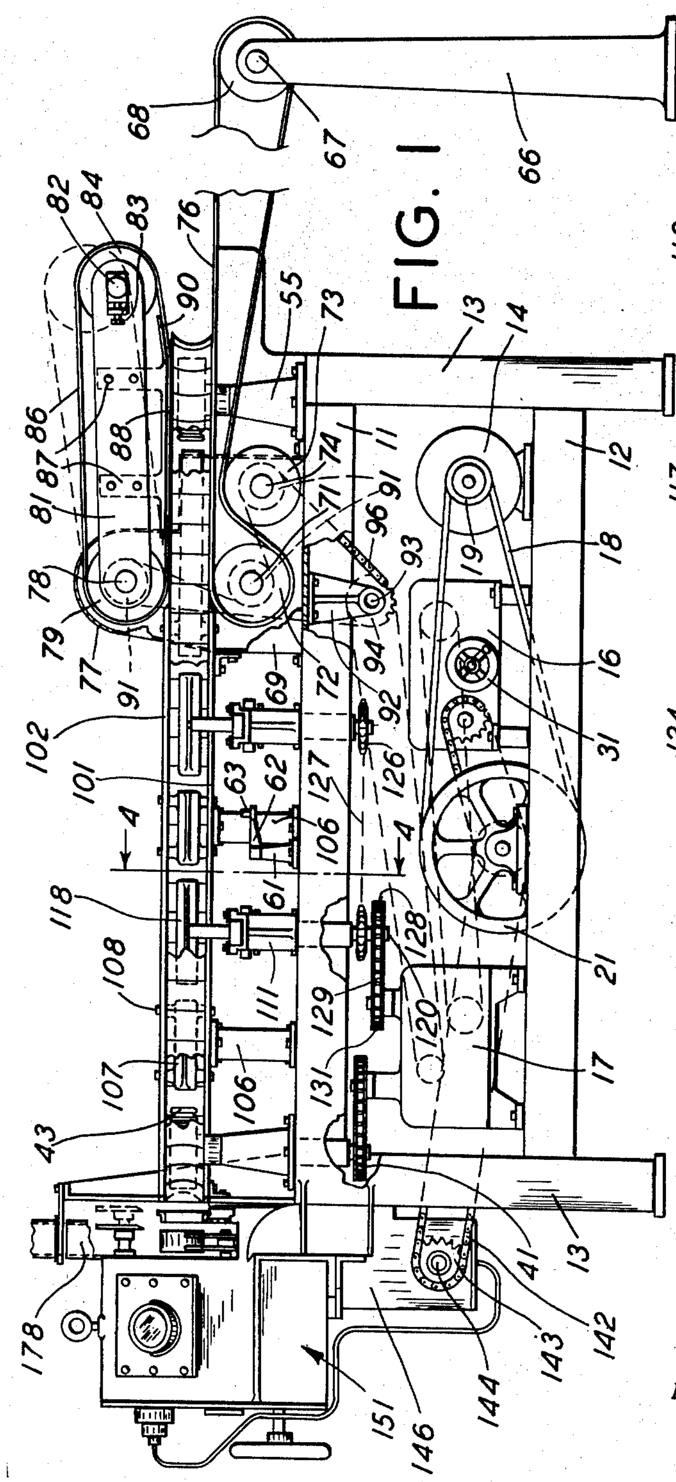
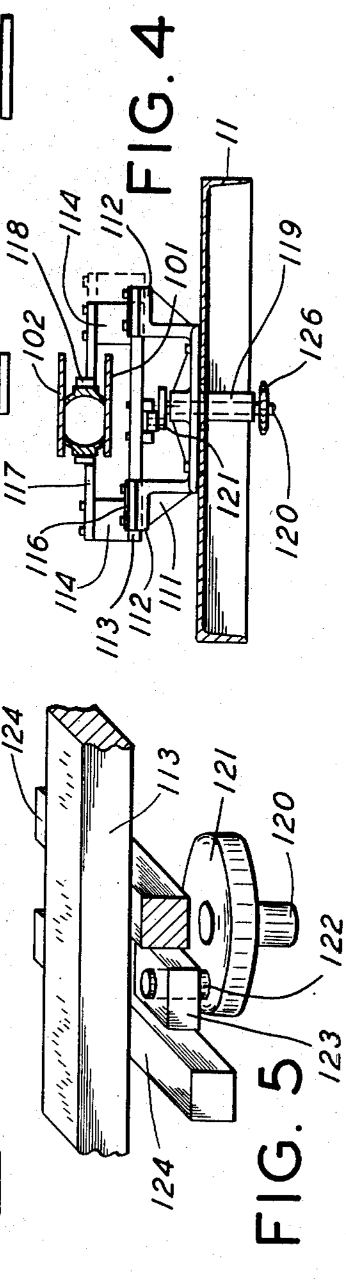
Feb. 16, 1954 E. H. CARRUTHERS 2,669,378

