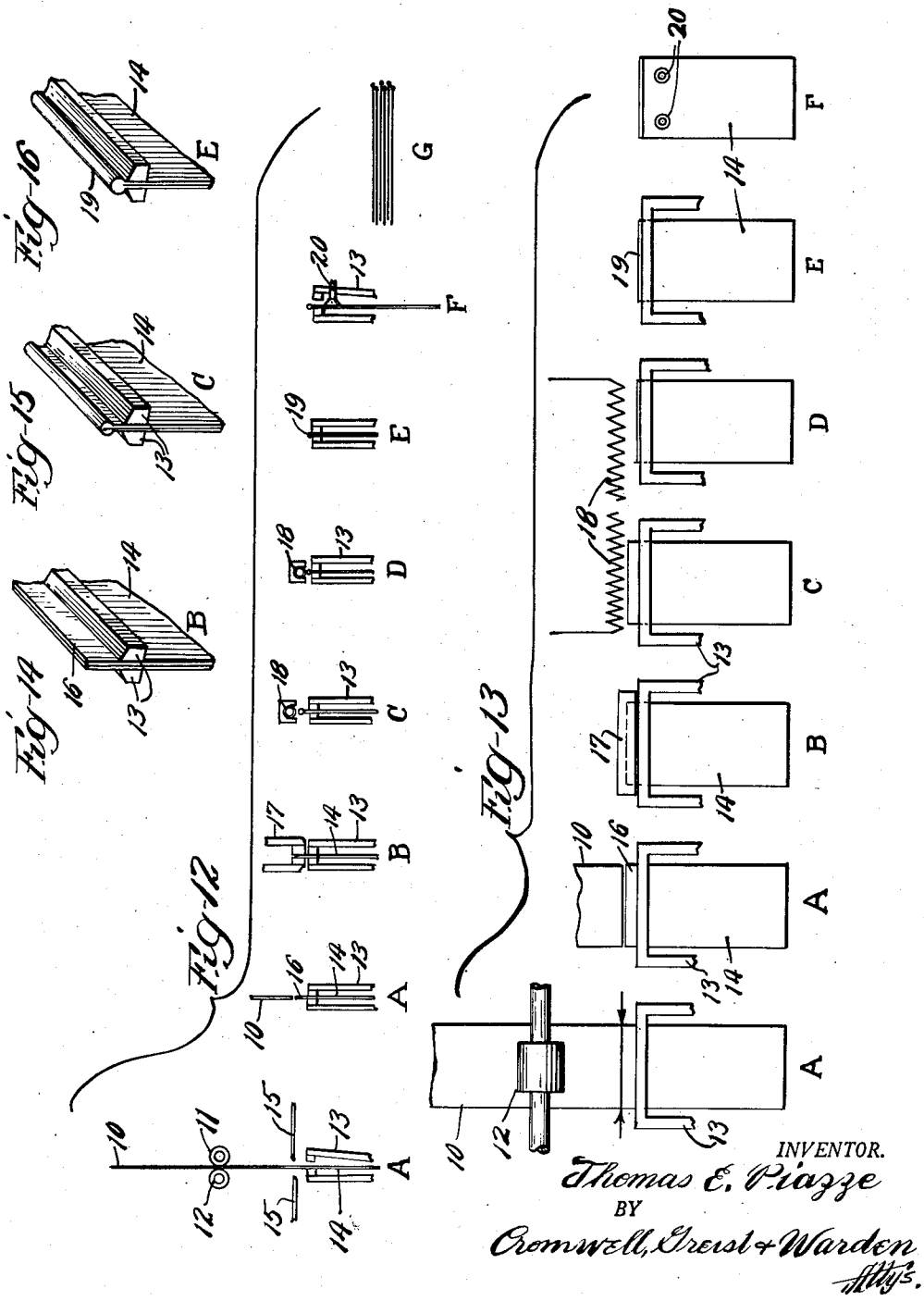
Fig. 9

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CONTAINER MAKING MACHINE

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Patented July 6, 1954 2,682,910

UNITED STATES PATENT OFFICE

2,682,910

CONTAINER MAKING MACHINE

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

Application September 5, 1952, Serial No. 308,061

21 Claims. (Cl. 154—42)

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This invention relates to methods and machines for making containers and is more particularly concerned with improvements in a method and machine for fabrication from tubular stock successive individual containers which may be used for packaging a variety of merchandise.

It is the general object of the invention to provide a method and a machine for fabricating from flattened tubular stock a plurality of successive containers wherein the stock is cut into sections of the desired length, each successive section is fed to one of a series of clamping devices mounted on an endless conveyor by means of which the tubular sections are carried past a series of stations having mechanisms associated therewith which close one end of each section to form therefrom a flat tubular container.

It is another object of the invention to provide a method and apparatus for forming bags of flexible plastic tubular material having heat sealing characteristics in which the tubular stock is divided into successive bag lengths and each bag length is sealed across one end, first with a relatively narrow flat heat seal, and subsequently with a bead-like end seal.

It is a further object of the invention to provide a method of forming a tubular container in which a continuous supply of tubular stock in flattened condition is cut into sections of desired length and each section is provided at one end with a cross seal formed by subjecting the edges of the section first to a flat seal forming device and subsequently to a second sealing device which forms the flat seal into a bead seal.

It is a more specific object of the invention to provide a mechanism for forming bags in which a plurality of clamping frames or carriers are provided on an endless conveyor, the clamping frames being adapted to receive bag forming sections of heat sealable tubular material, and in which sealing stations are provided along the path of travel of the clamping frames having mechanism for forming in one end of each tube section a transverse flat seal and thereafter for melting a predetermined portion of the material at the end of the section, including the flat sealed portion, to form a beaded end closure seam.

It is another object of the invention to provide a bag making machine which comprises a plurality of clamp-like carriers or forms mounted on a conveyor for movement in an endless path in combination with a flat seal forming device and a radiant heat sealing device spaced along

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the path of movement of the carriers, the flat seal forming device being arranged to engage one end of a bag forming section of flattened tubular material clamped in each of the carriers to form therein an initial flat seal and the radiant heat sealing device being arranged in operative relation to the path of travel of the flat sealed end of the section to subsequently form thereon a bead seal.

