June 13, 1967 H. F. RUNGE 3,324,621

PACKAGING MACHINE

Filed June 10, 1963 10 Sheets-Sheet 1

Fig. 1

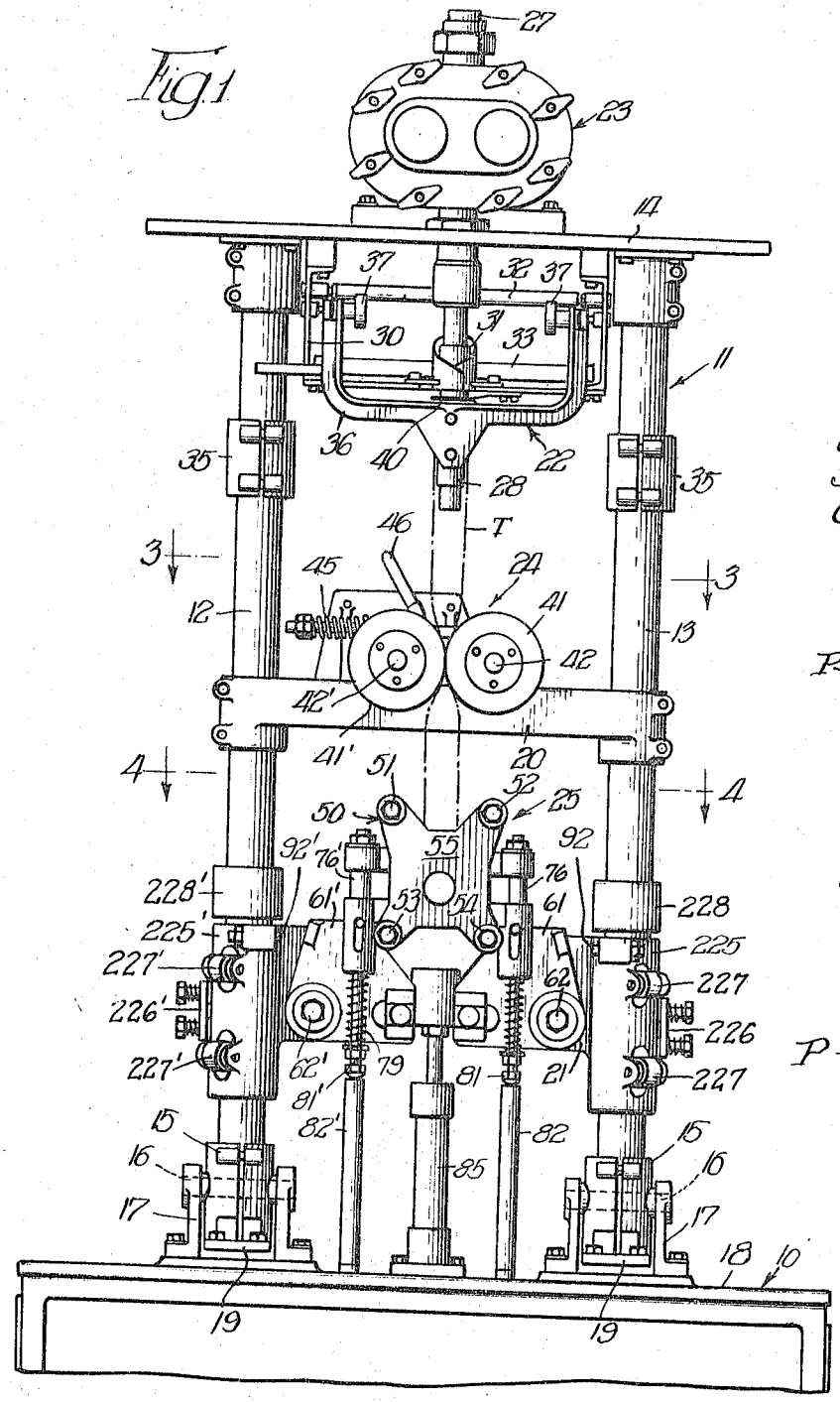
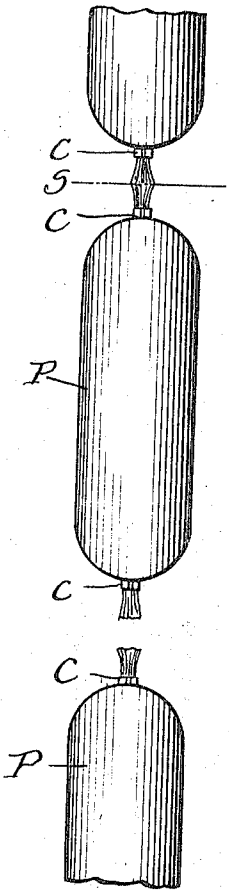


Fig. 19



INVENTOR.
Heinz F. Runge,
BY
Driest, Lockwood, Greenawalt & Drury.
Attys

June 13, 1967 H. F. RUNGE 3,324,621

PACKAGING MACHINE

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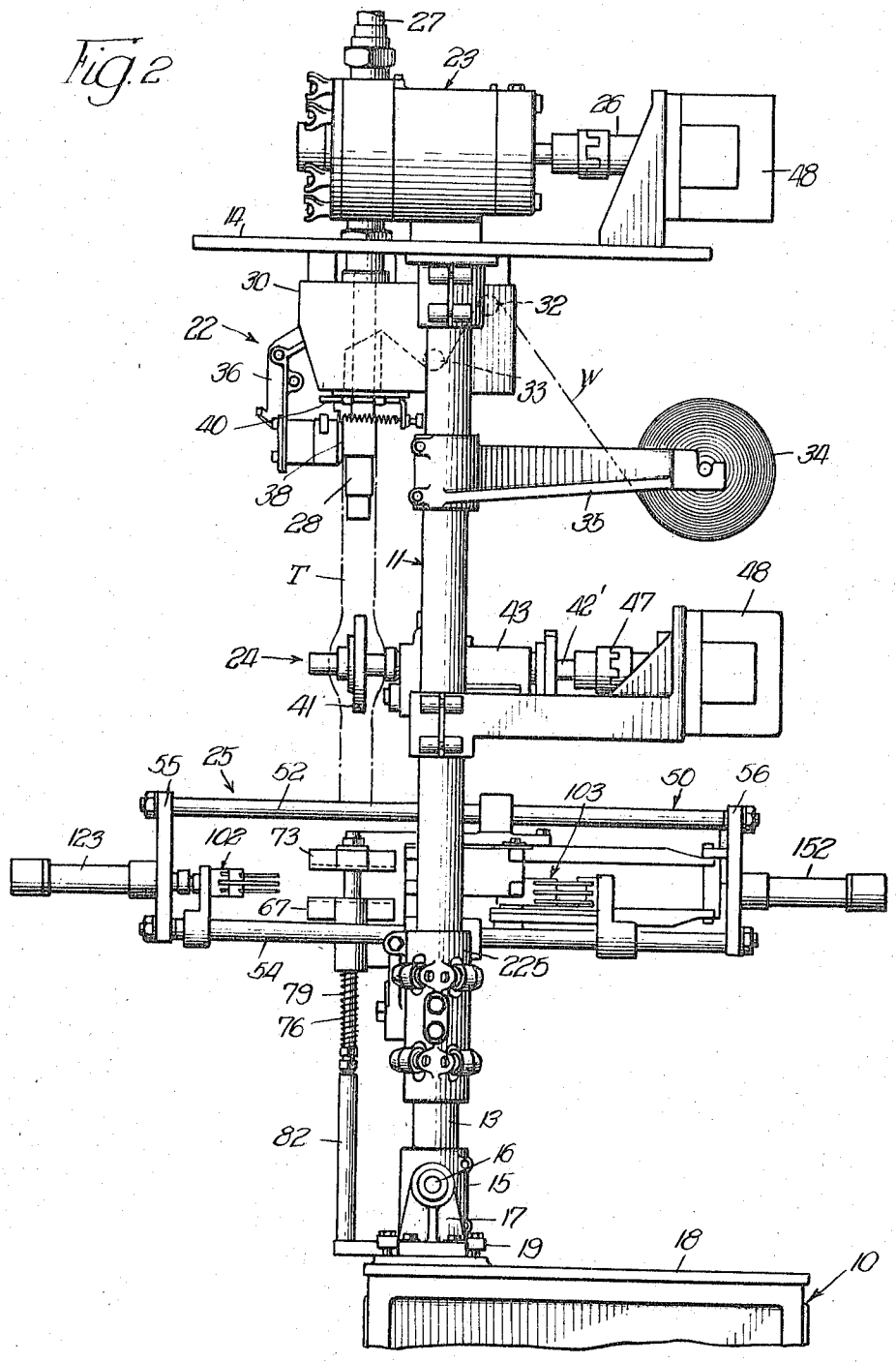
Fig. 2



INVENTOR.
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June 13, 1967 H. F. RUNGE 3,324,621

PACKAGING MACHINE

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Fig. 3

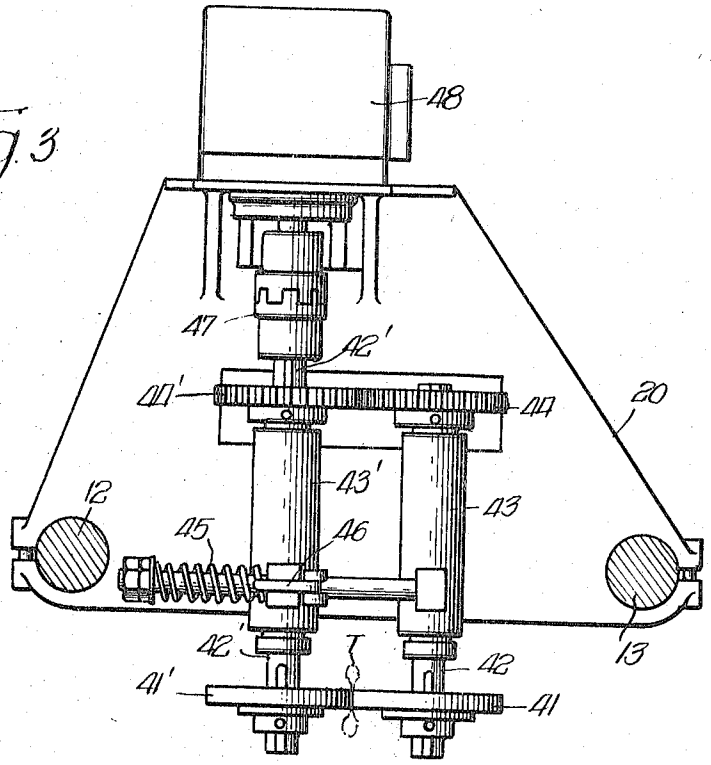
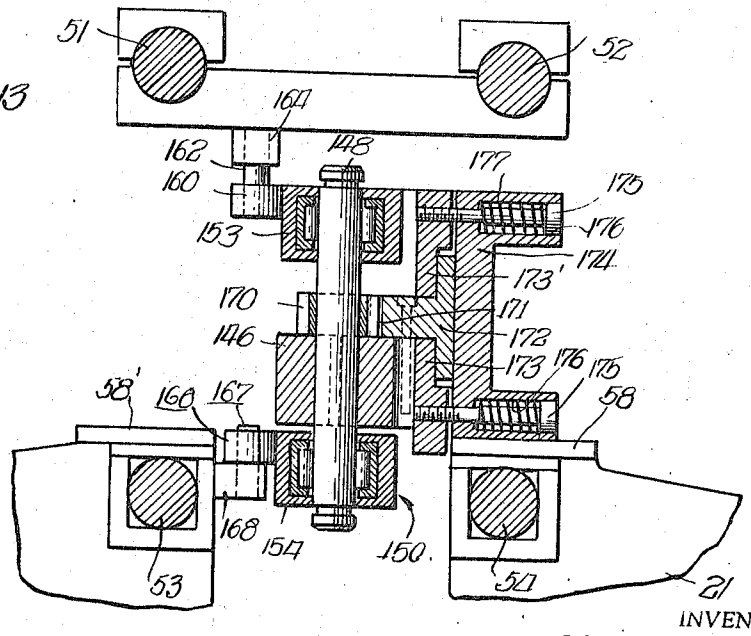


Fig. 13



INVENTOR.
Heinz F. Runge.