MACHINE FOR PACKING A PREDETERMINED WEIGHT OF BULK PRODUCT

Filed Oct. 13, 1949 6 Sheets-Sheet 1





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MACHINE FOR PACKING A PREDETERMINED WEIGHT OF BULK PRODUCT

Filed Oct. 13, 1949 6 Sheets-Sheet 2

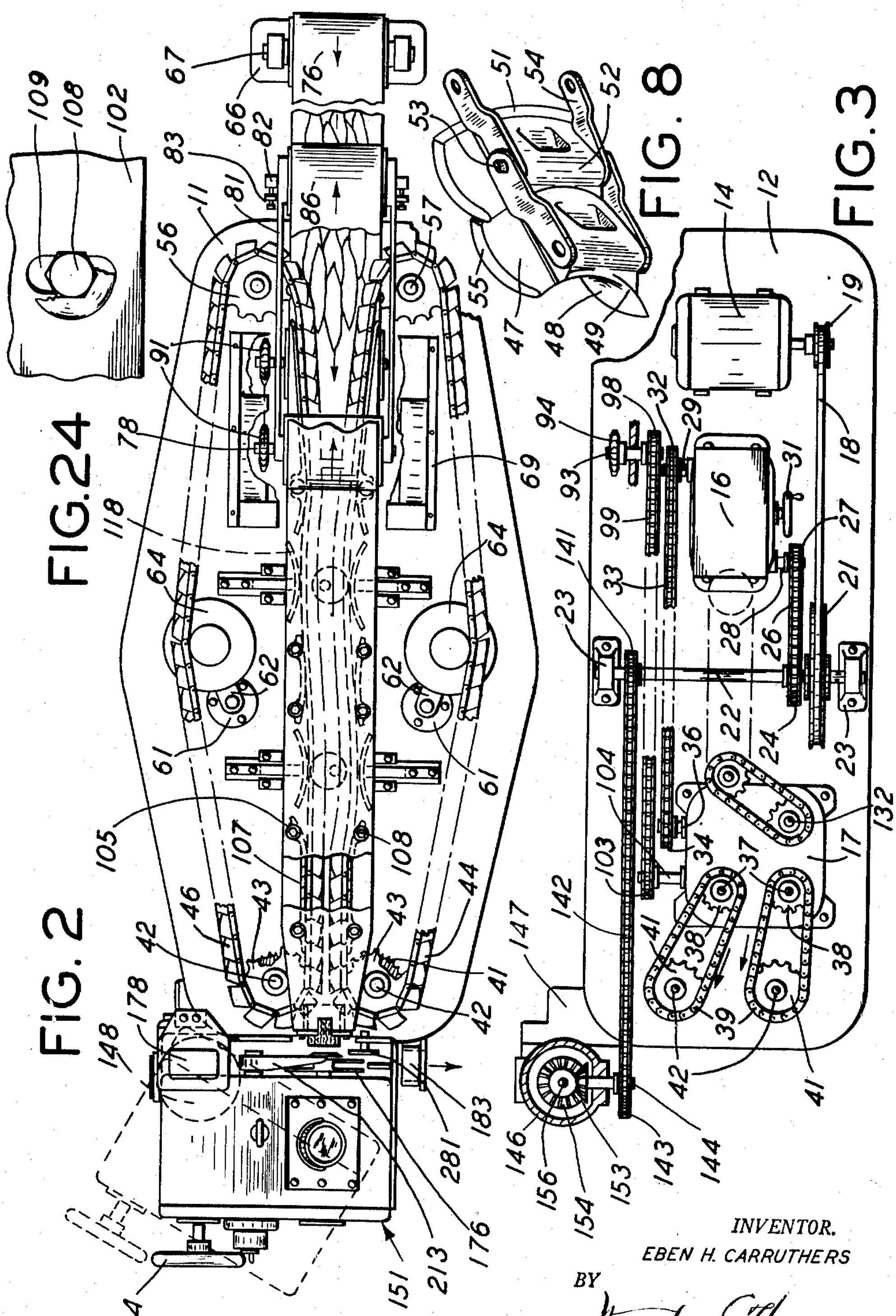

FIG. 24 FIG. 2 FIG. 8 FIG. 3

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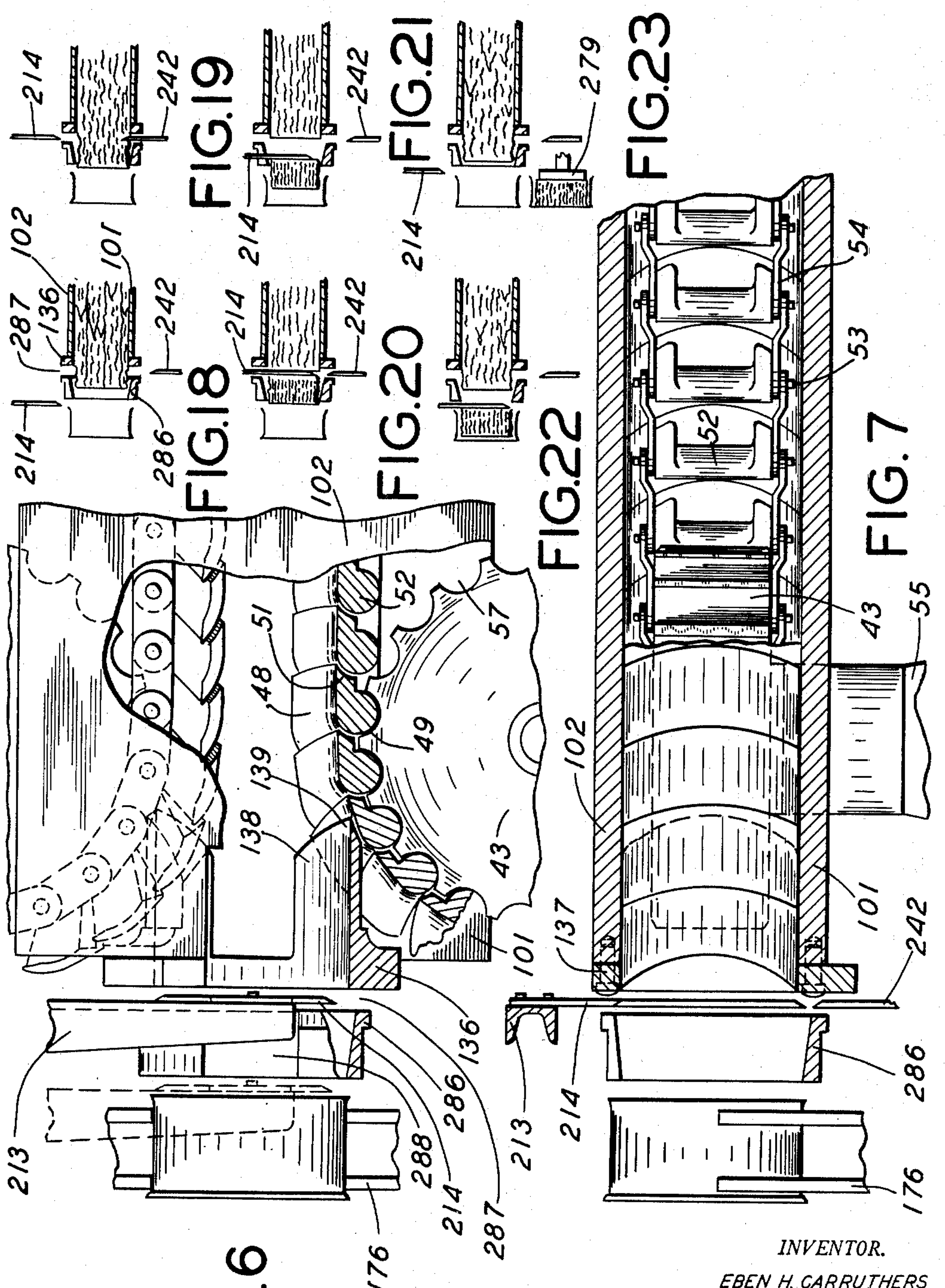
MACHINE FOR PACKING A PREDETERMINED WEIGHT OF BULK PRODUCT