It is a still further object of the invention to provide a method of fabricating flat pouches or bags wherein heat sealable tubular material in flattened condition is divided into successive bag forming lengths, one end of each length is provided with a flat transverse heat seal and thereafter the flat heat sealed end is subjected to radiant heat sufficient to melt back the end material a predetermined distance and form thereon a beaded end closure seam.

It is another object of the invention to provide a method of forming successive bags or pouches from heat sealable tubular stock, particularly, polyethylene tubing, wherein successive cut lengths of the tube stock are clamped in a holder with an end portion thereof extending beyond the face of the holder, a flat heat seal is placed transversely across the end portion which terminates on a line spaced outwardly of the face of the holder and thereafter the extended portion of the material is melted back to the face of the holder to form thereon an integral end seam.

It is another object of the invention to provide a pouch fabricating mechanism comprising a series of clamping frames mounted on an endless conveyor which are moved by the conveyor in a curved path, a mechanism mounted adjacent the path of movement for feeding cutting and delivering successive lengths of heat sealable flattened tubular material to successive clamping frames a flat heat seal forming mechanism mounted for engaging the end margins of the lengths of material to form across each length an initial flat seal, a mechanism for fusing the end portion of each length of the material, including the initial flat sealed area, to form thereon an integral bead seal and mechanism for delivering the completed pouches from the clamping frames.

It is a further object of the invention to provide in a pouch fabricating machine of the type described automatic means for moving the radiant heat sealing mechanism out of seal forming position upon failure of the power supply for the machine.

These and other objects and advantages of

the mechanism and method constituting the invention will be apparent from consideration of the following description of the apparatus, which is shown by way of example, in the accompanying drawings wherein:

Fig. 1 is a plan view of a mechanism incorporating therein the principal features of the applicant's invention, with portions thereof broken away;

Fig. 2 is a side elevation, to an enlarged scale, of a portion of the machine, the view being taken on the line 2—2 as shown in Fig. 1;

Fig. 3 is a partial cross section, to an enlarged scale, taken on the line 3—3 of Fig. 1, which shows the web feeding and cutting mechanism;

Fig. 4 is a partial cross section, to an enlarged scale, taken on the line 4—4 of Fig. 1 which shows the flat seal forming mechanism operating on the top of a bag section;

Fig. 5 is a partial cross section, to an enlarged scale, taken on the line 5—5 of Fig. 1 showing the bead seal forming mechanism;

Fig. 6 is a partial cross section, taken on the line 6—6 of Fig. 1, showing the finished bag delivery mechanism;

Fig. 7 is a partial longitudinal section, taken generally on the line 7—7 of Fig. 1, with portions broken away;

Fig. 8 is a partial end elevation, looking in the same direction as in Fig. 4;

Fig. 9 is a partial side elevation, taken generally on the line 9—9 in Fig. 1, with portions broken away;

Fig. 10 is a partial section taken generally on line 10—10 in Fig. 1;

Fig. 11 is a detail section taken on line 11—11 in Fig. 2;

Figs. 12 and 13 are schematic views illustrating the steps involved in the formation of the bag; and

Figs. 14, 15 and 16 are enlarged fragmentary perspective views illustrating the formation of the bead seal.

The method involved in the manufacture of the bags is illustrated schematically in Figs. 12 and 13. The bags are formed from a flattened tube of heat sealable material, such as polyethylene, or similar material. The tube stock 10 is fed between a pair of feed rollers 11 and 12 to position the leading end thereof within the operating area of a clamping mechanism 13 comprising relatively movable arms or frames which close on the tube 10 and grip the portion 14 which is to form the bag. The clamping mechanism 13 is mounted for intermittent movement in a generally circular path past a series of work stations at which various operations are performed on the bag. These work stations are indicated by capital letters on Figs. 12 and 13. The initial tube feeding and cutting station is indicated at A. At station A the clamping mechanism 13 is positioned in open position and a cutting mechanism is arranged as indicated at 15, to engage and cut the leading bag forming portion 14 from the tubular stock 10. A plurality of the clamping frames or mechanisms 13 are mounted on an endless carrier which operates intermittently to move them from one work station to the next. The lettered stations which are shown do not constitute all the stations around the path of the carrier, only those being shown which are necessary to describe the operations, performed on the end of the bag section. The tubular section 14 is severed by cutting mechanism 15 and clamped in the frame 13 which is then moved to station B where the marginal portions 16 of the end of the bag forming section 14 which extend above the clamping frame 13 are engaged in sealing relation by a flat seal forming mechanism 17. Thereafter the section 14 with the flat end seal 16 is moved through a series of cooling stations (not shown) to a radiant heat sealing mechanism 18 which is indicated at stations C and D. The flat sealed top margins 16 of the section 14 are subject to the heating effect of the mechanism 18 as the section is moved through a series of stations extending from C to D, which raises the temperature sufficiently to melt the material extending above the upper limits of the clamping mechanism 13 and form a final bead-like cross seal or closure seam 19.

After the bead seal 19 is formed the bag section 14 is moved beyond the radiant heat sealing mechanism 18 through a series of stations E which permit the seal to cool until it reaches the station F at which it is released from the clamping frame 13 and removed by a delivery mechanism which is indicated at 20 and the successive bags are piled in a stack on a delivery table indicated at G (Fig. 12).