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3,324,621

PACKAGING MACHINE

Filed June 10, 1963

10 Sheets-Sheet 4

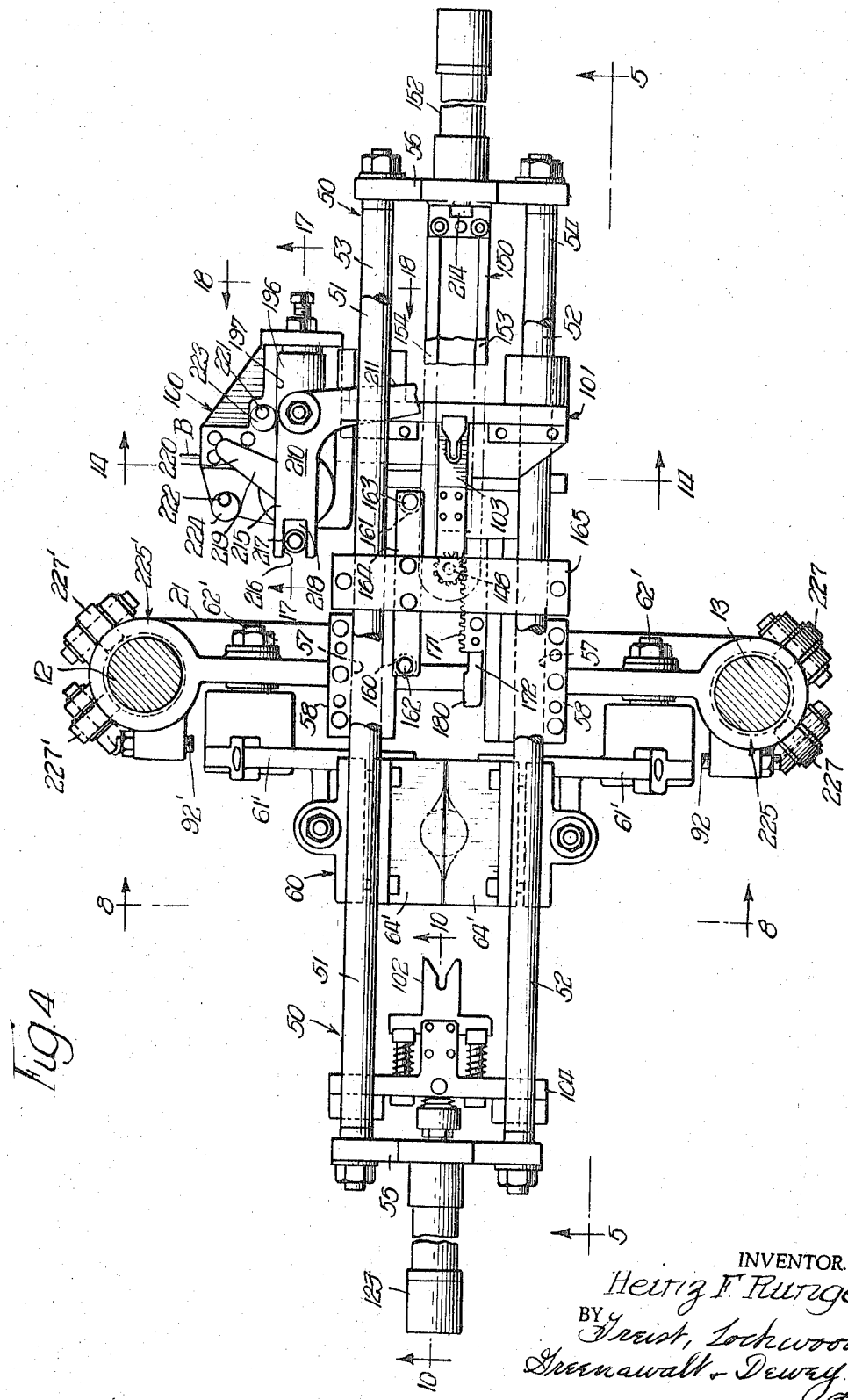

Fig 4

INVENTOR.
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June 13, 1967 H. F. RUNGE 3,324,621

PACKAGING MACHINE

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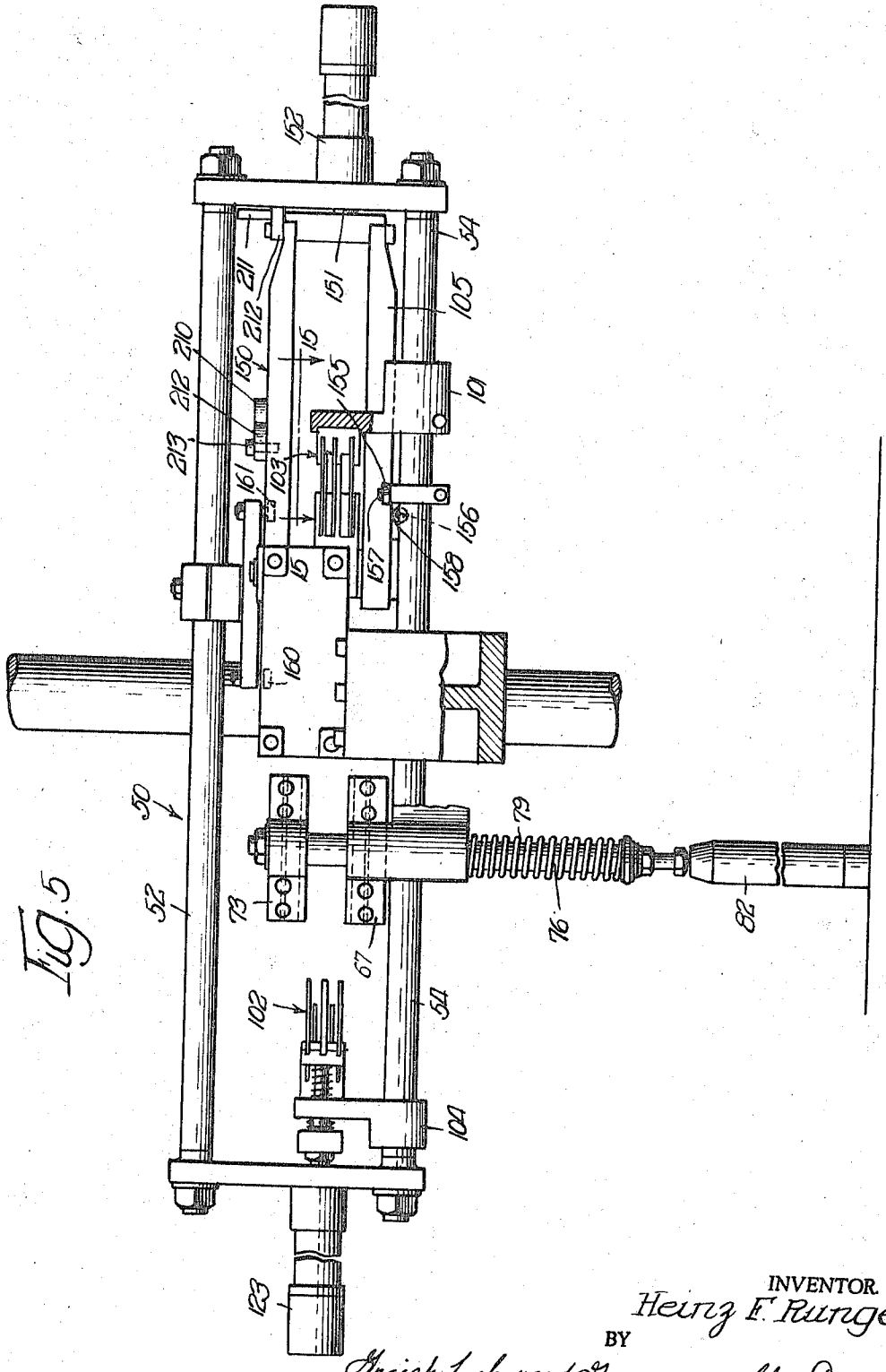

Fig. 5

INVENTOR.
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June 13, 1967 H. F. RUNGE 3,324,621

PACKAGING MACHINE

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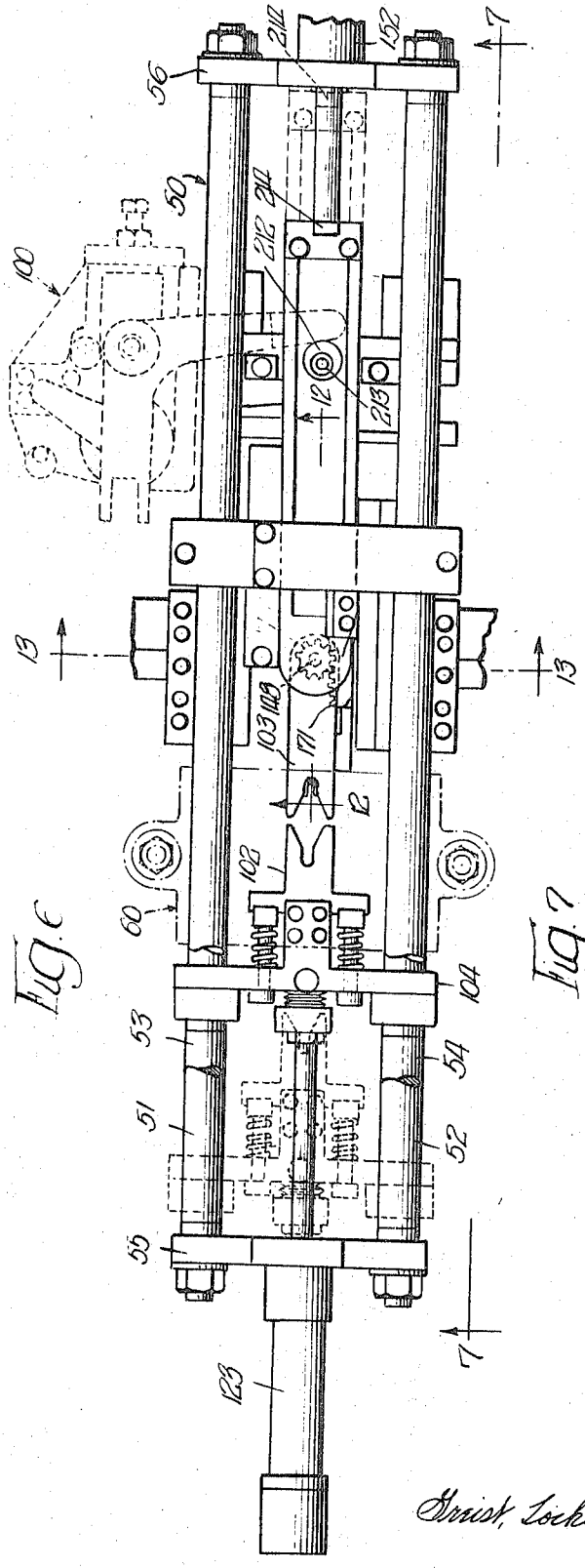