Filed Oct. 13, 1949 6 Sheets-Sheet 3



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MACHINE FOR PACKING A PREDETERMINED WEIGHT OF BULK PRODUCT

Filed Oct. 13, 1949

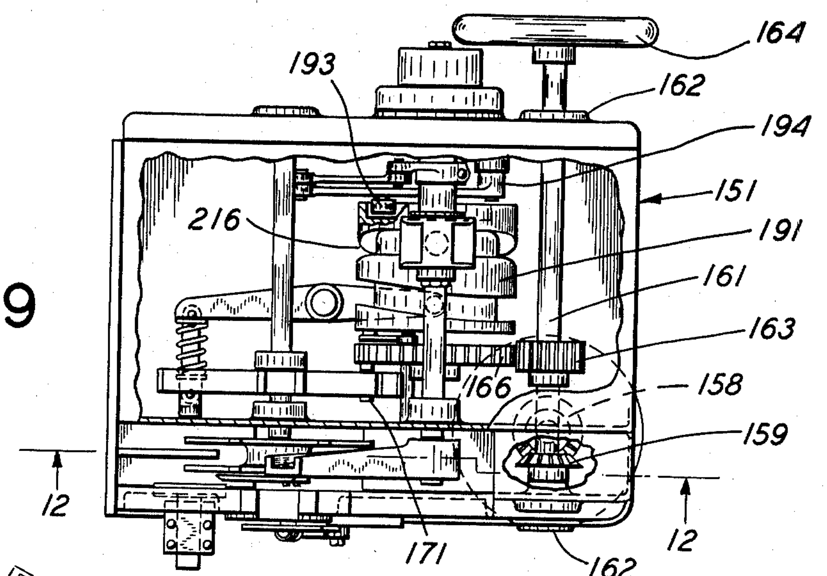

FIG.9

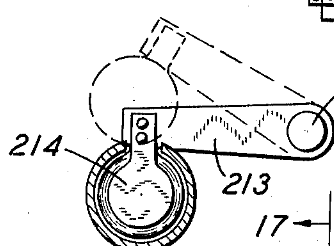

FIG.11

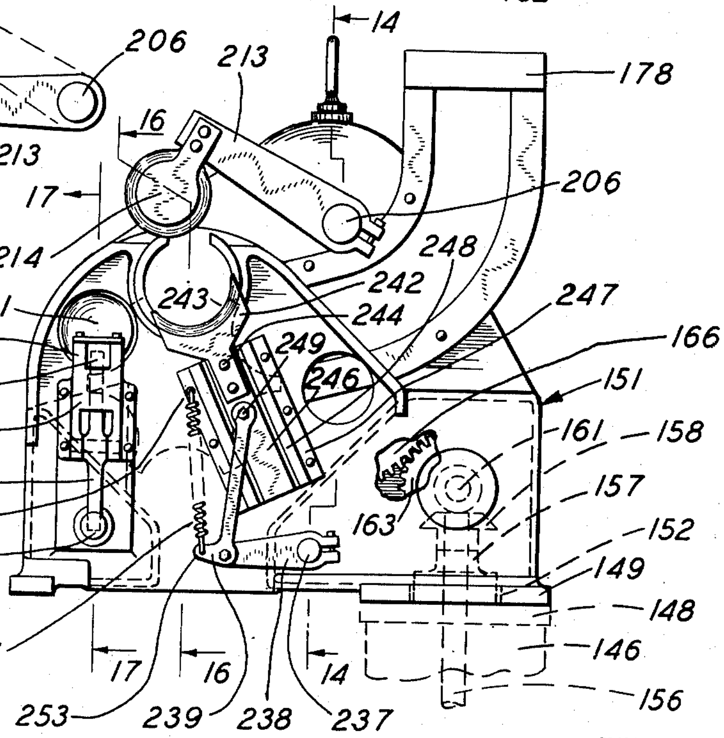

FIG.10

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MACHINE FOR PACKING A PREDETERMINED WEIGHT OF BULK PRODUCT

Filed Oct. 13, 1949

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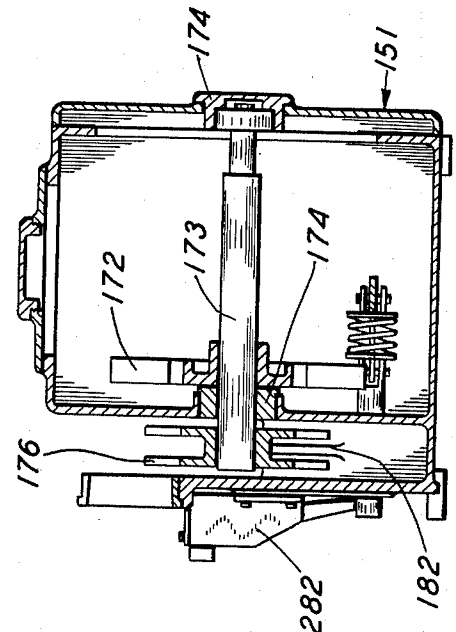