The purpose in applying double seals to the bag section is, of course, to obtain a more efficient seam. In order to form satisfactorily a beaded end seam by a radiant heat sealing mechanism it is necessary that the web sections or edges of the material be held in a closely contacting relationship. At the same time sufficient of the margin of the material must extend beyond the clamping elements to permit the material to be melted and form the bead-like seal formation thereon. In bead seal forming operations as heretofore practiced the material to be sealed has merely been held in contacting relationship by clamping elements and difficulty has been encountered in producing a satisfactory seam because the material is not in close surface contact all the way across the area to which the seam is applied. This may be due to irregularities in the material or to the fact that sufficient material must extend beyond the clamping elements in unclamped and unsupported relation to be melted to form a bead of substantial cross section. This difficulty is overcome with the present invention by first forming a flat seal or seam area 16 of a conventional nature at the marginal edges of the material (Fig. 14) and subsequently forming the final bead seal 19. The flat seal 16 extends from the marginal edge of the material inwardly a predetermined distance and holds the material in close surface contact. The seal area 16 does not extend to the clamping mechanism 13 but terminates short of the upper faces of the clamping frame members. When the extended and sealed margins of the sections are moved or advanced beneath the radiant heating mechanism 18 the extended material is melted by the heat and due to the nature of the material involved forms a bead along the end edge of the tube section. The material is subject to the radiant heating mechanism 18 for a sufficient length of time to cause it to melt back to the upper or outer faces of the clamping frame members. The formation of the preliminary flat seal or seam 16 and the arrangement of the tubular section in the clamping mechanism 13 results in the formation of a beaded end seal or seam 19 which does not have any weak spots or areas in it due to the fact that the material melts and coalesces as though it were a single

thickness, the two thicknesses of the material being held in close surface relation by the initial flat seal 16.

Referring to Figs. 1–11 of the drawings there is illustrated a machine which incorporates therein mechanism for forming a bag or pouch following the steps of the method heretofore described. The machine comprises a horizontally disposed conveyor 21 (Fig. 1) which is mounted for movement in an elliptical path and which carries a plurality of spaced clamping mechanisms or frames 13 in which the bag lengths 14 are held during the end sealing operations. The mechanisms for performing the operations on the top end of the successive bag lengths are arranged around the path of the conveyor 21. The feeding and cutting mechanism 22 for the tube stock 10, which includes feed rollers 11, 12 and cutting knives 15 is arranged at the forward side of the machine as shown in Fig. 1. The flat seal forming mechanism 17 is arranged immediately adjacent to the feeding and cutting mechanism 22. The radiant heating mechanism 18 is arranged at the opposite side of the machine and the finished bag delivery mechanism 20 is arranged at the forward side of the machine adjacent to the tube feeding and cutting mechanism 22.

The endless conveyor 21 and the associated stock feeding and cutting and seal forming mechanisms arranged around it are all mounted on a main supporting frame comprising parallel oppositely disposed upright side frame plates 23 and 24 (Figs. 6 to 9). For convenience in describing the machine the side of the machine on which the feeding and cutting mechanism is located will be designated the front of the machine and the frame plates 23 and 24 will be referred to as front and rear frame plates, respectively. Longitudinally extending upright frame plates or rails 25 and 26 are arranged on the top edges of the side frame plates 23 and 24, respectively, on which the various operating mechanisms are mounted. The frame side rails 25 and 26 are connected by cross bars 27, 28 and 29 (Fig. 7) on which the conveyor 21 is mounted.

The endless conveyor mechanism 21 comprises a pair of horizontally arranged upper and lower chains 30 and 31 (Fig. 7) which are carried on a pair of upper and lower driven sprockets 32 and 33 at one end of the machine and on a pair of upper and lower idler sprockets 34 and 35 at the other end of the machine. The sprockets 32 and 33 are secured in vertically spaced relation on a vertically extending driven shaft 36 while the sprockets 34 and 35 are secured in vertically spaced relation on a vertically extending idler shaft 37 which is journaled between vertically spaced upper and lower frame plates 38 and 39. The frame plates 38 and 39 extend longitudinally in approximately the center of the machine. Vertically extending posts 40 connect the plates 38 and 39 in spaced relation. The lower plate 39 is supported by vertically extending posts 41 from a longitudinally extending support plate 42 which is in turn mounted on short cross support blocks 43 resting on the cross frame bars 27, 28 and 29 which connect the side frame rails 25 and 26. The driven shaft 36 is journaled in the upper and lower plates 38 and 39 and extends at the lower end below the base plate 42. A beveled gear 44 is secured on its bottom end and engages in driving relation with a beveled gear 45 on a driven cross shaft 46 which is journaled in the side frame plates 23 and 24. The cross shaft 46 is provided with a driving gear 47 (Figs. 6, 7 and 9) which is connected in driving relation with a gear 48 on an intermittently driven cross shaft 49. The cross shaft 49 extends through the frame plate 24 and carries the driven element 50 of a Geneva movement. The driving element 51 of the Geneva mechanism is mounted on a cross shaft 52 which is also journaled in the side frame plates 23 and 24. The cross shaft 52 is driven from a secondary drive shaft 53 through connecting gears 54 and 55 located inside the rear side frame plate 24. The secondary drive shaft 53 is connected in driving relation with the main drive shaft 56 by gear 57 and pinion 58 located inside the front side frame plate 23. The main drive shaft is connected in driving relation with a power shaft 59 by gear 60 and pinion 61 (Fig. 9). The power shaft 59 carries a pulley 62 which is connected by a drive belt 63 with the pulley 64 on motor 65, the latter being supported in any convenient manner on the main supporting frame of the machine.

The conveyor chains 30 and 31 support in spaced relation the clamping mechanisms 13. Each of the clamping mechanisms is carried on the chains by a pair of pivot support pins 66 which extend between links of the chains 30 and 31 which carry on their upper and lower ends guide rollers 67 and 68. Longitudinally extending upper guide channels 69, 70 are provided for the guide rollers 67 which are supported on the end cross plates 71 and 72 while lower guide channels 73, 74 for the guide rollers 68 are supported on end cross plates 75, 76. The cross plates 71, 72 and 75, 76 are secured to the longitudinal conveyor frame plates 38 and 39. The guide channels 69, 70 and 73, 74 prevent the chains from moving out of alignment while they carry the clamping mechanisms 13 along the front and rear sides of the machine. This control is unnecessary at the ends where the chains engage with the supporting sprockets. The pivot support members 66 are connected by a bracket 77 with a vertically extending base plate 78 which forms the base or fixed portion of the clamping mechanism 13. Each clamping mechanism 13 comprises the base plate or fixed jaw forming member 78 and a movable frame member 79 which constitutes the movable jaw. The frame member 79 is generally U-shaped (Figs. 2 and 4) with the ends of the legs secured to a pivot shaft 80 which is mounted in bearing ears 81 on the lower end of the base plate 78. The pivot shaft 80 carries at its center an arm 82 which extends through a suitable aperture in the base plate 78 and is provided with a cam roller 83 on its inner end. The jaw forming frame members 78 and 79 are urged toward each other by torsion springs 84 on the pivot shaft 80. The jaw forming members 78 and 79 are provided at their upper ends with cooperating gripper bar members 85, 86, respectively. The torsion springs 84 normally urge the cam roller 83 downwardly and the gripper bar or jaw members 85, 86 toward each other and into gripping relation with the bag forming tube section 14. Suitable cam mechanisms are provided for engaging the roller 83 to open the jaw members 85, 86, which will be described subsequently.