Fig. 6

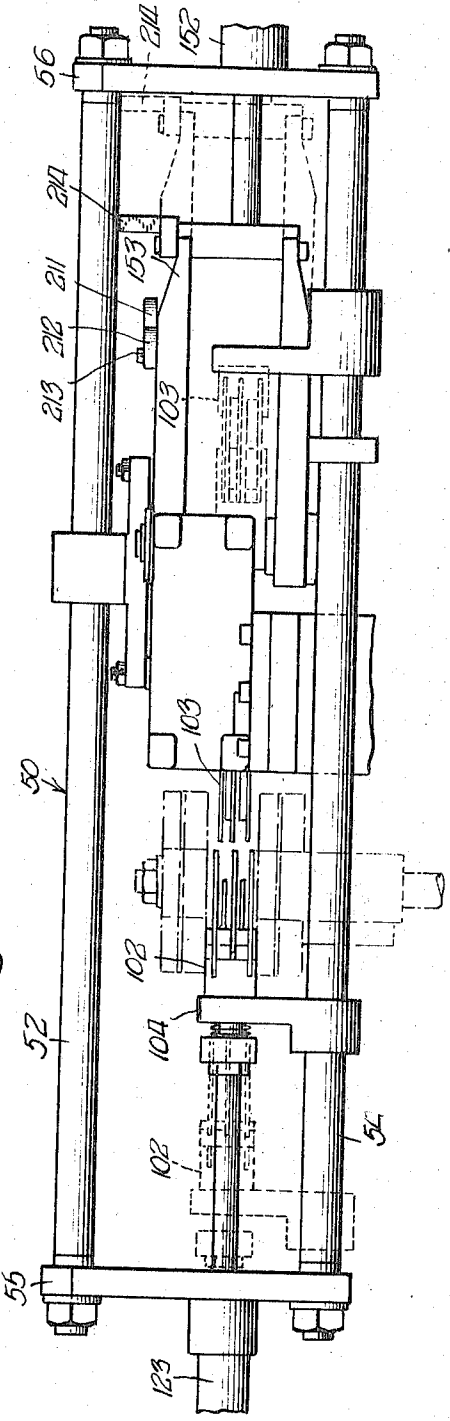

Fig. 7

INVENTOR.
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June 13, 1967 H. F. RUNGE 3,324,621

PACKAGING MACHINE

Filed June 10, 1963 10 Sheets-Sheet 7

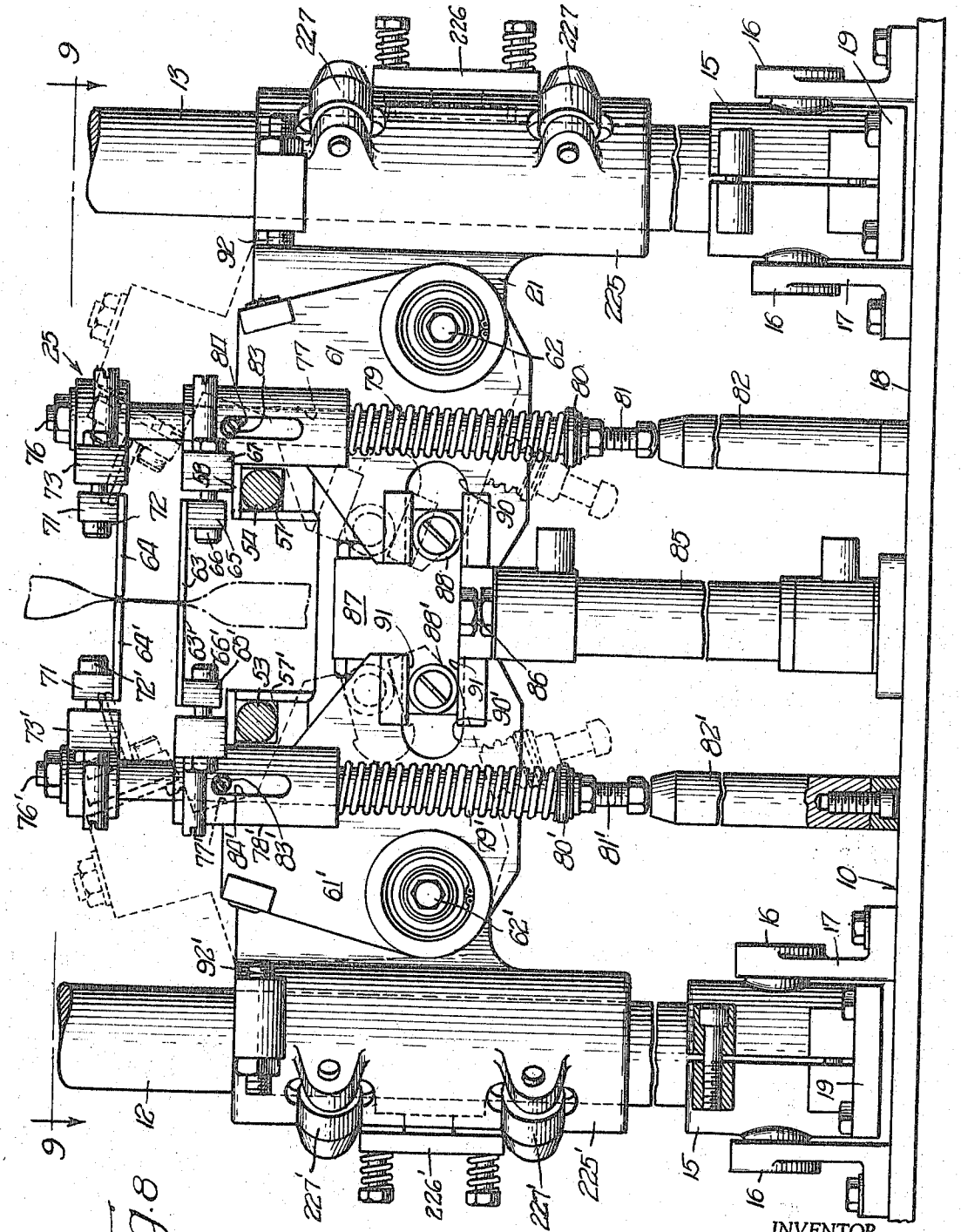

Fig. 8

INVENTOR.
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June 13, 1967 H. F. RUNGE 3,324,621

PACKAGING MACHINE

Filed June 10, 1963 10 Sheets-Sheet 8

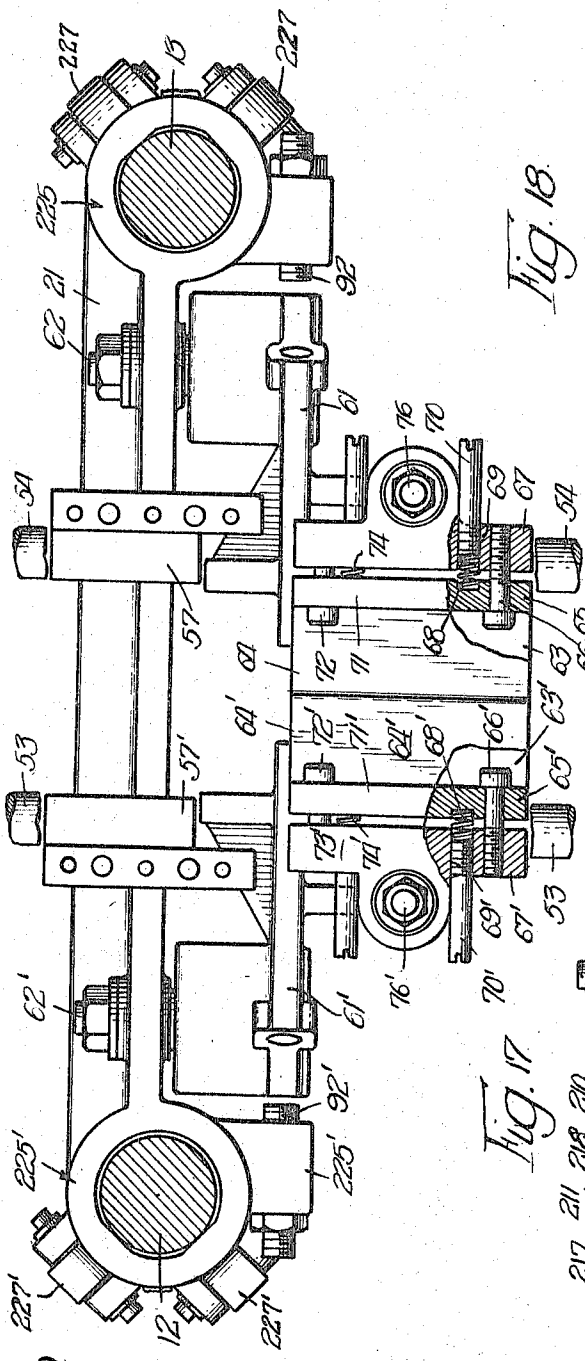

Fig. 9

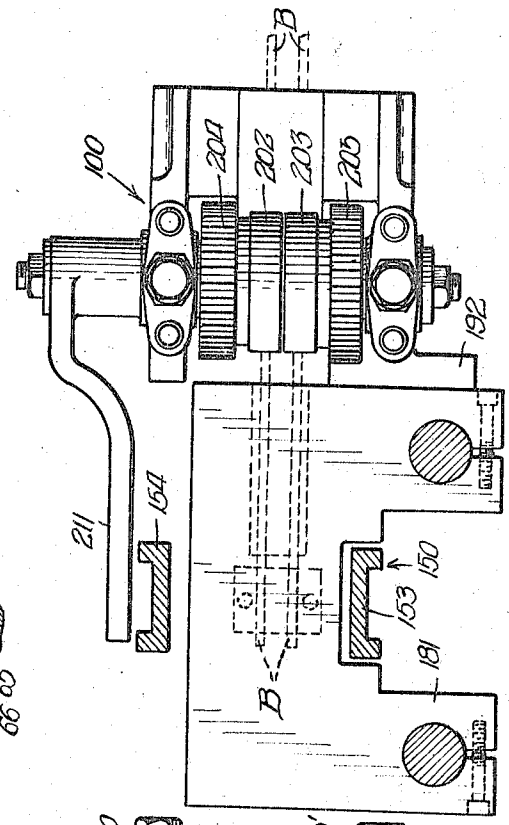

Fig. 18

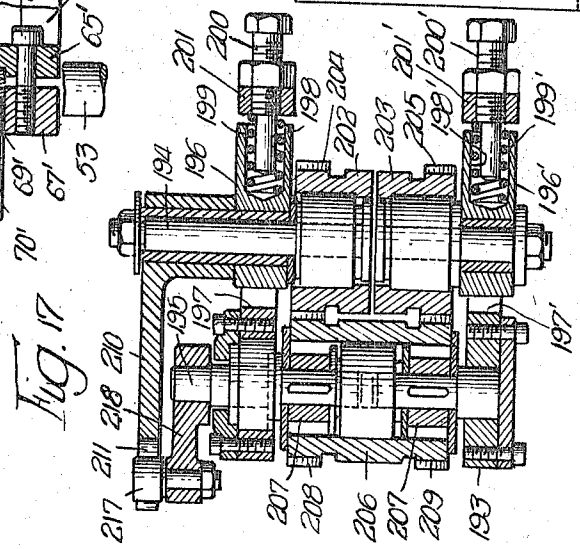

Fig. 17

INVENTOR.
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June 13, 1967 H. F. RUNGE 3,324,621

PACKAGING MACHINE

Filed June 10, 1963 10 Sheets-Sheet 9

Fig. 10.