FIG.16

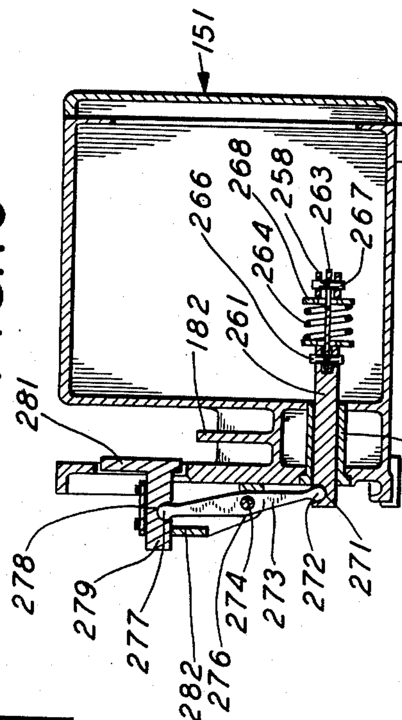

FIG.17

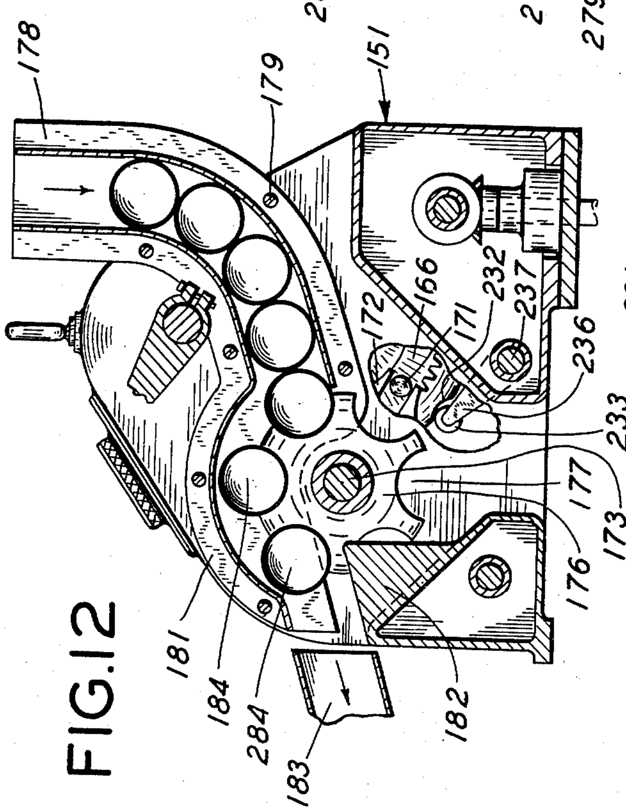

FIG.12

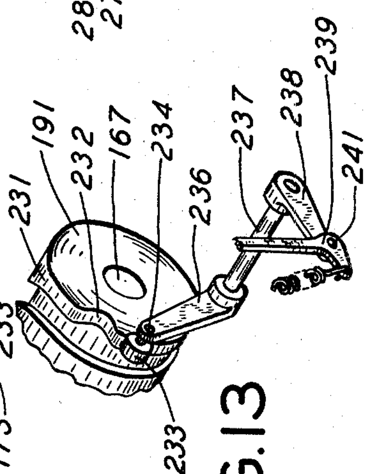

FIG.13

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MACHINE FOR PACKING A PREDETERMINED WEIGHT OF BULK PRODUCT

Filed Oct. 13, 1949 6 Sheets-Sheet 6

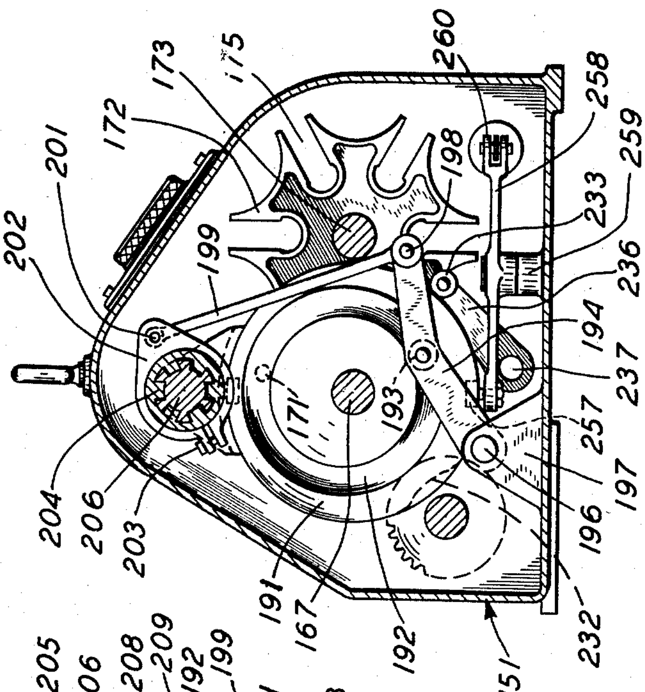

FIG.15

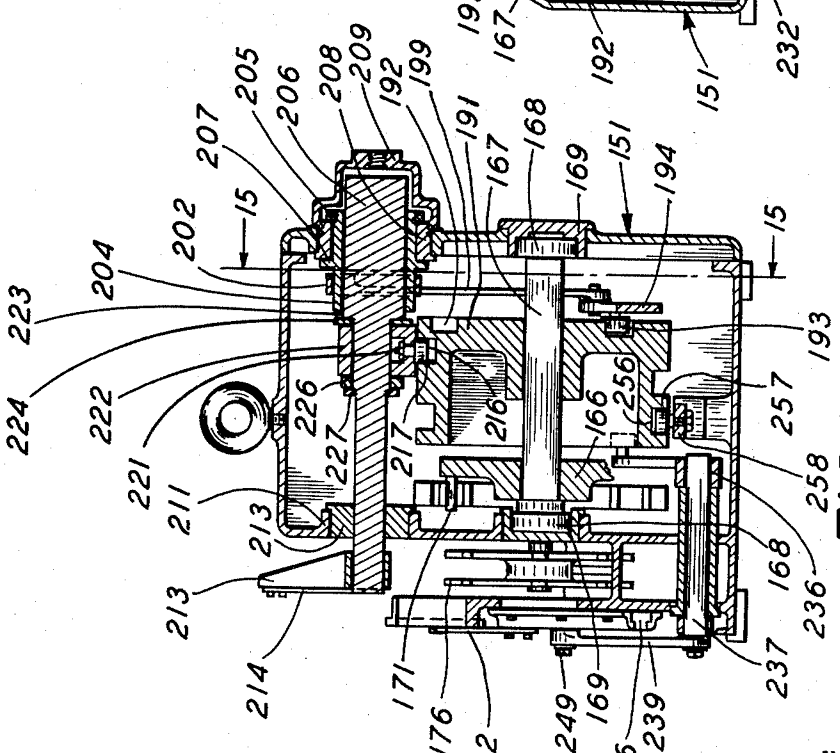

FIG.14

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Patented Feb. 16, 1954

2,669,378

UNITED STATES PATENT OFFICE

2,669,378

MACHINE FOR PACKING A PREDETERMINED WEIGHT OF BULK PRODUCT

Eben H. Carruthers, Warrenton, Oreg.