The tube stock is fed and cut by the mechanism 22 (Figs. 1, 2 and 3) which comprises transversely extending upright spaced side support plates 90, 91 secured at the top of upright bracket plates 92, 93 which are in turn secured to a longitudinally extending front side plate 94 projecting above the front frame members 23 and

25. A supply of the tube stock 10 is supported on a reel (not shown) attached to the front frame in any conventional manner. The stock 10 is fed over a guide roller 95 journaled between the support plates 90, 91 to a pair of cooperating upper and lower feed rollers 96, 97 which are mounted on shafts 98, 99. The lower shaft 99 is journaled between the support plates 90, 91 and the upper shaft 98 is journaled in spring pressed end bearings 100 in bearing brackets 101 extending above the support plates 90, 91. The feed roller shafts 98, 99 are extended at one end beyond the outer face of the side support plate 91 and gears 102 and 103 are secured thereon which connect the shafts in driving relation. The lower feed roller shaft 99 connects at its end with a one way clutch 104 which is mounted between the side support plate 91 and a laterally extending U-shaped bracket 105, the latter having its legs secured to the outer face of the plate 91. The clutch mechanism 104 includes a driving pinion 106 in operative engagement with a gear segment 107. The gear segment 107 is secured on a shaft 108 which is journaled in the outer wall of the bracket member 105 and oscillated by means of an arm 109 secured at the one end to the outer end of shaft 108 and pivotally connected at the other end to the upper end of a vertically extending link or pitman 110 which carries at its lower end a pivot member 111 (Fig. 2) adjustably secured in a radial slot 112 in the eccentric arm 113 which is secured to a short stub shaft 114 journaled in the bearing 115 which bearing is mounted on the front face of vertical support plate 94. The stub shaft 114 carries at its other end a gear 116 which is in operative engagement with a gear 117 on a front cam shaft 118. The front cam shaft 118 extends lengthwise of the machine along the upper edge of the front frame plate 23 and is supported in longitudinally spaced bearings 119 and 120 mounted thereon. The cam shaft 118 is driven in a manner which will be described subsequently. The lower feed roller shaft 99 is extended at the other end outside the support plate 90 and a sprocket 121 is mounted thereon which is connected by a chain 122 with a sprocket 123 on the forward shaft 124 journaled between the plates 90, 91 and supporting a guide roller 125. The shaft 124 is extended outside plate 91 and a driving gear 126 is mounted thereon which is connected in driving relation with an idler pinion 127 on a stub shaft 128 journaled in the side plate 91. The idler gear 127 is connected in driving relation with a gear 129 on a cross shaft 130 which is journaled between the side plates 90, 91 and which carries one of a pair of tension feed rollers 11, 12. The other feed roller 12 is mounted for swinging movement on a cross shaft 131 which is journaled in the lower ends of a pair of upright support arms 132. The support arms 132 are mounted intermediate their ends on a cross bar 133 which is journaled between the frame plates 90, 91. The roller shaft 131 extends at the one end through an aperture 134 in the plate 91 and carries a gear 135 which meshes with the driving gear 129 on the roller shaft 130 when the feed rollers 11 and 12 are in operative relation. The roller 12 is urged toward the roller 11 by a tension spring 136 which is connected at one end to the upper end of one of the roller supporting arms 132 and at the other end to a post 137 on the frame member 91. A stock guide plate 138 is pivotally supported on the cross bar 133 forwardly of the guide roller 125 and above the roller 12 to facilitate threading the stock material 10 between the feed rollers 11 and 12. The amount or length of stock 10 which is fed may be varied by adjusting the pivot 111 in the slot 112 to vary the length of the path of movement of the segment 107. The tension feed rolls 11, 12 are rotated at a faster speed than the stock feed rolls 96 and 97 and keep any slack from developing in the material being fed. The side plates 90, 91 are provided on their oppositely disposed inner faces with aligned slots or guideway forming recesses 139 in which there is mounted a sliding cross plate 140. The slide plate 140 provided with a downwardly extending ear 141 which is pivotally connected by link 142 to the upper end of a vertically extending operating arm 143. The arm 143 is mounted at its other end on a cross shaft 144 (Figs. 2, 3 and 11) journaled between the vertical support plates 92 and 93. The shaft 144 has a downwardly extending operating arm 145 on the lower end of which there is mounted a cam roller 146 held in engagement with a cam 147 mounted on the front cam shaft 118 by a tension spring 148 connected at one end to the arm 143 and at the other end to a cross bar between the plates 90, 91. At its forward end the feed plate 140 is provided with an upper guide plate 149 which is adapted to engage the stock material 10 beneath the feed rollers 11 and 12 as the plate 140 is moved forwardly by operation of the cam 147.

The feed plate 140 also carries at its forward end a lower plate 150 which forms at its forward edge one of the knives of the cutting mechanism 15. The other knife 151 is carried on the end of a sliding cross plate member 152 which is mounted in oppositely disposed guideway forming slots or recesses 153 in the forward ends of the side plates 90 and 91. The slide plate 152 is provided with an upstanding ear 154 to which there is pivotally connected one end of a link 155, the other end of the link being pivotally connected to the lower end of a depending arm 156 which is mounted on a cross shaft 157 journaled between the plates 90 and 91. At one end the shaft 157 is provided with an arm 158 which is pivotally connected at 159 to a horizontally extending link 160. The other end of link 160 is pivotally connected at 161 to an upwardly extending arm 162 of a bell crank which is pivotally mounted at 163 on the vertical support plate 93. The other arm 164 of the bell crank carries a cam roller 165 at its lower end engageable with an operating cam 166 mounted on the front cam shaft 118. The cam roller 165 is held in engagement with cam 166 by tension spring 162' secured at one end to arm 162 and at the other end to the frame plate 91.