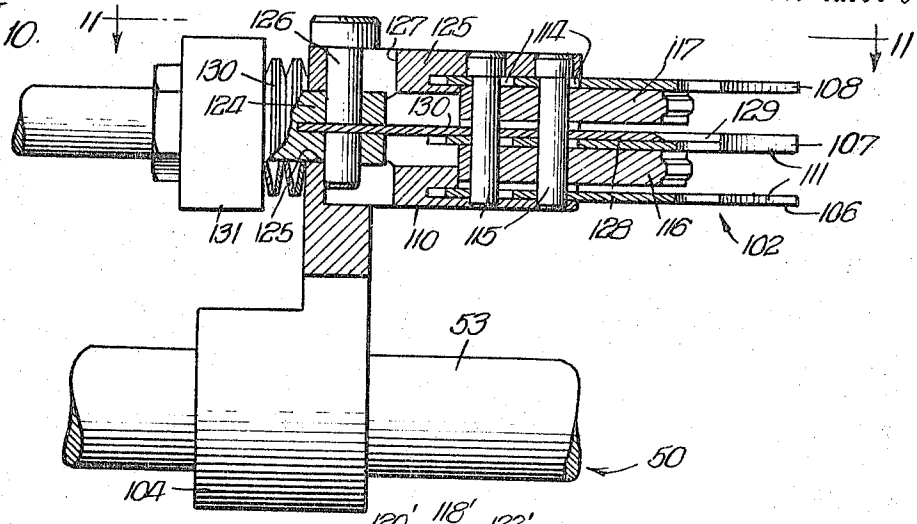
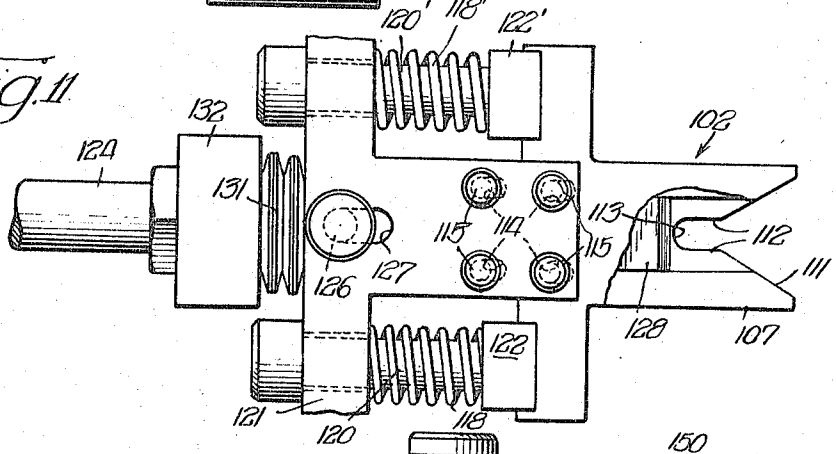


Fig. 11



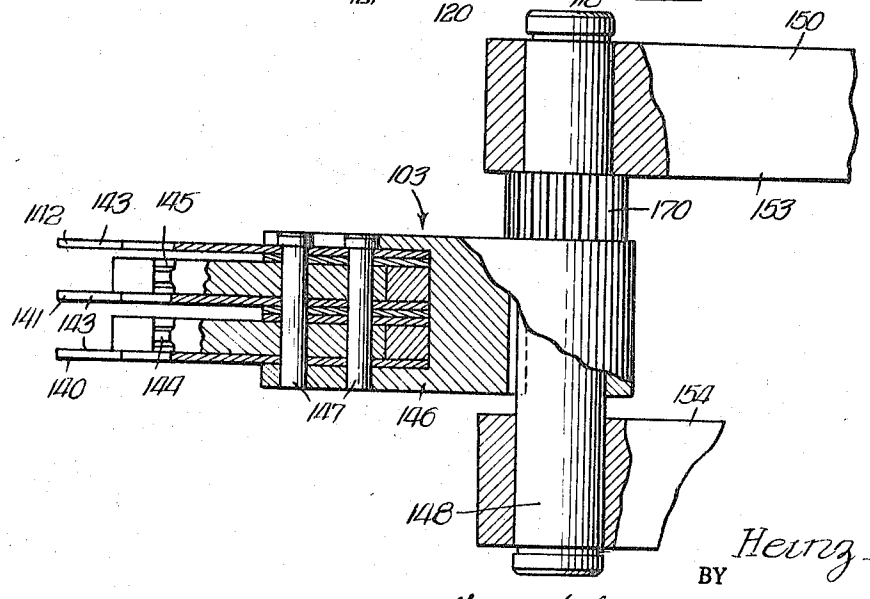


Fig. 12

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June 13, 1967 H. F. RUNGE 3,324,621

PACKAGING MACHINE

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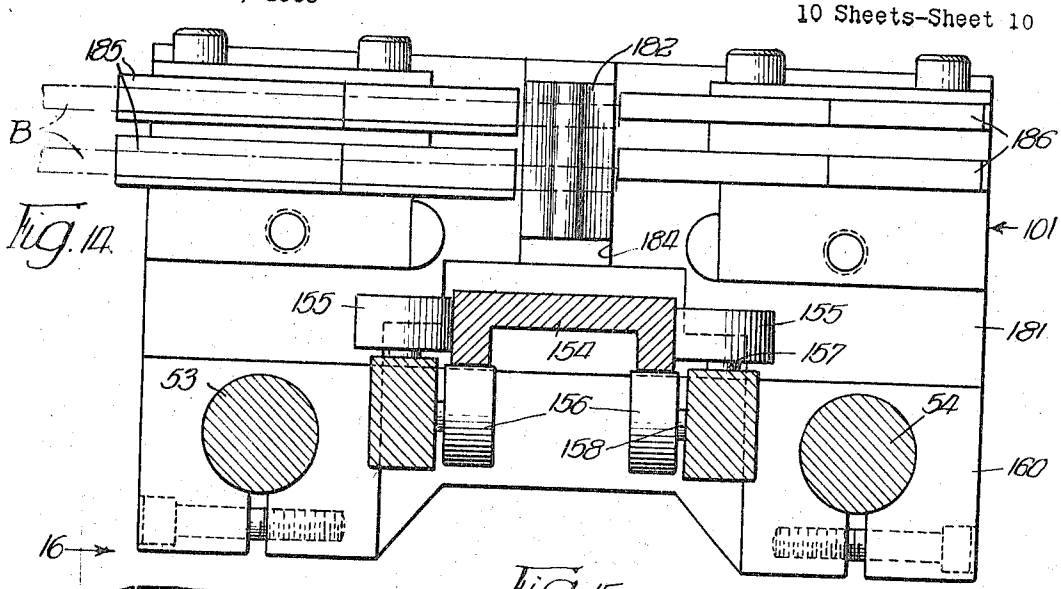
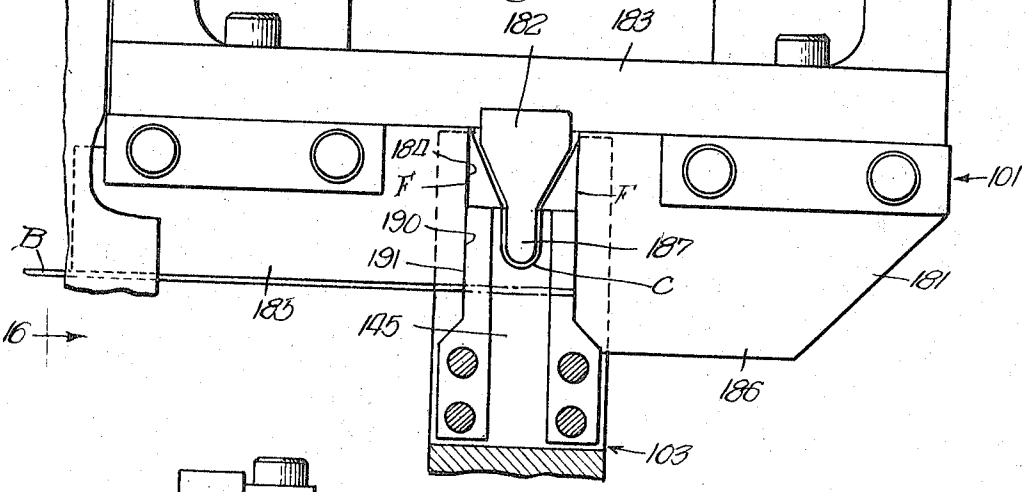


Fig. 14.

Fig. 15.



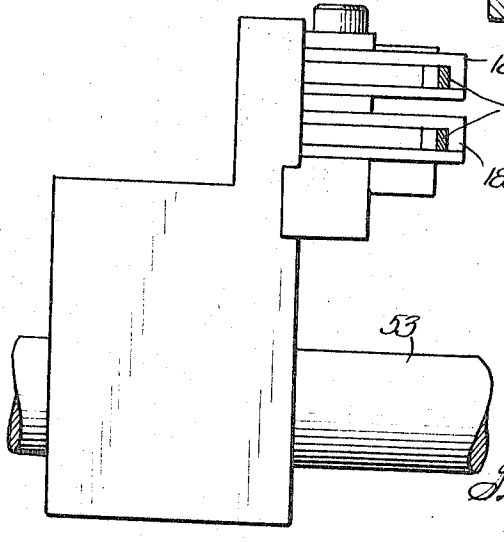


Fig. 16.

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United States Patent Office

3,324,621

Patented June 13, 1967

3,324,621

PACKAGING MACHINE

Heinz F. Runge, Madison, Wis., assignor to Oscar Mayer & Co., Inc., Chicago, Ill., a corporation of Illinois

Filed June 10, 1963, Ser. No. 286,691
23 Claims. (Cl. 53—138)

This invention relates to packaging machines and is more particularly concerned with improvements in a machine of the type which feeds material to be packaged into a continuous tube of relatively thin pliable material and constricts, seals and severs the filled tube at intervals to divide the same into a plurality of separate, individual packages.

It is a general object of the invention to provide a packaging machine of the type described which feeds the material to be packaged through a hollow tubular mandrel to a continuous tube of relatively thin pliable material, which divides the tube at predetermined spaced intervals by gathering the tube material and forming therein a constricted area, which forms and applies axially spaced closure forming metal clips within the constricted area to form the top of one package and the bottom of the next succeeding package, and which severs the constricted portion of the tube between the closure forming clips to separate the successively formed packages.

It is a more specific object of the invention to provide a packaging machine for forming and advancing a tube of relatively thin pliable material about a tubular filling mandrel, which feeds a product to be packaged to the mandrel and into the tube, which divides the tube at regular intervals by clearing the product from a section of the tube, which gathers the tube material thus cleared of the product so as to form therein a constricted area, which preforms and applies a pair of spaced metal closure members within the constricted area so as to close the top forming end of one package and the bottom forming end of the next succeeding package and which severs the constricted tube between the closure clips to separate the successively formed packages.

It is another object of the invention to provide a machine of the type described for forming from a web of flexible sheet material a continuous tube around a hollow cylindrical mandrel to which the product to be packaged is delivered, for simultaneously forming pairs of U-shaped metal band members, for transferring the pairs of band members successively to a tube constricting station, for constricting the tube at successive axially spaced areas by first clearing the product from the area and then gathering the tube material, for simultaneously placing the band members in spaced encompassing relation on the constricted portion of the tube, for clinching the band members to provide encircling closure members and for severing the tube between the closure members to provide individual packages.