Application October 13, 1949, Serial No. 121,172

34 Claims. (Cl. 226—97)

1

My invention relates to a machine for packing a predetermined weight of bulk products and is a continuation in part of my co-pending application Serial No. 20,894, filed April 14, 1948, now Patent No. 2,601,093, entitled "Method and Machine for Packing a Predetermined Weight of Bulk Products."

While the machine of my invention has been particularly designed for the packing of tuna, it has other uses. It may be employed in the packing of other species of fish and it may be adaptable to the packing of other bulk food products, for example, sauerkraut or spinach. It further may be adapted to the packing of meat products which are packed in bulk and may have uses in connection with the packing of non-food products which are of a pliable or deformable character.

The invention of the present application discloses improvements on the machine shown in the above mentioned application. Reference is also made to my co-pending application Serial No. 689,146, filed August 8, 1946, now Patent No. 2,575,703, and entitled "Method and Apparatus for Packing Products."

An object of my invention is to provide an improved machine for packing a predetermined weight of tuna or other bulk product in a container to the end of accomplishing increased production and a saving in labor costs.

Another object of my invention is to provide an improved cut-off mechanism for the tuna or other bulk product to secure a cleaner cut of the tuna and a cut which is more attractive when the can of tuna is opened.

Another object of my invention is to provide a machine wherein after the chunk or section of tuna has been cut from the formed cylinder of tuna and placed in the can, a tamper is provided to insure that the cut section of tuna is at the bottom of the can.

My invention further contemplates improvements in the mechanism of my above mentioned copending application whereby a better product is obtained; more accurate control of weight is secured; the parts are rendered more accessible for adjustment or repair; and the cost of production of the machine is reduced.

Other objects and advantages of the machine of my invention will be set forth in the claims and will be apparent from the following description, when taken in connection with the accompanying drawings, in which:

Fig. 1 is a side elevation of the machine of my invention with parts being shown in dotted lines better to illustrate the invention;

Fig. 2 is a top plan view thereof with parts being shown in dotted lines;

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Fig. 3 is a top plan view of the driving mechanism showing the variable speed and power transmission housings;

Fig. 4 is a view partially in section taken substantially on the line 4—4 of Fig. 1 and showing the flexing mechanism for the forming chains;

Fig. 5 is a perspective view showing the mechanism for flexing the forming chains;

Fig. 6 is an enlarged view of a portion of Fig. 2 showing the discharge end of the forming chains and partly illustrating the manner in which the tuna is cut off and transferred from the forming chains to the cans;

Fig. 7 is a vertical sectional view of the discharge end of the forming and molding section of the machine illustrating the forming chains or links and showing how the tuna is cut off after being formed and molded;

Fig. 8 is a perspective view showing two of the molding and forming links of the molding and forming chain;

Fig. 9 is a top plan view of the housing which encloses the operating mechanism for the can turret, the cut-off knives and tamper with the top wall of the housing partly removed to show the interior thereof;

Fig. 10 is a front elevation of the housing of Fig. 9 showing the cut-off knives and tamper and illustrating the accessibility of the parts for adjustment and repair when the housing is shifted to the dotted line position shown in Fig. 2;

Fig. 11 is a view partly in section showing the cut-off knife in solid lines in cut-off position and in dotted lines its position when partly retracted;

Fig. 12 is a sectional view taken substantially on the line 12—12 of Fig. 9 in the direction indicated by the arrows showing in particular the can chute, can turret and with parts broken away better to illustrate the invention;

Fig. 13 is a perspective view showing a part of the mechanism for operating the lower knife;

Fig. 14 is a sectional view taken substantially on the line 14—14 of Fig. 10 in the direction indicated by the arrows;

Fig. 15 is a sectional view taken substantially on the line 15—15 of Fig. 14 in the direction indicated by the arrows;

Fig. 16 is a view taken substantially on the line 16—16 of Fig. 10 in the direction indicated by the arrows;

Fig. 17 is a sectional view taken substantially on the line 17—17 of Fig. 10 in the direction indicated by the arrows;

Figs. 18 to 23 inclusive are a series of successive views illustrating how a slice or section of tuna is cut off, transferred to the can, and then tamped in position; and

Fig. 24 is an enlarged view of a portion of Fig. 2 showing the adjustment slots for the fixed shoes.

As previously mentioned, the machine of my invention has been particularly designed for the packing of a predetermined weight of tuna in each of successive cans or other containers. However, the machine of my invention may be adapted to the packing of other materials in bulk such as various kinds of fish, meat and certain types of vegetables, for example, sauerkraut and spinach. Moreover, the machine of my invention may be adapted to the packing of non-food products particularly those which are of a bulky, pliable character.

As shown most clearly in Figs. 1, 2 and 3, the machine of my invention comprises an upper bed **11** and a lower bed **12** which are supported in spaced relation by legs **13**. The lower bed **12** (Fig. 3) supports a motor **14**, a variable speed drive **16** and a power transmission case **17**. The motor **14** through a belt **18** and pulley **19** drives a pulley **21**. The pulley **21** is mounted on a shaft **22** (Fig. 3) which is suitably journaled in bearings **23** mounted on the lower bed **12**. Rigidly secured to the shaft **22** is a sprocket **24** which drives a chain **26** which passes over a sprocket **27** mounted on a shaft **28**.

The shaft **28** enters the variable speed drive housing **16**. Since variable speed drives are well known in the power transmission art, it is believed unnecessary to describe such mechanism. Through the variable speed drive **16**, a shaft **29** is driven at a variable speed which may be adjusted by means of the hand wheel **31**. Thus all the mechanism driven from the shaft **29** may be varied in speed simultaneously by adjusting the hand wheel **31**.

On the extended end of the shaft **29** a sprocket **32** is mounted which drives a chain **33** which in turn drives a sprocket **34** mounted on the extended end of a shaft **36**. The shaft **36** extends into the power transmission housing **17** wherein there is located suitable gearing, not necessary to be shown and described, for securing the desired speeds for various operating elements of the machine as will presently appear.

A pair of shafts **37** extend upwardly from the power transmission housing **17** and have sprockets **38** rigidly mounted on the upper extended ends thereof. The sprockets **38** drive chains **39** which in turn drive sprockets **41**. The sprockets **41** are rigid with shafts **42** which have sprockets **43** (Fig. 2) mounted on the upper ends thereof. The sprockets **43** are the driving elements for a pair of feeding and forming chains **44** and **46** which feed, form and mold the material to be packed as presently described. The sprockets **38** and **41** driven from the power transmission case for driving the chain drive sprockets **43** are the same in size and number of teeth for each sprocket **43**. Hence the lineal speed of the forming and feeding chains is the same.