As the feed mechanism 22 is operated to feed a length of the stock 10 downwardly between the feed rollers 11, 12 a clamping frame 13 is moved into position beneath the rollers 11 and 12 by the conveyor 21. The jaw members 85 and 86 are moved apart, into open position, by the cam roller 83 on the actuating arm 82 engaging with a longitudinally extending cam plate 167 (Figs. 3 and 10) which is mounted on a longitudinally extending horizontal supporting plate 168 extending between the cross frame bars 28 and 29. The cam plate 167 terminates short of the feeding station so that at the end of the movement of the conveyor which brings the clamping frame 13 into position for receiving the cut section 14 of the stock 10 the cam roller 83 passes from the plate cam 167 to a supporting trip arm 169. The trip arm 169 extends through suitable apertures or slots in the side plates 94 and 25 and is secured to a rock shaft 170 which is journaled between

the frame plates 92 and 93. The rock shaft 170 has a depending arm 171 with a cam roller 172 on the end thereof in engagement with a cam 173 mounted on the front cam shaft 118. The trip arm 169 holds the jaws 85 and 86 of the clamping frame 13 in open position until the stock has been fed a sufficient distance to provide a bag length 14 and the cutting mechanism 15 is actuated to cut off the bag length. Thereupon the arm 169 is rocked by cam 173 to drop the roller 83 a sufficient distance to allow the clamping jaws 85 and 86 to close under the action of the torsion springs 84 on the clamping mechanism 13. The feeding mechanism 22 for the stock 10 and the cutting mechanism 15 are, of course, operated intermittently in timed relation to the movement of the conveyor 21.

From the tube stock feeding and cutting station each successive clamping frame 13 is moved by the conveyor 21 to the next adjacent station where the flat seam 16 is applied to the portion of the cut tube section which extends above the upper faces of the clamping jaws 85 and 86 by the flat seal forming mechanism 17. The flat seal forming mechanism 17 is mounted on an upwardly extending plate bracket 174 (Figs. 2 and 4) which is secured to the front frame member 23. It comprises a pair of cooperating sealing irons 175 and 176 which are mounted for movement toward and from each other above the clamping frame 13. The clamping and sealing irons 175 and 176 are mounted on the ends of pairs of spaced depending arms or supports 177 and 178. The arms of each pair of the supports 177 and 178 are pivotally mounted at 179 and 180 on spaced support plates 181, 182 which extend forwardly from and are secured at the upper end of the bracket plate 174 and which are held in parallel relation by suitable connecting tie rods. Each of the support plates 181 and 182 is provided in its top edge with a pair of spaced upwardly opening notches or slots 183 and 184 to permit movement of tie rods 185 and 186 which connect the upper ends of the support arms 177 and 178 and extend parallel to the sealing irons 175 and 176. Tension springs 187 connect the upper extremities of the support arms 177, 178 which are pivoted on the outside faces of the plates 181 and 182, respectively, and normally urge the sealing irons 175 and 176 out of sealing engagement. The tie rods or cross shafts 185 and 186 each carry a cam roller 188 located between the plates 181 and 182 which engages with a cam 189 on a rock shaft 190 journaled between the plates 181 and 182. The one end of rock shaft 190 is extended beyond support plate 181 and provided with an operating arm 191 which is pivotally connected at 192 with a link 193 extending forwardly beyond the support bracket 174 and pivotally connected to the upper end of a vertical arm 194. The arm 194 is mounted on a short shaft 195 journaled in brackets 196 extending outwardly of bracket plate 174. Shaft 195 is provided with a cam arm 197 which carries at its outer end a cam roller 198 in engagement with cam 199 mounted on the front cam shaft 118. The cam 199 as it is rotated on the cam shaft 118 rocks the shaft 190 through the operating linkage described and causes cam 189 to move the supporting arms 177 and 178 to bring the sealing irons 175 and 176 toward each other. The operation of cam 199 is timed so as to engage the top margins of the bag section 14 with the sealing irons 175 and 176 a sufficient length of time to form therein the flat seal or seam 16. Thereafter the sealing irons 175 and 176 are moved apart to free the bag section 14 and the clamping mechanism 13 is moved away from the sealing station by the conveyor 21. The clamping mechanism 13 thereafter moves through or around the end of the machine to the radiant heat sealing mechanism 18 which is located on the opposite, or back side, of the machine frame.

The radiant heat sealing mechanism 18 (Figs. 1 and 5) is mounted on a pair of arms 200 and 201 which extend horizontally across the top of the machine and which are supported on a cross shaft 202 mounted between the feeding mechanism support plates 90 and 91. An elongate support member 203 is arranged at the outer end of the arms 200 and 201 and is provided on its bottom face with a resistance coil, forming a heating element 204, which is seated in a suitable recess extending the length of the support 203. The support member 203 is secured to the ends of arms 200, 201 by a bracket plate 205 having inwardly extending arms 205' adjacent the opposite ends which are provided with adjusting stop screws 206 which engage the top surface of a part of the supporting frame of the conveyor 21 to limit the downward positioning of the heating mechanism.

The heating mechanism 18 is adapted to be manually lowered into operative position and to be lifted out of operative position by a counterweighted shaft arrangement which comprises the cross shaft 207 (Figs. 1 and 5) journaled in upstanding end support plates 208 and 209 projecting above a top cross frame plate 210. The shaft 207 is provided at one end with a rocking arm 211 which is pivotally connected to the top end of a link 212 the other end of which is pivotally connected to a rod 213 extending between the arms 200 and 201 supporting the sealing mechanism 18. The shaft 207 carries adjacent its center an outwardly extending counter-weight support arm 214 on the outer end of which there is secured a suitable counter-weight 215. With this arrangement the counter-weight 215 tends to rock the shaft 207 to lift the sealing mechanism 18 out of sealing position. The frame support plate 210 is secured at one end to the top bar 216 of a top cross supporting frame 217 which also supports portions of the finished bag delivery mechanism. The plate 210 is secured to the bar 216 by an upstanding post 218. The shaft 207 is provided with a hand wheel 219 for manual rotation and is held against rotation by means of a depending latching finger 220 having a hooked end 221 which is adapted to engage an abutment 222 on a latching bar 223 which is pivotally connected at 224 to the cross frame bar 216 and which is slidably and pivotally connected at its other end by means of a depending link 225 with the depending arm 226 of a solenoid 227. The link is bifurcated at its lower end and receives a sliding pivot pin 228 on the latch bar 223. The pivot 228 is connected to one end of a coil spring 229, the other end of the spring 229 being connected to the link 225. The link 225 is pivoted at 230 to the depending arm 226 of solenoid 227 and the latter is controlled by a switch 231 located above the shaft 207. The solenoid 227 is supported on an upstanding angular bracket 232. The shaft 207 carries a cam 233 which is adapted to operate the switch 231 upon rotation of the shaft 207 to position the heating member 18 in operative relation relative to the top of the clamping mechanism 13. In this position the latching arm 220 is engaged with the