It is another object of the invention to provide a machine for solidly packaging a flowable product in a thin pliant, skin-like tubular casing wherein the tubular casing of thin, pliant, skin-like material is applied in telescoping relation around a hollow mandrel, the product to be packaged is fed in a continuous stream through the mandrel and into the tube as the tube is advanced beyond the end of the mandrel wherein a cross frame is supported on spaced side frame members which extend across the path

of advancing movement of the filled tube and mechanism is associated with the cross frame for engaging the filled tube and flattening a section thereof by moving the product in both directions along the axial path of the filled tube so as to clear the product out of a section of the tube and wherein the cross frame carries mechanism for constricting the cleared tube section and for forming and applying spaced closure members to the constricted tube section.

It is still another object of the invention to provide in a machine of the type described a mechanism for constricting the filled tube at spaced intervals and applying thereto a pair of spaced closure members in combination with a closure member forming mechanism which includes means for intermittently feeding strips of material suitable for fabricating the closure member, a pre-forming anvil, means for severing predetermined lengths of material from the strips when they are positioned adjacent the anvil, for bending severed lengths of material around the anvil and into generally U-shaped clips and for transporting the preformed clips to a tube constricting and clip applying area, which severing, forming and transporting means is mounted on a rotatable and reciprocable carrier which is operated to bring the clips into the plane of a flattened section of the tube formation and thereafter to move toward the tube formation for application of the clips to the flattened section when it is constricted by associated tube constricting members.

It is another object of the invention to provide in a packaging machine of the character described a mechanism which is operable in timed relation to the advancing movement of the tube to intermittently engage the filled tube at predetermined intervals so as to flatten the tube and thereafter force the material in the tube axially in both directions away from the flattened area thereby compacting the material in the package and clearing a section of the tube of the material which is subsequently constricted for application of closure forming and sealing clip elements.

It is a further object of the invention to provide a packaging machine of the type described wherein mechanism is provided for engaging the filled tube at intervals in order to void a section of the tube for subsequent gathering into closure forming condition which mechanism comprises pairs of plates mounted for reciprocating movement on opposite sides of the path of the filled tube so as to engage the tube between confronting edges of the pairs of plates and mechanism for moving the respective plates of each pair thereof apart while they are engaged with the tube, thereby providing an empty tube section for gathering and application of closure clips and also compacting the material in the leading end of the tube.

It is a still further object of the invention to provide a packaging machine of the type described wherein the tube forming, filling, constricting and closure applying apparatus is mounted on a pivoted frame which can be swung between a vertical position and a horizontal position so as to provide for greater flexibility in the use of the machine.

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

FIGURE 1 is a front elevation of a packaging machine embodying the principles of the invention, portions of the machine being broken away or omitted;

FIGURE 2 is a side elevation of the packaging machine, with portions broken away or omitted;

FIGURE 3 is a horizontal cross section taken on the line **3—3** of FIGURE 1, to an enlarged scale;

FIGURE 4 is a horizontal cross section taken on the line **4—4** of FIGURE 1, to an enlarged scale;

FIGURE 5 is a vertical section taken on the line **5—5** of FIGURE 4, with portions broken away;

FIGURE 6 is a horizontal section similar to FIGURE 4 with the elements in a different position and to a slightly larger scale;

FIGURE 7 is a vertical section taken on the line **7—7** of FIGURE 6;

FIGURE 8 is a partial vertical section taken on the line **8—8** of FIGURE 4, to a still larger scale;

FIGURE 9 is a horizontal section taken on the line **9—9** of FIGURE 8, with portions broken away;

FIGURE 10 is a vertical section taken on the line **10—10** of FIGURE 4, to an enlarged scale;

FIGURE 11 is a view taken on the line **11—11** of FIGURE 10, with portions broken away;

FIGURE 12 is a vertical section taken on the line **12—12** of FIGURE 6, to an enlarged scale;

FIGURE 13 is a vertical section taken on the line **13—13** of FIGURE 6, to an enlarged scale, and with portions broken away;

FIGURE 14 is a partial vertical section taken on the line **14—14** of FIGURE 4;

FIGURE 15 is a fragmentary view taken on the line **15—15** of FIGURE 5, to an enlarged scale and with portions broken away;

FIGURE 16 is a fragmentary view taken on the line **16—16** of FIGURE 15;

FIGURE 17 is a vertical section taken on line **17—17** of FIGURE 4, to an enlarged scale;

FIGURE 18 is a vertical section taken on the line **18—18** of FIGURE 4, to an enlarged scale; and

FIGURE 19 is an elevation showing the product of the machine.

Referring to FIGURES 1 and 2, there is illustrated a machine having embodied therein the principal features of the invention and which is particularly adapted to fabricate a package of generally tubular shape having its opposite ends gathered and closed by encircling metal bands or closure clips C as illustrated in FIGURE 19, the packages P being formed by the machine in a continuous connected string or series of predetermined size and length and being separated into individual packages by severing between the end closure clips C on the line indicated at S simultaneously with the gathering of material and the application of the closure clips C or by severing the same at a later time as desired.

The machine is shown in upright vertical position in the drawings. It is supported on a generally rectangular upstanding base frame **10** which may be enclosed to form a compartment for part of the hydraulic mechanism which is employed in operating the movable elements of the machine. The package forming elements are mounted on an upright top frame structure **11** which is pivotally supported at the forward side of the base frame **10** so that it may be swung forwardly and supported in a horizontal position when desired, thereby enabling the apparatus to be operated either in the vertically disposed position or in a horizointally disposed position. The top frame is formed by a pair of parallel side frame members or posts **12** and **13** which are connected at the top to a platform forming plate **14**. At the bottom each of the side frame members is seated in a pivot bracket **15** having trunnion members **16** journaled in a pair of bearing forming brackets **17** mounted on the top plate **18** of the base **10**. The trunnion axes are in alignment so that the frame **11** may swing forwardly about the same. Removable

clamp members **19** are provided which are adapted to be mounted on the top plate **18** so as to hold the frame **11** in either a vertical or horizontal position. The side frame members **12** and **13** are further connected by cross members **20** and **21** which support portions of the operating mechanism which will be hereinafter described.

A tube forming mechanism **22** and a product feeding pump **23** are supported on the top frame plate **14**. The cross bar **20** supports a tube feeding mechanism **24** and the cross bar **21** supports elements of a tube gathering, closing and severing mechanism **25**.

The product feeding pump **23** is mounted on the top platform plate **14** and has a suitable connection indicated at **26** with a power drive for delivering the material to be packaged from a supply tube **27** to a depending hollow mandrel **28** which is supported beneath the top plate **14** and through which the product is fed to the tubular material from which the package is formed. The mandrel **28** extends below a U-shaped supporting frame **30** which comprises laterally spaced side plates connected by a bottom plate and which is suspended from the top platform **14**. A tube forming sleeve member **31** is arranged about an intermediate portion of the mandrel **28** and supported on the frame **30**. A pair of guide rollers **32** and **33** are journaled at their ends in the side plates of the frame **30** and receive a web W of film forming material from a supply roll **34** mounted on a pair of laterally spaced, parallel supporting brackets or arms **35** extending rearwardly of the vertical post members **12** and **13**. A generally U-shaped frame **36** is pivotally mounted at **37** on the supporting frame **30** at the forward side of the latter and carries a sealing iron **38** constituting part of an electronic sealing mechanism for forming the longitudinal seam in the tube as it passes below the forming collar or sleeve **31** with its margins held in overlapped relation by pivotally mounted, spring urged fingers indicated at **40**. A cooperating sealing iron is incorporated in the tube forming mandrel **28**.

The formed tube T is filled with the product which is forced through the mandrel **28** as it leaves the lower end of the mandrel and is advanced beyond the mandrel by a pair of feed rollers **41** and **41'**. The feed rollers (FIGURE 3) are mounted on the ends of supporting shafts **42** and **42'** which are journaled in bearing members **43** and **43'** and carry at their other ends gears **44** and **44'** which are adapted to interengage in driving relation. The one bearing support **43** is pivotally mounted relative to the other bearing support **43'** and has a spring urged link connection **45** to permit the rollers **41** and **41'** to be separated for threading purposes. A separating cam lever **46** is provided to enable the operator to force the pivotally mounted roller support **43** to an open position where the rollers **41** and **41'** are separated. The shaft **42'** is connected by coupling **47** with the power output shaft of an hydraulic motor indicated at **48**. The entire mechanism is mounted on the cross bar forming member **20** and the latter is adjustable on the supporting frame members **12** and **13**. The filled tube is advanced by the feed wheels **41** and **41'** to the tube voiding, constricting and closure applying mechanism **25**.

The tube voiding and constricting and the closure forming and applying mechanism **25** is supported in part directly on the cross frame member **21** and in part on a horizontally disposed frame **50** (FIGURES 1, 2, 5, 6 and 7) comprising parallel spaced top rods **51, 52** and bottom rods **53, 54** which are connected at their opposite ends by vertically disposed plates **55** and **56** so as to form a generally rectangular frame extending forwardly and rearwardly of the upright frame **11** with the forward portion disposed across the path of the tube T. The bottom pair of bars **53** and **54** of the frame **50** are seated in recesses **57, 57'** in the cross frame **21** (FIGURES 4, 8 and 9) and retained therein by top clamp plates **58** and **58'**.

The tube voiding mechanism **60** (FIGURES 4, 5, 8 and 9) is mounted directly on the cross frame member

21. The voiding mechanism 60 comprises support castings 61 and 61' which are pivotally mounted at 62 and 62' on the cross frame member 21. The castings 61 and 61' and the associated elements for voiding the tube are identical except for being rights and lefts and the details of only one of these will be described, it being understood that corresponding elements on the other casting 61' and the associated elements thereof will be identified by the same numerals primed. The support castings 61 and 61' carry pairs of cooperating tube engaging voider plates 63, 64 and 63', 64'. The lowermost voider plate 63 on the casting 61 is secured to a bar member 65 which is slidably mounted on a pair of guide forming headed bolts 66 extending from a top portion 67 of the casting 61. Compression springs 68 are mounted in socket forming bores 69 which are threaded to receive pressure adjusting screws 70. The springs 68 urge the bar 65 against the heads of the bolts 66 so as to provide a resilient mounting for the plate 63. The uppermost voider plate 64 is attached to the lower face of the bar 71 which is of the same character as the bar 65 and slidably mounted on a pair of headed support or guide bolts 72 extending from a bracket forming member 73 with the bar 71 urged against the heads of the guide bolts 72 by compression springs 74 so as to provide a resilient mounting for the plate 64 of the same character as for plate 63. The bracket member 73 is attached to the top end of a vertically disposed slide rod or bar 76. The rod 76 is mounted in sliding relation in a vertical bore 77 in a bearing forming portion 78 of the casting 61. The slide rod 76 extends below the bearing member 78 and carries a compression spring 79 which abuts at one end against the lower face of the bearing member 78 and at the other end against a stop collar 80 secured near the end of the slide rod 76. A stroke adjusting bolt 81 extends from the lower end of the slide rod 76 and is adapted to engage with the top end of an abutment post 82 which is mounted in upstanding relation on the top plate 18 of the base 10. The slide rod 76 carries a cross pin 83 which operates in a slot 84 in the outside wall of the bearing member 78 and limits the vertical movement of the slide rod 76.

The voider support castings 61 and 61' are oscillated about their supporting pivots 62 and 62' by operation of an hydraulic cylinder 85 which is mounted in vertically disposed relation on top plate 18 of the base 10. The cylinder 85 carries on the free end of its piston rod 86 a bracket 87 on which a pair of rollers 88 and 88' are mounted which rollers are operative in slots 90 and 90' in the castings 61 and 61'. The slots 90 and 90' are provided with wear plates 91 for receiving the rollers 88. The castings 61 and 61' are limited in their movement in the direction to separate the two pairs of voider plates by adjustable stop pins 92 and 92' mounted on the cross frame member 21. The separated position is shown in dotted line in FIGURE 8.