As shown most clearly in Figs. 6, 7 and 8, the forming or molding chains **44** and **46** are made up of a series of molding elements or links **47**, each of which has a concave molding face preferably formed substantially on the arc of a circle, as shown at **48**. As shown most clearly in Figs. 6 and 8, each molding element has a convexly curved forward edge as indicated at **49**, and a concavely curved rearward edge as indicated at

51. This arrangement enables the molding chains to be flexed in a direction transverse to their direction of movement with adjacent molding elements shifting angularly with respect to each other while still maintaining a substantially closed space between adjacent molding elements or links. Thus, when the chains are flexed as will be presently described and one molding link rotates angularly with respect to its adjacent link, the curvature of the following edge of one link may rotate with respect to the leading edge of the adjacent link without interference between the two links while still maintaining a relatively close fitting joint between the adjacent links. Moreover, the arrangement permits the molding chains to pass smoothly around the sprockets without excessive intervening spaces.

As shown most clearly in Figs. 7 and 8, the rearward face of each of the molding elements or links **47** has a boss **52** on its rearward side through which a pivot pin or pintle **53** extends. Links **54** connect the pivot pins of adjacent molding elements **47**, the links **54** being freely rotatable with respect to the pivot pins **53** to allow the above described angular movement of adjacent molding elements with respect of each other as they pass around the sprockets and the flexing of the chains as a whole in the manner presently to be described. The edges **55** of the molding links are machined smooth so that they may slide with respect to associated parts as presently described.

The forming or molding chains **44** and **46** pass over idler sprockets **56** which freely rotate on shafts **57** supported by pedestals **55** (Fig. 1) extending from the upper bed **11** of the machine. As shown most clearly in Fig. 6, the sprockets **43** and **56** have special semi-circularly shaped driving teeth **57** which are adapted to receive the semi-cylindrically shaped bosses **52** on the rear faces of the molding elements or links **47**.

Mounted on the upper bed of the machine is a pair of pedestals **61** (Figs. 1 and 2) which carry arms upon which a shaft **63** is mounted. The shafts **63** have freely mounted thereon flanged rollers **64** upon which the chains ride. Suitable means are provided for adjusting the position of the rollers so as to maintain the forming and molding chains **44** and **46** taut. On a pedestal **66** is a shaft **67** upon which an idler pulley **68** is freely rotatable. Carried by side plates **69** supported from the upper bed **11** is a shaft **71** which has a pulley **72** rigidly secured thereto. A second pulley **73** is rigidly mounted on a shaft **74** also carried by the side plates **69**. A feed belt **76** extends over the three pulleys **68**, **72** and **73** as indicated in the drawings.

In the machine of the above mentioned copending application, I have described the feed belt as being marked with equally spaced markings as a guide to enable the operator to place the whole loins of fish on the belt in an approximation of uniform weight per unit of belt length. However, I have found this is unnecessary and that an operator soon becomes sufficiently proficient and experienced as to enable her to place the loins in overlapping relation on the belt in an approximation of uniform weight per unit of length of the belt. In Fig. 2 I have indicated roughly the manner in which the loins are placed on the belt in overlapping relation with the long axis of the fish extending lengthwise of the belt. The fish indicated are a relatively small variety of tuna but the same principle applies with larger fish. The fish thus form a continuous unbroken line of loins with the loins being as evenly distributed along the belt as it is possible to do by eye. Although the loins are spread along the feed belt as evenly as possible, considering small increments of the length of the belt, a difference between the weight of loins on one small section of the belt from that on an adjacent similar small section of the belt exists. The machine, particularly the action of the forming and molding chains as will be presently described, smooths out these differences in weight load so as to gradually form the fish into a cylinder of tuna which is of substantially constant weight per unit of length. In Fig. 2 I have illustrated approximately how the loins appear when placed on the belt by the operator who feeds the machine.

A pair of side stands 77 extend upward from side plates 69 and have journaled therein a shaft 78 which carries a pulley 79. Extending forward from the shaft 78 is a pair of side rails 81 which carry a shaft 82 adjustably supported therein as indicated at 83. An idler pulley 84 is loosely mounted on the shaft 82 over which passes a belt 86 which also passes over the pulley 79. Secured to the side rails 81, as indicated at 87, is a pair of brackets which depend therefrom and support a shoe 88 upon which the belt rides. The shoe has an upturned forward end 90 so that in cooperation with the arrangement of the chains (Fig. 2) presents a relatively wide open mouth at the entrance end of what may be termed a forming tunnel, for the reception of the loins of tuna.

As indicated in the drawings, the forward end of the belt assembly above described is supported by the side rails and may be pivoted around the axis of the shaft 78 so as to swing upward, as indicated in dotted lines. This arrangement enables convenient access to the forward end of the forming and molding chains or entrance end of the tunnel so that in case there is a jamming of fish at the entrance end of the moving tunnel, access to the forming and molding chains may be had for the purpose of removing or rearranging the fish which may be jammed.

Mounted rigidly on each of the shafts 71, 74 and 78 is a sprocket 91. Depending from the upper bed of the machine is a support bracket 92 which has suitably journaled therein a shaft 93 which carries a sprocket 94. As shown in the drawings, a chain 96 passes over the three sprockets 91 and the sprocket 94 so as to drive the belts 76 and 86. Since the sprockets 91 are all of the same diameter and number of teeth and the belt rollers are all of the same diameter and driven from a common sprocket 94, the lineal speed of the belts 76 and 86 is the same.

A second sprocket 98 is mounted on the shaft 93 (Fig. 3) which is driven by a chain 99. The other end of the chain passes over a sprocket 103 mounted on a drive shaft 104 extending sidewardly outward from the transmission case 17.

The sizes of the sprockets 38 and 41 are chosen so that the forming and molding chains move at the same lineal speed as the feed belt 76 and the belt 86. At the terminus of the belts 76 and 86, at the left as viewed in Fig. 1, a pair of plates 101 and 102 form the lower and upper walls of the tunnel as shown most clearly in Fig. 4. The forward ends of the plates 101 and 102 are beveled, as indicated in the drawings, so that the tuna will smoothly pass from between the belts 76 and 86 to a position between the plates 101 and 102 as the forming and molding chains continuously feed the tuna toward a can filling position or station presently to be described.