latch bar 223 and the solenoid arm 226 is retracted. Upon failure of the power supplied to the solenoid 227 the arm 226 will drop and engagement of the latch arm 218 with the latch bar 223 will be broken. The counter-weight 215 then causes rotation or rocking of the shaft 207 to lift the sealing mechanism 18 out of operative position.

After the formation of the bead seal closure 19 by movement of the bag section 14 beneath the radiant heat sealing mechanism 18 the clamping frame 13 is carried around the end of the machine by the conveyor 21 with sufficient time elapsing for the heat seal 19 to cool before the completed bag is removed from the clamping frame 13. As the clamping frame 13 arrives at the discharge or delivery station the cam roller 83 on the clamping frame 13 moves into position over a trip mechanism which comprises an inwardly extending trip arm 240. The trip arm 240 is mounted on a relatively short rock shaft 241 journaled in bearing support 242 secured on the front side frame plate 25. The rock shaft 241 carries an actuating arm 243 on the end of which there is a cam roller 244 engageable with a cam 245 on the front cam shaft 118. The cam 245 operates the arm 240 in timed relation to the movement of the clamping frame 13 to open the clamping jaws 85 and 86 at the proper time for release of the completed bag 14.

The delivery mechanism comprises a pair of suction cups 246 mounted on a block 247 depending from a carrier member 248 which is slidable on a pair of guide rods 249 extending between the upright members 250 and 251 of the top frame 217. The carrier 248 is reciprocated on the guide rods 249 by means of a long link member 252 which is pivotally connected at one end 253 to the carrier 248 and at the other end 254 to the top of a crank arm 255 which is projected upwardly from a longitudinally extending rock shaft 256 at the rear side of the machine. An air hose 257 connects the suction cups 246 through the carrier bracket 248 and the supporting block 247, with a suitable vacuum device. The carriage 248 moves across the bars 249 and carries the bag 14 above a delivery table 258. The bag moves beneath a delivery or hold down arm 259 above the table 258 which is pivoted at 260 to the frame member 251 and which has connected therewith an operating arm 261 pivotally connected at 262 to the end of an upstanding link 263 which is pivotally connected at its other end 264 to a cam arm 265 carrying the cam roller 266 and pivotally mounted on the rock shaft 241. The cam roller 266 engages an operating cam 267 mounted on the front cam shaft 118. The vacuum mechanism is controlled by a suitable valve operated by cam 268 which is mounted on an auxiliary shaft 269, the latter being connected by a sprocket and chain drive 270 with the drive shaft 118. The shaft 269 is journalled in bearings on a bracket 271 supported on the front frame plate 23.

The rock shaft 256 which extends longitudinally of the back plate 24 of the main frame of the machine is supported on bearing brackets 272, 273 (Fig. 9). The shaft 256 is extended at the one end and provided with an arm 274 (Fig. 8) which is pivotally connected at its outer end 275 to an upstanding link 276. The link 276 is pivotally connected at its lower end at 277 to an eccentric 278 which is mounted on the end of a driven shaft 279. The shaft 279 is supported in bearings 280, 281 on the back plate 24 of the main frame. A bevel gear 282 on the inner end thereof is connected with a bevel gear 283 on a cross shaft 284. The cross shaft 284 is connected adjacent the opposite end in driving relation with the main drive shaft 56 by gear 285 and pinion 286 on the shaft 56.

The shaft 279 carries a sprocket 287 which is connected by a drive chain 288 with a sprocket 289 on front cam shaft 118.

While the specific mechanism illustrated in the drawings is preferred for fabricating bags in accordance with the method heretofore described it will be understood that modifications are contemplated within the spirit of the invention.

I claim:

1. A machine for forming receptacles from a continuous length of flattened tubular material which material is characterized by its ability to melt and form into a bead when an edge thereof is subjected to radiant heat, said machine comprising an endless conveyor, a plurality of gripper frames mounted in spaced relation along said conveyor, web feeding and cutting means arranged to feed successive cut sections of said flattened tubular material to said frames, flat heat sealing means spaced along said conveyor adjacent said web feeding and cutting means for successively engaging portions of the cut sections of material projecting from said frames and forming a relatively narrow flat heat sealed seam, and radiant heating means supported along said conveyor in spaced relation to said heat sealing means in the direction of advance of said conveyor, said radiant heating means being positioned laterally of the path of movement of the sections of tubular material to form the flat heat sealed seams into bead seals.

2. In a machine for sealing the ends of cut sections of flattened tubular bag forming material, endless conveyor means having bag holding clamp members spaced therealong, means for delivering cut sections of said tubular material to said clamp members with the end margins of each section extending a predetermined distance outwardly of said clamp members, seal forming means for engaging said extending end margins to form a flat marginal seal therein and radiant heating means spaced from said flat seal forming means and operative on said extending end margins to melt the same and form thereon a bead seal.

3. In a machine for sealing the ends of cut sections of flattened tubular bag forming material, endless conveyor means having cooperating gripper assemblies spaced therealong for engaging one end of each of said cut sections, means for delivering the cut sections of said tubular material to said gripper assemblies with a predetermined portion of the end margins of each section extending a predetermined distance outwardly of said gripper assemblies, flat seal forming means for engaging portions of said extending end margins to form a flat marginal seal therein, and heating means spaced along said conveyor means from said flat seal forming means and operative on said end margins to melt the extending portions and form thereon a bead seal.