The tube constricting and the closure forming and applying devices are mounted on the longitudinally disposed frame 50. This mechanism includes a wire feeding device 100 (FIGURES 4, 5, 17 and 18) and an associated mandrel and support 101 which are mounted in fixed relation on the frame 50 to the rear of the upright posts 12 and 13. The frame 50 also carries a pair of constricting and closure applying heads 102 and 103, which are mounted on movable support carriages. The tube constricting or gathering and closure applying and clinching heads 102 and 103 are adapted to move toward and from the tube in a path which is transverse of the axial path of the tube and to engage the tube in order to form a constricted area for the application of the closure members while the tube is clamped between the voider plates and the plates of each pair thereof are spread apart to provide a flattened empty tube area for the conflicting and closure applying operation.

The constricting head 102 (FIGURES 10 and 11) is mounted on the carriage 104 at the forward end of the frame 50 and the carriage 104 is slidably mounted on the two bottom bars 53 and 54 of the frame. The head 102 comprises three gathering plates 106, 107 and 108 mounted in parallel, vertically spaced relation on a forwardly extending bracket forming portion 110 of the carriage 104. Each of the plates 106, 107 and 108 has a V-shaped slot 111 in the inner end which merges with an elongate inner slot having parallel side walls 112 and a semi-circular inner end 113. The plates 106, 107 and 108 are each mounted for sliding movement in a recess provided in the bracket 110 and each plate is provided with elongate slots 114 for accommodating pins 115 extending through the bracket 110 and forming guides for limited movement of the plates in the lengthwise direction of the frame 50. A pair of punches 116 and 117 for clinching the closure members C on the constricted portion of the tube are disposed between the center plate 107 and the two outermost plates 106 and 108. The punches 116 and 117 are connected to the bracket 110 by the pins 115. The plates 106, 107 and 108 are urged in the direction of the tube by compression springs 118 and 118' which are mounted on guide pins 120 and 120' extending from a cross bar forming portion 121 of the carriage 104 to a pair of vertically disposed tie bars 122 and 122' which bridge the back edges of the plates 106, 107 and 108 with the springs 120 and 120' being seated at one end against the cross bar portion 121 and at the other against the tie bars 122 and 122' so that the plate assembly is slidably mounted. The carriage 104 is reciprocated by an hydraulic cylinder 123 mounted on the end frame plate 55 and having the end of the piston rod 124 extending into a bore 125 in the bracket 110. A pin 126 extends through the end of the piston 124 with its ends seated in an elongate cross slot 127. A plate-like knife element 128 has its outer end seated in a guideway forming recess 129 in the top surface of the center plate 107 and is connected by the pin 126 to the end of the piston rod 124. A pair of Belleville springs 130 are held on the piston rod 124 by a collar 131 so that initial advance of the piston rod 124 advances the carriage 104. When there is sufficient resistance to further advance of the carriage 104 at the end of the tube gathering operation the Belleville springs 130 are compressed and the cutter blade 128 is advanced to bring the knife edge into the slot in the plate 107 and sever the constricted tube to which a pair of closure members C have been applied.

The constricting head 103 (FIGURES 4 and 12) comprise a constricting plate assembly comprising three vertically spaced plates 140, 141 and 142, each of which has an end slot 143 of the same character as the end slots 111, 112. The plates 140, 141 and 142 are separated by closure forming and applying punches 144 and 145 and the entire assembly is mounted in fixed relation in the recessed end of a supporting bracket 146 by means of mounting pins 147. The plate supporting bracket 146 is mounted at its other end on a vertical pin 148 which is carried at the end of a carriage forming fork 150 (FIGURES 4 and 5). The fork 150 is mounted for movement longitudinally of the frame 50 and has its rear end connected to the end of the piston rod 151 extending from power cylinder 152 mounted on the end plate 56 of the frame 50. The fork 150 comprises upper and lower members 153 and 154 of oppositely facing channel-shaped cross section. The pin 148 is journaled in the inner ends of the two fork members 153 and 154. The carriage forming fork 150 is guided for movement longitudinally of the frame by spaced pairs of guide rollers 155 and 156 (FIGURES 5 and 14) mounted on vertically and horizontally disposed pins 157 and 158 on a supporting bracket

160 which is clamped to the bottom bars 53 and 54 of the frame 50 with the rollers 155 and 156 engaging the lower member 154 of the carriage fork 150. A pair of longitudinally spaced guide rollers 160 and 161 (FIGURES 4, 5 and 13) are mounted on depending pins 162 and 163 on a longitudinally extending support bar 164 which is fastened to a cross bar 165 clamped to the top rails 51 and 52 of the frame 50. The rollers 160 and 161 guide the forward end of the carriage form 150 as it is advanced toward the path of the tube. A similar set of guide rollers 166 (FIGURE 13) which engage the lower member 154 of the carriage fork 150 are mounted beneath the guide rollers 160 and 161 on upstanding pins 167 on an elongated bar 168 which is fastened to the cross frame 21.

The pivot pin 148 in the end of the carriage fork 150 carries a pinion 170 which is positioned to engage with a rack formation 171 on a slide member 172. The slide member 172 has a T-shaped cross section with the rack formation 171 on the end of the stem forming section and disposed horizontally. The head forming section of the slide 172 operates in a guideway provided by two vertically spaced, grooved or rabbetted plate members 173 and 173' each of which is fastened to a fixed bracket 174 on the frame cross member 21 by a pair of bolts 175 having the heads thereof seated in the enlarged outer portions of the recesses or bores 176 through which the bolts extend with the threaded ends screwed into threaded bores provided in the guideway forming plates. The bolts 175 each carry a compression spring 177 which is confined within the center portion of the bore 176 so that the plates 173 and 173' are spring pressed in the direction of the support plate 174. The slide plate 172 is somewhat thicker in the head section than the clearance in the guideway for the same which is formed betwen the plates 173 and 173' so that the slide plate 172 is normally frictionally held in its guideway against movement in the direction of reciprocation of the carriage fork 150 with the slide 172 being free to move when sufficient force in the longitudinal direction of the frame is applied by the fork 150 acting through the pinion 170 and the rack 171 to overcome the friction. The slide 172 has an abutment forming inner surface 180 (FIGURE 4) at its inner end which provides a stop for the swinging head 103. When the carriage fork 150 is moved to the left in FIGURES 4 to 7, there is a small initial forward movement of the head 103 in the path of movement of the fork 150 because the head is restrained against rotating movement. This movement is resisted by the friction applied to the slide plate 172 by the guide plates 173 and 173' and when the head 103 has advanced sufficiently to permit it to rotate counterclockwise, as viewed in FIGURE 4, the pivot 148 is rotated through engagement of the pinion 170 with the rack 171 until the head has turned through 180° when it engages the abutment surface 180 and thereafter continued movement of the fork 150 forces the slide 172 to move forward against the resistance afforded by the springs 177 until the head 103 is in tube gathering position where it cooperates with the head 102 for constricting the tube and applying the closure clips. The plates 140, 141, and 142 on the head 103 are disposed so as to interleave with the plates 106, 107, 108 on the head 102 for the tube constricting operation. Prior to the movement of the head 103 into tube constricting position, a pair of closure clips C are pre-formed into U shape and supplied to the head 103.

The closure clips C are formed from a pair of wire members B which are advanced into clip forming position on anvil assembly 101 (FIGURE 4) by the wire feed mechanism 100. The anvil assembly 101 and the wire feed mechanism 100 are both mounted on the bottom bars 53 and 54 of the frame 50. The anvil assembly 101 comprises a bracket forming member 181 (FIGURES 5, 14 and 15) which is clamped to the bottom bars 53 and 54 of the frame 50 and an anvil member 182 mounted on a vertically disposed portion 183 of the bracket. The anvil member is mounted in a slot 184 formed between opposed edges of wire guide members 185 and backing members 186. The anvil or closure clip preforming block 182 has a forwardly extending portion 187 shaped to permit the closure C to be formed into a U shape about the same when the forming punches 144 and 145 are forced by retraction of the carriage fork 150 and the head 103 in the direction of the anvil 182. The inner edges 190 of the wire guides 185 cooperates with the edges 191 of the punches 144 and 145 to cut off the length of wire required for the clips C, this length being determined by the spacing between the inner ends of the wire guides 185 and the back-up members 186, which are secured for lateral adjustment on the supporting bracket 181 by suitable clamp members. The clips C are retained in the slotted ends of the punches 144 and 145 when the carriage fork 150 is advanced and the head 103 moves forwardly away from the anvil assembly 101.

The wire feed device 100 (FIGURES 4, 17 and 18) is mounted on the lower rod 53 of the frame 50 by a suitable angle bracket 192 attached to the bracket member 181. It comprises a housing 193 in which two vertically disposed parallel shafts 194 and 195 are supported in spaced relation. The shaft 194 is in two sections which are journaled in upper and lower slide blocks 196 and 196' seated in slots 197 and 197' in the housing 193. The slides 196 and 196' have recessed 198, 198' for receiving compression springs 199, 199' seated on guide forming ends of adjusting bolts 200, 200' which are in threaded engagement in bores provided in bars 201, 201' closing the outer ends of the slots 197 and 197'. The two sections of the shaft 194 carry a pair of upper and lower wire feed rolls 202 and 203 each of which has integral therewith a gear 204 and 205. A cooperating wire feed roller 206 is mounted on the shaft 195 by means of a pair of overrunning clutches 207 of conventional construction and having integral gear sections 208 and 209 for driving the gears 204 and 205 on the feed rolls 202 and 203. The shaft 194 carries at its upper end a bell crank 210. One arm 211 of the bell crank 210 extends above the path of the fork 150 and is adapted to be engaged by cylindrical block 212 (FIGURES 6 and 7) which is eccentrically mounted on a pin 213 carried on the upper arm 153 of the fork 150 on the return stroke of the fork 150 to feed the wire W and also to be engaged by the upstanding pin 214 on the end of the fork 150 on the forward stroke. The other arm 215 of the operating crank has a slotted end at 216 which receives roller 217 on the end of the one arm 218 of the bell crank 219 which is mounted on the top of the drive shaft 195 so as to rotate the latter. The other arm 220 of the bell crank 219 extends radially of the drive shaft 195 and moves in a path between to stop members 221 and 222 which are in the form of upstanding posts eccentrically mounted on the top of the supporting frame 193 by clamp bolts 223 and 224 so as to adjust the stroke of the arm 220 for feeding different lengths of wire.

The cross frame support member 21 which carries the frame 50 and its associated mechanism is adjustably mounted on the posts 12 and 13 by means of integral end sleeve members 225 and 225' having spring pressed post engaging clamp devices 226, 226' in slots in the sleeve members. Anti-friction rollers 227, 227' are mounted in slots in the sleeve members for facilitating movement of the frame 21 on the posts 12 and 13 and stop collars 228, 228' (FIGURE 1) limit any upward movement when the mechanism is in operation.

The machine illustrated in the drawings with the frame forming posts 12 and 13 in vertical position. The entire upper frame assembly 11 may be pivoted about the trunnions 16 to bring the frame 11 and the mechanism carried thereby into a horizontal position extending forwardly of the lower supporting base 10. It is necessary, of

course, to re-position the abutment forming posts 82 and 82' and also the hydraulic cylinder 85 when the frame 11 is positioned horizontally. A suitable bracket (not shown) is provided for supporting these members when they are re-positioned for horizontal operation.