The lower plate 101 is supported by pedestals 106 carried by the upper bed 11 of the machine. The lower plate 101 forms a slide support for the lower side edges 55 of the forming chains. Three sets of fixed shoes or backing plates 107 (Figs. 1 and 2) extend between the upper and lower plates 101 and 102. These fixed shoes are provided with bosses 105 through which pass bolts 108. The bolts extend between and through the upper and lower plates and are adapted to receive nuts by which the fixed shoes may be placed in a desired position of adjustment. The backing plates 107 are somewhat curved, as indicated in the drawings, the bolts passing through slots 109 (Fig. 24) formed in the upper and lower plates so that the transverse gap between the fixed shoes can be adjusted within the limits of the lengths of the slots. The upper plate is supported by the fixed shoes, the upper side edges 55 of the forming chains sliding on the under side of the upper plate.

In setting up the machine for use, the fixed shoes at the left of the machine, as viewed in Fig. 2, are adjusted so that the transverse gap between them is the correct amount to bring the forming chains to the proper spacing for reducing the cross-sectional area of the cylinder of tuna to an area less than the diameter of the can. The gap between the center two of the fixed shoes is made somewhat greater than the gap between the two fixed shoes at the left of the machine. The third fixed shoes at the right of Fig. 2 are adjusted so that the gap between them is somewhat greater than that of the center two of the fixed shoes. Thus the cross-sectional area of the forming and molding tunnel defined by the molding and forming chains and the upper and lower plates 101 and 102 is gradually decreased from the entrance end for the tuna, as indicated in Fig. 2 toward the discharge end or container filling position or station. The continuous substantially cylindrical roll of tuna is gradually decreased in cross-sectional area until the cylinder has been molded and shaped to the size desired for reception in the can or other container. Since the cross-sectional area of the cylinder of tuna is gradually reduced to a diameter just slightly less than the diameter of the can or other container, the cut-off pieces or sections of tuna may easily be transferred in succession to the cans as will presently appear.

It will be noted from Fig. 4 that a cross-section of forming and molding chains and the plates 101 and 102 do not form a true circle. Adjacent the can filling position, however, the chains are closer together than shown in Fig. 4 so that for practical purposes the forming and molding tunnel shapes the tuna into a cylinder which is of substantially the same shape as the shape of the can. If desired, the machine may be employed for filling rectangular or other shaped containers by properly shaping the forming or molding chains to conform substantially to the shape of the containers to be packed.

Carried by the upper bed 11 (Fig. 1) is a support bracket 111 which has a pair of arms 112 in which are formed ways (see also Fig. 4). The ways are adapted to receive a slide bar 113 which carries upstanding members 114 at each end thereof. Caps 116 hold the slide bar 113 in position. The upstanding members 114 carry arms 117 upon the ends of which movable shoes or backing plates 118 are provided.

A bearing 119 extends through the upper bed 11 and through the base of the bracket 111 and supports a vertical shaft 120 (Figs. 4 and 5). The shaft 120 is adapted to receive at its upper end an eccentric 121 having an eccentric pin 122 which forms part of a scotch yoke assembly. The eccentric pin 122 is freely rotatable with respect to a block 123 which is adapted to slide between guide bars 124. As the shaft 120 is rotated, the eccentric pin 122 moves eccentrically with respect to it to shift the slide bar 113 transversely of the machine, the slide bar 113 being fixed with respect to the guide bars 124.

As shown most clearly in Figs. 1 and 2, two pairs of movable shoes 118 are provided which are mounted longitudinally on opposite sides of the center pair of fixed shoes. The shafts 120 for driving them extend below the upper bed 11 and are provided at their lower ends with sprockets 126 for the reception of a chain 127. The shaft 120 at the left of Fig. 1 carries a second sprocket 128 over which passes a chain 129 which is driven by a sprocket 131 mounted on a shaft 132 (Fig. 3) extending upward from the transmission case 17.

It will now be appreciated that by adjusting the eccentrics 121 so that the eccentric pins 122 thereof are out of time with respect to each other, that is, one of the eccentric pins is advanced 180 degrees with respect to the other as shown in Fig. 1, one pair of movable shoes will be moving in one direction transversely of the machine while the other is moving in the opposite direction. Thus the shoes may be adjusted and timed so as to give the forming chains a wavelike or serpentine motion. The purpose of imparting this action to the forming and molding chains is so that as the loins of tuna are fed through the machine by the conveying action of the forming and molding chains, the loins are bent and flexed during their passage through the forming space or moving tunnel provided by the forming and molding chains and the upper and lower plates 101 and 102. Thus the roll of tuna is continuously flexed and kneaded during its passage so as to gradually form and shape the roll into substantially a cylinder of tuna of substantially constant weight per unit of length as will more fully later appear.

At the discharge end of the forming and molding chains and adjacent the container filling station, as shown most clearly in Fig. 6, a discharge throat 136 is provided. The discharge throat comprises an annular ring supported as indicated at 137 (Fig. 7) by the upper and lower plates 102 and 101. The discharge throat 136 has two inwardly extending chute or shovel shaped portions 138 which are shaped in cross-section substantially to conform substantially to the curvature of the inner surfaces of the forming and molding links. The forward ends of the chute portions 138 of the discharge throat are shaped, as indicated at 139, so as to freely receive the cylinder of tuna as it is fed towards the container filling position.

It will be particularly noted (Fig. 6) that the discharge throat is slightly larger in internal diameter than the smallest transverse distance between the forming chains so that the cylinder of tuna fed into the discharge throat is somewhat smaller in diameter than the diameter of the discharge throat 136. In actual practice, the tuna is molded into a cylinder of sufficient rigidity that it is self-supporting and will extend into the discharge throat and be substantially free of the side walls thereof. The effort is made to avoid any extrusion of the tuna as any attempt to extrude the material tends to break down the flake structure and under certain conditions of pressure, will cause the tuna to break up into a fibrous mass which is an extremely undesirable product.

Mounted rigidly on the shaft 22 (Fig. 3) is a sprocket 141 which drives a chain 142 which in turn drives a sprocket 143 rigidly secured to a shaft 144. The shaft 144 extends into a tubular enclosure or post 146 supported from the main frame of the machine as indicated at 147. The tubular post 146 extends upward, as indicated in Fig. 10, and is adapted to receive at the top thereof an apertured plate 148 the upper surface of which is machined and adapted to receive the bottom machined surface 149 of a housing, generally indicated by the numeral 151. The housing is provided with a bore 152.