4. In a machine for sealing the ends of cut sections of flattened tubular bag forming material, an endless conveyor having frame members spaced therealong, said frame members comprising cooperating relatively movable jaw members, means for delivering cut sections of said tubular material to said jaw members with portions of the end margins of each section extending a

predetermined distance outwardly of said jaw members, flat heat seal forming means for engaging said extending end margins to form a flat marginal seal therein and radiant heating means spaced along said conveyor from said flat seal forming means and operative on said extending end margins to melt the portions beyond said jaw members and form a bead seal.

5. In a bag forming machine an endless conveyor, carrying frames arranged along said conveyor and extending laterally of the path thereof, said carrying frames comprising pivotally connected clamp members having cooperating gripper jaws for engaging in clamping relation adjacent one end of a flattened tubular bag forming section, means spaced along said conveyor for pivoting one of said clamp members relative to the other of said clamp members to receive the bag forming section as said carrying frames are moved along the path of said conveyor, and means for delivering successive bag forming sections to said gripper jaws as said carrying frames are moved adjacent said last mentioned means.

6. In a bag forming machine a horizontally mounted endless conveyor, a series of carrying frames arranged in spaced relation along the periphery of said conveyor, said carrying frames comprising vertically positioned clamp members having cooperating jaws at the upper ends thereof for engaging in clamping relation adjacent the upper end of a flattened tubular bag forming section, said clamp members being pivotally connected at the lower ends thereof and an arm extending horizontally from one of said clamp members operable to pivot the same relative to the other of said clamp members, and cam members arranged at predetermined points around the path of movement of said conveyor to engage said arm whereby to open and close said jaws.

7. In a bag forming machine a horizontal endless chain conveyor, generally vertical carrying frames arranged in spaced relation along said conveyor, said carrying frames comprising generally rectangular clamp members having cooperating jaws at the upper ends for engaging in clamping relation adjacent the upper end of a flattened tubular bag forming section and said clamp members having pivotal connections at the lower ends, laterally extending means on one of said clamp members adapted to pivot the same relative to the other of said clamp members, and movable control members at predetermined points around the path of movement of said conveyor to engage said last mentioned means in timed relation to the movement of the conveyor and open and close said clamp members.

8. In a bag forming machine a horizontal endless conveyor, a plurality of vertical carrying frames arranged in spaced relation along said conveyor, said carrying frames comprising pivotally connected clamp members having cooperating jaws for engaging in clamping relation adjacent one end of a flattened tubular bag forming section, means for feeding successive bag sections between the jaws of successive clamp members and means operative on one of said clamp members to pivot the same away from the other of said clamp members during the feeding of the bag sections.

9. In a machine for sealing the ends of cut sections of flattened tubular bag forming material, an endless conveyor mounted for movement in a horizontal plane, cooperating vertical bag engaging clamp members mounted in spaced relation therealong, means for delivering cut sections of said tubular material to said clamp members, means to move the respective clamp members to engage said bag sections with the end margins of each section extending a predetermined distance outwardly of said clamp members, seal forming means adjacent said delivering means having movable sealing bars for engaging said extending end margins to form a flat marginal seal therein and radiant heating means adjacent said flat seal forming means movable into close proximity to said extending end margins to melt the same and form therein a bead seal.

10. In a machine for forming receptacles from a continuous length of flattened tubular material which is characterized by its ability to melt and form into a bead when an edge thereof is subjected to radiant heat, a horizontal endless conveyor, a plurality of carrier frames mounted in depending spaced relation along said conveyor, web feeding and cutting means arranged along said conveyor to feed successive cut sections of said flattened tubular material vertically to said frames, heat sealing means spaced along said conveyor adjacent said web feeding and cutting means for successively engaging trailing end portions of the cut sections of material and for forming therein a relatively narrow flat heat sealed seam, and radiant heating means movably supported along said conveyor, said radiant heating means being spaced from said heat sealing means in the direction of advancing movement of said conveyor and being adjustable relative to the path of movement of the flat sealed portions of the tubular material to form the same into bead seams.

11. In a machine for forming receptacles from a continuous length of flattened tubular material which is characterized by its ability to melt and form into a bead when an edge thereof is subjected to radiant heat, an endless conveyor mounted for intermittent movement in a horizontal plane, a plurality of gripper frames mounted in spaced relation along said conveyor, web feeding and cutting means arranged to feed successive cut sections of said flattened tubular material to said gripper frames, reciprocable heat sealing jaws adjacent said web feeding and cutting means for successively engaging portions of the cut sections of material projecting from said frames and for forming a relatively narrow flat heat sealed seam therein, radiant heating means supported above said conveyor, said radiant heating means being movable into close proximity to the path of movement of said conveyor and being operative on the flat sealed ends of said sections of tubular material to form the flat heat sealed seams into bead seals, and means to deliver the sealed sections from said gripper frames.

12. In a machine for forming receptacles from a continuous length of flattened tubular material which is characterized by its ability to melt and form into a bead when an edge thereof is subjected to radiant heat, a power operated intermittent horizontal endless conveyor, a plurality of pivotally connected jaw forming gripper frames mounted in spaced relation along said conveyor, web feeding and cutting means arranged to feed successive cut sections of said flattened tubular material to said gripper frames, flat heat sealing jaws adjacent said web feeding and cutting means for successively engaging portions of the cut sections of material projecting from said frames and for forming a relatively narrow flat heat sealed seam therein, a radiant heat-

ing device pivotally supported above said conveyor, said radiant heating device being swingable into close proximity to the path of said conveyor to position the heating element for melting the flat heat sealed seams and forming therefrom bead seals, and means controlling the positioning of said radiant heating device to automatically swing the same to an inoperative position upon failure of the power means for the endless conveyor.