In operating the machine, the supply pipe 27 for the pump 23 is, of course, connected to a supply line for delivery of the product to be packaged thereto. The web W is threaded onto the mandrel 28 in position for operation of the sealing mechanism 22 which forms a longitudinal seam. A sufficient length of the tube T is extended below the mandrel 28 and threaded between the tube feeding roller members 41 and 41'. All of the operating motors and hydraulic cylinders are connected to a suitable fluid supply for operation. A supply of wire in the form of strands B is provided for the closure clip forming mechanism 100, 101 and threaded between the feed rolls 202, 203 and 206. The various mechanisms are timed and operated so that a product is fed into the tube T through the mandrel 28 and the filled tube is advanced by the feed rolls 41, 41' to the voiding and closing area where the pivoted brackets 61 and 61' are swung toward each other to bring the pairs of plates 63, 64 and 63', 64' into engagement on opposite sides of the filled tube. As the two pairs of plates engage the filled tube T the respective plates of the two pairs are separated so as to force the product away from the point of initial engagement in both directions axially of the tube thereby compacting the product in the leading portion of the tube and clearing an area between the plates for gathering of the tube and application of the closures C. The closure clips C are formed on the anvil 182 by the initial retractive movement of the clip forming and applying head 103. The wire strip or band material is fed by the mechanism 100 until the ends of the strips B engage the stop members 186. The end portions of the strips B are cut off by the clip forming members 144 and 145 in the head 103 and wrapped around the vertical face of the mandrel 182 to form the U-shaped closure members C. The carriage forming fork 150 then advances towards the front of the frame 50 and the head 103 is rotated through 180° by operation of the pinion 170 engaging with the rack 171. As the head 103 completes its turning movement and engages against the abutment forming face 180 on the front end of the slide 172, continued movement of the carriage 150 advances the head 103 into engagement with the flattened portion of the tube T. Simultaneous with the movement of the head 103 the head 102 is advanced into engagement with the flattened portion of the tube T and the plates in the two heads interleave to gather the flattened tube section into a tight tubular condition after which the clips C which have been moved into partially encompassing relation with the gathered section of the tube are clinched by continued movement of the head 102 and operation of the clinching members 116 and 117 in the latter. The knife 128 is advanced at the very end of the movement of the head 102 to sever the tube between the two closure clips C after the latter are clinched on the tube. The operations are intermittent and repetitious for forming successive packages.

While particular materials and specific details of constructions have been referred to in describing the illustrated form of the machine, it will be understood that other material and equivalent structural details may be resorted to within the spirit of the invention.

I claim:

1. In a machine for continuously forming a series of packages, in which a hollow mandrel is provided through which the material to be packaged is adapted to be moved, and in which mechanism is provided for applying a tube around said mandrel, and for advancing the tube along the mandrel to a position beyond the end of the same for receiving the material to be packaged; the provision of a frame extending across the path of axial movement of said tube, a pair of tube constricting and closure applying heads disposed in said frame for lateral reciprocating movement on opposite sides of the path of said tube, a pair of carriages reciprocably mounted on said frame, one of said tube constricting and closure applying heads being fixed on one of said carriages, the other of said tube constricting and closure applying heads being mounted for rotation on the other carriage about an axis parallel with the longitudinal axis of the tube, said tube constricting and closure applying heads having spaced plates with oppositively disposed V-shaped slots which plates are adapted to interleave and constrict the tube in the V-shaped slots therein when the heads are moved toward the tube, a closure forming anvil member mounted in spaced relation laterally of the path of said tube and in the path of the carriage on which the rotatable head is mounted, means for delivering strips of closure forming material to a position adjacent said anvil member, means on said rotatably mounted head for cooperation with said anvil member to form the strips of material into U-shaped closure elements and for thereafter positioning the closure elements thus formed around the constricted portion of the tube, means cooperating with said rotatably mounted head and its associated carriage for turning the rotatably mounted head through 180° while said rotatably mounted head is moved by its associated carriage from closure forming association with said anvil forming member to tube constricting position, and means on the tube constricting and closure applying head which is fixed on its supporting carriage for cooperation with said closure forming and applying means on said rotatably mounted head in clinching the closure elements on the constricted portion of the tube.

2. In a machine for continuously forming a series of packages, in which a hollow mandrel is provided through which the material to be packaged is fed and in which mechanism is provided for applying a tube around said mandrel, and for advancing the tube along the mandrel to a position beyond the end of the same for receiving the material to be packaged: the provision of a frame extending transversely of the path of axial movement of said tube, a pair of tube constricting and closure clip applying heads disposed in said frame for reciprocating movement on opposite sides of the axial path of said tube, a pair of carriages mounted on said frame for reciprocation toward and from the tube, one of said tube constricting and closure clip applying heads being fixed on one of said carriages, the other of said tube constricting and closure clip applying heads being rotatably mounted on the other carriage for swinging movement about an axis parallel with the axis of the tube, said tube constricting and closure applying heads having spaced plates with slots in their opposed edges opening in the direction of the tube which plates are adapted to interleave and constrict the tube in the slots therein when the heads are moved toward the tube, a closure forming anvil member mounted in spaced relation laterally of the path of said tube and opposite the carriage on which the rotatable head is mounted, means for delivering strips of closure forming material to a position in front of said anvil member, means on said rotatably mounted head for engaging said trips and forming the same into U-shaped closure clips about said anvil member and for thereafter positioning the closure clips thus formed around the constricted portion of the tube, a rack and pinion means for turning the rotatably mounted head through 180° when said rotatably mounted head is moved by its associated carriage from closure clip forming position adjacent said anvil forming member to tube constricting position, and said tube constricting and closure applying head which is fixed on its supporting carriage having means for cooperating with said closure clip forming and applying means on said rotatably mounted head in clinching the closure clips on the constricted portion of the tube.

3. In a machine for forming a series of tubular packages which machine is provided with a hollow mandrel,

mechanism for supplying a continuous tube of relatively thin pliable material around said mandrel, and mechanism for advancing said tube along said mandrel, mechanism for delivering material to be packaged through the mandrel and into the tube, a frame disposed in a plane extending transversely of the axial movement of the tube and across the path of the tube, said frame having tube constricting heads mounted thereon for movement toward and from the tube, one of said constricting heads being rotatable about an axis parallel with the axial path of the tube when moved relative to the tube, mechanism spaced at one side of the path of the tube for delivering successive pairs of generally U-shaped individual closure clips to said rotatably mounted tube constricting head, mechanism for rotating said one head in said transverse plane while the head moves between the clip delivering means and a predetermined position adjacent the tube and for thereafter moving said one head into engagement with the tube, mechanism for moving the other constricting head into engagement with the tube, said other constricting head having closure clip clincher members for cooperation with closure carrying members on the rotatable head whereby the tube is constricted between the heads and the closure clips are applied and clinched on the constricted portion of the tube.

4. In a machine for forming a series of tubular packages which machine is provided with a hollow mandrel, mechanism for supplying a continuous tube of relatively thin pliable material around said mandrel, and mechanism for advancing said tube, mechanism for delivering material to be packaged through the mandrel and into the tube, tube constricting heads mounted on opposite sides of the path of the tube for movement toward and from the tube, one of said constricting heads being mounted for rotation about an axis parallel with the path of the tube when moved relative to the tube, mechanism spaced at one side of the path of the tube for delivering successive pairs of generally U-shaped individual closure clips to said rotatably mounted tube constricting head, mechanism for rotating said one head while said head moves between the closure clip delivering means and a predetermined position spaced from the tube and for thereafter moving said one head into engagement with the tube, mechanism for moving the other tube constricting head into engagement with the tube, said other constricting head having closure clip clinching members for cooperation with closure receiving members on the rotatable head whereby the tube is constricted by the heads and the closure clip members are clinched on the constricted portion of the tube when the heads are moved toward the tube.

5. In a machine for forming a series of tubular packages which machine is provided with a hollow tubular mandrel, mechanism for supplying a continuous tube of relatively thin pliable material around said mandrel, and mechanism for advancing said tube beyond the end of said mandrel, mechanism for delivering the material to be packaged through the mandrel and into the tube, a frame extending in fixed position transversely of the path of movement of the tube and having tube constricting heads mounted thereon for movement toward and from the tube, one of said constricting heads being rotatable about an axis parallel with the path of movement of the tube, means spaced at one side of the path of the tube for cooperation with said rotatable constricting head in forming successive pairs of generally U-shaped individual closure elements and for delivering the same to said rotatable constricting head, mechanism for rotating said constricting head while it moves between the closure forming means and a position adjacent the tube and for thereafter moving the head into engagement with the tube, mechanism for moving the other constricting head into engagement with the tube, said other constricting head having closure clinching means for cooperation with the rotatable head whereby the heads constrict a portion of the tube and apply and clinch the closure members on the constricted portion thereof when moved into engagement with the tube.

6. In a machine for continuously forming a series of packages, a frame support, a hollow forming mandrel mounted on said frame support, mechanism for supplying a continuous tube of relatively thin pliable material around the mandrel and mechanism for advancing the tube over the mandrel, mechanism for feeding the product through the hollow mandrel and into the tube, a cross frame mounted in transversely extending relation relative to the axial path of the tube, a pair of oppositely disposed reciprocable heads in said cross frame, said heads being in a plane extending transversely of the axial path of the tube, each of said heads comprising a plurality of spaced plate members having V-shaped slots in the oppositely disposed free edges thereof, said plates moving into interleaved relation upon movement of said heads towards the tube for constricting the tube in said slots, mechanism for preforming a pair of generally U-shaped metal closure clips and for delivering said closure clips simultaneously to an open end of one of said heads, said one head being mounted for rotation in said transversely extending plane between a position where it receives the closure clips and another position adjacent the path of the tube and into transverse alignment with the opposite head so as to bring the plates thereon into interleaved relation with the plates on the opposite head when the heads are moved into engagement with the tube and mechanism mounted between the plates on said heads for clinching said closures around the constricted area of the tube to close the top of one package and the bottom of the next succeeding package.

7. In a machine for forming a series of tubular packages, a frame support, a hollow forming mandrel fixed on said frame support, mechanism for supplying a continuous tube of reltively thin pliable material around the mandrel and mechanism for advancing the tube over the mandrel, mechanism for feeding the product to the hollow mandrel and into the tube, a cross frame mounted in transversely extending relation relative to the path of the tube, a pair of oppositely disposed tube constricting heads movably mounted on said cross frame, said heads moving in a common plane, each of said heads comprising a plurality of spaced plate members having V-shaped slots in oppositely disposed confronting edges thereof, said plates moving into interleaved relation upon movement of said heads towards the tube for constricting the tube at successive predetermined areas spaced longitudinally of said tube, mechanism for preforming a pair of generally U-shaped closure clips including an anvil and cooperating forming members in one of said heads, said one head being mounted for linear and rotative movement between a position where the closure clips are formed and another position adjacent the path of the tube, whereby to bring the plates on said heads into interleaved relation, and mechanism between the plates of the other one of said heads cooperating with said clip forming members for linching said closure clips around the constricted area of the tube to close the top of one package and the bottom of the next succeeding package.

8. In a machine as recited in claim 7, and means to feed clip forming material into position in front of said anvil where it is picked up by the forming members in the head having linear and rotative movement.

9. In a machine for forming a series of tubular packages, a main frame support having a pivotally mounted top section, a hollow forming mandrel fixed on said top frame section, mechanism for supplying a continuous tube of relatively thin pliable material around the mandrel and mechanism for advancing the tube along the mandrel, mechanism for feeding the product through the hollow mandrel and into the tube, a cross frame mounted so as to extend across the axial path of the tube, a pair of tube constricting heads slidably mounted on said cross frame,

said heads being movable in the same plane and disposed on opposite sides of said tube, each of said heads comprising a plurality of spaced plate members having V-shaped slots in the free edges thereof, said plates moving into interleaved relation upon engagement of said heads with the tube for constricting the tube in said slots, mechanism for preforming a pair of generally U-shaped metal closure clips including an anvil member and clip forming members in one of said heads, said one head being mounted for rotation about an axis parallel with the axis of the tube while it is moved toward and from the tube and means for rotating said one head to align it with the other head and bring the plates thereon into interleaved relation with the plates on the other head and means between the plates of the other head for cooperation with said clip forming members in clinching said closure clip around the constricted area of the tube when the heads engage the tube thereby to close the top of one package and the bottom of the next succeeding package.