13. In a machine for forming receptacles from a continuous length of flattened tubular material which is characterized by its ability to melt and form into a bead when an edge thereof is subjected to radiant heat, an endless conveyor mounted for intermittent movement in a horizontal plane, a plurality of gripper frames mounted in spaced relation along said conveyor, web feeding and cutting means arranged to feed successive cut sections of said flattened tubular material to said gripper frames with an end margin of each section extending above the upper edges of the gripper frames, reciprocable heat sealing jaws adjacent said web feeding and cutting means for successively engaging outer portions of the end margins extending above said frames and for forming relatively narrow flat heat sealed seams therein, radiant heating means supported above said conveyor, said radiant heating means being movable into close proximity to the path of movement of said conveyor and being operative on the flat sealed ends of said sections of tubular material for a sufficient length of time to melt the material above the upper edge of the gripper frames and form the same into bead seals, and means to deliver the bead sealed sections from said gripper frames.

14. In a machine for forming receptacles from a continuous length of flattened tubular material which is characterized by its ability to melt and form into a bead when an edge thereof is subjected to radiant heat, an endless conveyor mounted for intermittent movement in a horizontal plane, a plurality of gripper frames mounted in spaced relation along said conveyor, said gripper frames having relatively movable jaw members, web feeding and cutting mechanism arranged to feed cut sections of said flattened tubular material between said gripper jaw members, pivotally connected heat sealing jaws for engaging portions of the cut sections of material projecting above said frames to form therein a relatively narrow flat heat sealed seam and elongate radiant heating means supported above said conveyor and movable into close proximity to the path of movement of said conveyor to form the flat heat sealed seams into bead seals, said radiant heating means being mounted on a counter-weighted frame for movement into and out of sealing relation with said conveyor.

15. In a machine for forming receptacles from a continuous length of flattened tubular material which is characterized by its ability to melt and form into a bead when an edge thereof is subjected to radiant heat, an endless conveyor mounted for intermittent movement in a horizontal plane, a plurality of gripper frames mounted in spaced relation along said conveyor, said gripper frames comprising a base member and a movable jaw member, said base member being secured in depending relation to the outer periphery of the conveyor, said movable jaw member being pivoted at its lower end to the lower end of said base member and spring means urging the upper end of said jaw member toward the upper end of said base member, cam means along said conveyor cooperating with said jaw member to open the same, web feeding and cutting means arranged to feed successive cut sections of said flattened tubular material between the base members and the jaw members of said gripper frames when the latter are in open position, heat sealing jaws operative adjacent said web feeding and cutting means for forming a relatively narrow flat heat sealed seam on the ends of the cut sections and radiant heating means movable into close proximity to the path of movement of said conveyor to form the flat heat sealed seams into bead seals.

16. In a machine for forming receptacles from a continuous length of flattened tubular material, an endless conveyor mounted for intermittent movement in a horizontal plane, a plurality of frames having pivotally connected gripper jaws mounted in spaced relation along said conveyor, and web feeding and cutting means arranged to feed successive cut sections of said flattened tubular material to said frames, said web feeding and cutting means comprising intermittently operated web feeding rolls, a reciprocating feed plate for positioning the leading end of the web between said gripper jaws and reciprocating cutting elements adjacent said feeding rolls and operating in timed relation to the movement of the web and the conveyor.

17. In a machine for forming receptacles from a continuous length of flattened tubular material, an endless conveyor mounted for intermittent movement in a horizontal plane, a plurality of frames having pivoted gripper jaws thereon mounted in spaced relation along said conveyor, web feeding and cutting means arranged to feed successive cut sections of said flattened tubular material to said gripper jaws, said web feeding and cutting means comprising feed rollers, a movable guide plate beneath the feed rollers for directing the leading end of the material between the gripper jaws, a cutting bar on said guide plate, a cooperating movably mounted cutting bar opposite said guide plate and means for operating said feed rollers, said cutting bars and said gripper jaws, in timed relation, to grip the cut sections of material between said bars.

18. A method of fabricating a bag from a continuous tube of relatively thin, flexible heat sealable material which material is characterized by its ability to melt and form a bead thereon when an edge of the material is heated, said method comprising clamping a section of a flattened tube of the material along a line spaced inwardly of an end thereof, forming a flat heat sealed seam in said end of the material which flat seam extends from the end edge of the material to a line spaced outwardly of said clamping line and thereafter melting all of the material extending outwardly of said clamping line and forming thereon a bead seal.

19. A method of forming a seal on the end of a section of flattened polyethylene tubing which comprises engaging the section of tubing between clamping and cooling members having the outer edges thereof spaced a predetermined distance from the end of said section, placing a flat heat sealed seam in the end of said section which extends from the end marginal edge and terminates short of the clamping and cooling members, and thereafter melting the end material back to the clamping and cooling members and forming thereon a bead seal.

20. A method of fabricating a bag from a continuous tube of relatively thin, flexible heat seal-

able material which material is characterized by its ability to melt and form a bead thereon when an edge of the material is heated, said method comprising clamping a section of a flattened tube of the material between clamping and cooling members having the outer edges thereof spaced a predetermined distance from the end of said section, placing a flat heat sealed seam in the end of said section which extends from the end marginal edge and terminates short of the clamping and cooling members, and thereafter melting the end material back a sufficient distance toward the clamping and cooling members to form thereon a bead seal.

21. In a machine for forming receptacles from a continuous length of flat tubular material which is characterized by its ability to melt and form into a bead when an end thereof is subjected to radiant heat, an endless chain conveyor mounted for intermittent movement in a horizontal plane, a plurality of gripping frames spaced along said conveyor, said gripping frames comprising a base member secured in depending relation on the outer periphery of said conveyor, a movable frame member pivoted at its lower end to the lower end of said base member, a spring at the pivotal connection between said frame members for normally holding the frame members in gripping relation, web feeding and cutting means arranged adjacent the path of said conveyor to feed successive cut sections of the flattened tubular material between the base member and the movable member of said gripping frame, cam means operative to open and close said frame members against the action of said spring means in timed relation to the operation of said web feeding and cutting means, cooperating flat heat sealing jaws arranged adjacent said web feeding and cutting means and engageable with the projecting end of the cut sections of said flattened tubular material when said sections are engaged in clamping relation by said gripping frame members, cam means for operating the said heat sealing jaws whereby to form a relatively narrow flat heat sealed seam on the ends of the cut sections, and a radiant heating element arranged along the path of said conveyor in close proximity to the path of movement of the flat sealed ends of said cut sections to form the flat heat sealed seam thereon into bead seals.

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