10. In a machine for forming a series of tubular packages, a hollow mandrel, mechanism for forming web material into a tube around said mandrel and sealing the contiguous longitudinal edges, mechanism for advancing said formed tube beyond the end of the mandrel, mechanism for delivering a product to be packaged through the mandrel and into the tube, and mechanism operable intermittently on opposite sides of said tube for engaging the filled tube and constricting the same at predetermined, longitudinally spaced areas, said tube constricting mechanism comprising a pair of bracket members pivotally mounted on opposite sides of the path of movement of the tube, a pair of tube engaging plates mounted in face-to-face relation on each of said brackets and spaced from the pivotal mounting of the bracket, each pair of said plates being disposed on its bracket so that when the brackets are swung about their pivotal mountings corresponding edges of the plates are brought into engagement with opposite sides of the filled tube and one of the plates of each pair thereof being mounted on a slidable support on the associated bracket so that it is adapted to move away from the other plate as the bracket is swung to engage the edges of the plates with the tube, an abutment member in the path of said slidable support which is engaged by said slidable support near the end of the swinging movement of the bracket whereby the pairs of plates are engaged with the tube and the plates of each pair are moved apart to force the material in the tube toward the leading and trailing portions of the tube to clear the product from a predetermined area of the tube.

11. In a tube forming and filling machine in which successive tube sections are closed off at the ends thereof by wire clips, means for producing the clips from continuous lengths of wire, means spaced from the clip producing means for clinching the clips on the tube sections, said clip producing means including an anvil member and cooperating forming members mounted for reciprocating movement between said anvil and said clip clinching means, means cooperating with said forming members for severing the wire to separate therefrom the successive clip forming sections which are bent into U-shape between said anvil member and said forming members at one end of the path of movement of said forming members and retained on said forming members for application to the tube sections at the other end of the path of movement of said forming members.

12. In a tube forming, filling and closing machine wherein a hollow mandrel is supported on a frame and means is provided for forming a tube of relatively thin pliable film material around the mandrel, for advancing the tube along the mandrel, and for feeding the product to be packaged through the mandrel into the tube to substantially fill the same while it is advancing: the provision of a tube flattening mechanism which comprises supporting bracket members pivoted on parallel spaced axes extending transversely of the path of advancing movement of the tube and on opposite sides thereof, pairs of plate members mounted in face-to-face relation on the free ends of said bracket members, one of said plate members of each pair thereof being mounted on a slidable support member so as to be movable away from the other plate member, spring means normally holding the plate members in juxtaposed relation, means for intermittently swinging said bracket members to bring the free edges of the plate members into engagement with opposite sides of the filled tube and an abutment member in the path of each slidable support member which is engaged by the slidable support member to separate the plate members of each pair thereof as the bracket members approach the end of their swinging movement toward the tube whereby to force the product in the tube in opposite directions and provide a flattened tube area of predetermined size.

13. A tube forming and filling machine comprising a base of generally rectangular box-like form, an elongate frame constituting a superstructure, which superstructure is located forwardly of the rear portion of the base and which is hinged at its lowermost end to the top of the base so that it is adapted to be positioned either vertically or horizontally, a hollow mandrel mounted on the superstructure and extending in the direction of the base, means for forming a tube from a web of thin pliant material about said mandrel and means for delivering a product to be packaged through the mandrel and into the tube, a tube constricting, sealing and cutting mechanism mounted on the superstructure beyond the end of the mandrel and extending transversely of the superstructure, and means for locking the superstructure in either horizontal or vertical position.

14. A tube forming and filling machine having a base of generally rectangular box-like form, an elongate frame constituting a superstructure, which superstructure comprises laterally spaced post members and connecting cross members and which is located forwardly of the rear portion of the base, said post members being hingedly connected at the lowermost ends to the top of the base so that the superstructure is adapted to be swung between vertical or horizontal position above the base, a hollow mandrel mounted on the superstructure and extending generally parallel with said post members, means mounted on the superstructure for forming a tube from a web of thin pliant material about said mandrel and means for delivering a product to be packaged through the mandrel and into the tube, a tube constricting, sealing and cutting mechanism adjustably mounted on the superstructure beyond the end of the mandrel and extending transversely of the superstructure, and means for locking the hinge connections between the post members and the base with the superstructure in either horizontal or vertical position.

15. In a machine for forming a series of tubular packages which machine is provided with a hollow mandrel, mechanism for supplying a continuous tube of relatively thin pliable material around said mandrel, mechanism for continuously advancing said tube, mechanism for delivering the product to be packaged through the mandrel and into the tube, a cross frame disposed transversely of the axial movement of the tube and in the path of the tube, carriage forming members slidably mounted on said cross frame, tube constricting and closure applying heads mounted on said carriages, means for reciprocating the carriages in a path toward and from the tube for constricting the tube between the heads at predetermined, longitudinally spaced areas and for applying closures thereto, one of said tube constricting and closure applying heads being mounted on its carriage at its one end for rotation about an axis parallel with the axial path of the tube and normal to the path of its carriage, anvil mechanism spaced at one side of the path of the tube for cooperation with said rotatably mounted head in forming successive pairs of generally U-shaped individual clo-

sures in the open end of said rotatably mounted head, mechanism for rotating said rotatable head in a transverse plane as it is moved with its carriage between the anvil mechanism and a position adjacent the tube thereby to position the free end of said rotatably mounted head for cooperation with said anvil mechanism at one end of the movement of its carriage and for cooperation with the other tube constricting and closure applying head at the opposite end of the movement of its carriage.

16. In a machine as recited in claim **15**, and said mechanism for rotating said rotatable head comprising a rack mounted alongside the path of the carriage on which the rotatable head is mounted and a pinion on said head engageable with said rack.

17. In a machine as recited in claim **16**, and said rack being slidably mounted in a guideway and having friction means for restraining the rack against movement in the guideway.

18. In a machine as recited in claim **15**, and means for intermittently feeding closure forming strips between the anvil mechanism and the rotatably mounted head.

19. In a machine as recited in claim **18**, and said strip feeding means having an operating arm and means on the carriage for the rotatably mounted head engaging said operaitng arm upon predetermined movement of the carriage whereby the closure forming strips are fed in response to movement of said carriage.

20. In a machine for forming a series of tube-like packages, a hollow tube forming and product filling mandrel, mechanism for forming a web of wrapping material into a tube around said mandrel, mechanism for advancing said formed tube, mechanism for delivering the product to be packaged through the mandrel and into the tube as it leaves the mandrel, mechanism including reciprocably mounted plate members for flattening the filled tube at longitudinally spaced areas by engaging oppositely disposed edges of said plate members with the tube from opposite sides thereof along a transverse line and moving the plate members to force the material in both directions along the axis of the tube away from said line, reciprocating mechanism for engaging the tube along the side edges of the flattened section of the tube and for gathering the flattened section of the tube to constrict the same, mechanism for forming successive pairs of generally U-shaped metal closures and for delivering said formed closures to said tube constricting mechanism, and mechanism including closure applying and clinching members incorporated in said tube constricting mechanism and operable therewith for clinching successive pairs of closures around the constricted areas to close the top and bottom of succeeding packages, said mechanism for forming said pairs of closures comprising means for feeding closure forming strip material into the path of said constricting mechanism for engagement by said constricting mechanism when said constricting mechanism is moved away from the tube, and means co-operating with said constricting mechanism for cutting closure forming sections from said strip material and for preliminarily forming the same into U-shape.

21. In a machine for forming a series of packages, a hollow mandrel, mechanism for forming web material into a tube around said mandrel and sealing the contiguous longitudinal edges, mechanism for advancing said formed tube along the mandrel, mechanism for delivering material to be packaged to the tube through the mandrel, and mechanism operable intermittently on opposite sides of said tube and beyond the end of the mandrel for engaging said tube at predetermined, longitudinally spaced areas so as to flatten a section thereof, said tube flattening mechanism comprising a pair of bracket forming members pivotally mounted on parallel axes extending transversely and on opposite sides of the path of advancing movement of the tube, said bracket members each having a pair of tube engaging plates mounted in face-to-face juxtaposed relation, each pair of said plates being disposed on its bracket member so that when the bracket members are swung about their axes corresponding edges of the plates are brought into generally parallel relation and into engagement with the tube on opposite sides thereof, said bracket members having separable portions and resilient means mounting the plates of each pair thereof on said separable bracket portions, and means for moving said separable plate carrying bracket portions away from each other so as to separate the plates which means is operative near the end of the swinging movement of the bracket members in the direction of the tube whereby the tube is engaged between the edges of the pairs of plates and the plates of each pair are moved apart to force the material in the tube in opposite directions along the axis of the tube thereby to flatten a section of the tube and clear the material in the tube from the flattened section.

22. In a tube forming, filling and closing machine having a hollow mandrel supported on a frame, means for forming a tube of relatively thin pliable film around the mandrel, means for advancing the tube beyond the mandrel, and means for feeding a product to be packaged through the mandrel and into the tube to substantially fill the same: a mechanism for flattening a section of the tube which comprises a pair of arms swingably mounted at the end of the mandrel in oppositely disposed relation on opposite sides of the path of advance of the tube, spring pressed bars mounted on the free ends of said arms, pairs of plates mounted on said bars, the plates of each pair thereof being mounted in side-by-side juxtaposed relation and the spring pressed bars being movable in a direction to separate the plates of each pair thereof, means for intermittently swinging said arms to move the free ends thereof toward each other and to bring the edge portions of the plates into generally parallel relation and aligned resilient engagement with opposite sides of the filled tube at a point adajcent the end of the mandrel and means to move the plates of each pair thereof and the bars on which the plates are mounted in a direction along the path of the filled tube as the free ends of the arms are moved toward each other so as to separate the edge portions of the plates of each pair thereof and thereby force the product in the tube in opposite directions along the axis of the tube and clear the product from a predetermined section of the tube while flattening said tube section.

23. In a machine for forming a series of tube-like packages, a hollow tube forming and product filling mandrel, mechanism for forming a web of wrapping material into a tube around said mandrel, mechanism for advancing said formed tube, mechanism for delivering the product to be packaged through the mandrel and into the tube as it leaves the mandrel, mechanism including reciprocably mounted plate members for flattening the filled tube at longitudinally spaced areas by engaging oppositely disposed edges of said plate members with the tube from opposite sides thereof along a transverse line and moving the plate members to force the material in both directions along the axis of the tube away from said line, reciprocating mechanism for engaging the tube along the side edges of the flattened section of the tube and for gathering the flattened section of the tube to constrict the same, mechanism for forming successive pairs of generally U-shaped metal closures and for delivering said formed closures to said tube constricting mechanism, mechanism incorporated in said tube constricting mechanism and operable therewith for clinching successive pairs of closures around the constricted areas to close the top and bottom of succeeding packages, said mechanism for forming said pairs of closure members comprising an anvil member, mechanism for feeding strip material between the anvil and said constricting mechanism, mechanism co-operating with said constricting mechanism to cut closure forming sections from said strip material, and closure applying and clinching means in said constricting

mechanism which is operative upon predetermined movement of said constricting mechanism toward said anvil for preliminarily forming the sections of strip material into U-shape about the anvil member.

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