The other end of the shaft 144 (Fig. 3) carries a bevel gear 153 which meshes with a bevel gear 154 rigidly secured to a shaft 156. The shaft 156 extends upward through the cylindrical post 146 and at its upper end is provided with a bearing 157 which seats on the plate 148 and a bevel gear 158 rigidly secured to the shaft 156.

The bevel gear 158 (Fig. 9) meshes with a bevel gear 159 rigidly secured to a shaft 161 suitably journaled in the housing, as indicated at 162. The shaft 161 extends horizontally across the housing and has rigidly mounted thereon a spur drive gear 163.

It will now be appreciated that whenever the motor 14 is operating the shaft 22 is driven and the spur drive gear 163 is driven at constant speed. If it is desired to change the speed at which the drive gear 163 is rotated, sprockets 141 or 143 or both may be changed to sprockets of a different diameter and number of teeth. However, if it is desired to change the speed of all the mechanism the belt 18 and pulleys 19 may be changed. All of the mechanism mounted within the housing or carried thereby is adapted to be driven from the driving spur gear 163. The shaft 161 extends outward through a boss formed integral with the housing and the extended end thereof is provided with a hand wheel 164 by which the mechanism within and carried by the housing may be actuated independently of the above described drive mechanism upon manual rotation of the hand wheel 164.

The spur gear 163 drives a large gear 166 rigidly secured to a shaft 167 (Fig. 14). The shaft 167 is provided with suitable bearings which may be of the ball type, as indicated at 168. The bearings are supported in bearing caps 169 mounted in bores formed in the housing.

The large gear 166 carries pin 171 on one face thereof adjacent its periphery (Figs. 9, 12 and 14). The pin 171 is adapted to cooperate with a Geneva motion element 172 rigidly secured to a shaft 173 (Figs. 15 and 16). The shaft 173 is suitably journaled in the housing, as generally indicated at 174, extends through the housing and has a can turret 176 rigidly secured to the extended end thereof.

The Geneva motion has six positions, as indicated in Fig. 15, and six slots 175 into which the drive pin 171 may extend. Since Geneva motions are well known in the art to which this invention applies, it is sufficient to state that as the gear 166 rotates the pin 171 engages in one of the slots 175 and moves the Geneva element 172 through 60 degrees or through one station for each revolution of the gear 166. After completion of movement of the Geneva element 172 to the next station, the pin 171 moves out of the slot 175 and picks up the next slot on the next rotation. This intermittent motion of the Geneva element 172 is imparted to the can turret 176 which, as shown in Fig. 12, has six can receiving pockets 177.

In Fig. 12, I have shown a section of a can chute 178. The entering can chute may be affixed to the face of the housing, as indicated at 179, and may be extended above the turret so as to form a guard 181 for the cans while they are in the turret. As the cans leave the can turret they are guided or confined by a wall 182, preferably formed integral with the housing 151, and a part of the guard 181. The cans are thus guided into a can discharge chute 183.

It will now be appreciated that the cans are fed into the can entrance chute 178 from a source of supply of cans, enter the cups or pockets of the turret and are rotated to a can filling position or station which is indicated at 184. Continued operation of the machine brings a filled can into the next station, after which it is discharged from the can turret into the discharge chute 183.

The shaft 167 (Figs. 9 and 14) has a barrel cam 191 rigidly mounted thereon. This barrel cam is adapted to actuate all of the elements mounted in or carried by the housing 151 with the exception of the can turret. However, since the gear 166 is also mounted on the shaft 167, all of the operations may be accurately timed.

The barrel cam 191 has a cam groove 192 (Figs. 9 and 14) formed in one face thereof adapted to receive a cam roller 193. The roller 193 is rotatable on a pin carried by a bell crank 194 (Fig. 15). One end of the bell crank is pivoted as indicated at 196, to a boss 197 preferably integral with the housing casting while the other end of the bell crank 194 has an arm 199 pivoted thereto, as indicated at 198.

The arm 199 is pivotally secured, as indicated at 201, eccentrically with respect to a clamping collar or strap 202 which is provided with clamping means as indicated at 203. The clamping collar 202 as it is actuated is adapted to rotatably oscillate a splined element 204. The splines of the element 204 are adapted to mate with corresponding splines formed on a shaft 206 (Fig. 14). The splined element 204 is provided with a shoulder 207 which faces upon a bearing element. The bearing element provides a bearing support for the splined element 204 and the shaft 206. A nut 205 is threaded on the end of the splined element to hold it in position against longitudinal movement along the shaft. The bearing element 208 is mounted in the margins of a bore formed in the housing and the end thereof may be extended and threaded to receive a cap 209.

The shaft 206 extends longitudinally of the housing and at its forward end extends through a bore 211 in the margins of which a bearing 212 for the shaft 206 is seated.

On the extended end of the shaft 206 an arm 213 is rigidly mounted which carries a cut-off knife 214 preferably extending substantially at right angles to the arm 213. The cut-off knife is preferably circular and is adapted to cut off a slice or section of the tuna as will presently be described.

The barrel cam 191 (Fig. 14) is provided with a second cam groove 216 in the outer periphery thereof in which a roller 217 is adapted to ride.

The roller 217 is adapted to rotate on a pin 221 carried by a roller block 222. The shaft 206 has a shoulder 223 against which a washer 224 butts, the roller block 222 in turn seating upon the washer. The shaft 206 is provided with a second washer or spacer 226 and with a nut 227 threaded on the shaft which holds the assembly of parts above described in position on the shaft against the shoulder 223. The shape of the cam groove 216 is shown most clearly in Fig. 9.

It will now be appreciated that as the barrel cam 191 is rotated, by reason of the actuation of the roller 193 by the cam groove 192 and the connecting parts therefrom to the splined element 204 as shown in Fig. 15, an oscillating motion is imparted to the shaft 206 which oscillates the knife 214 in the manner indicated in solid and dotted lines in Fig. 11. Simultaneously and in timed relation therewith, by reason of the fixed relationship of the cam grooves 192 and 216, a reciprocating motion of the shaft 206 and consequently the cut-off knife 214 is imparted which causes the cut-off knife to have an amplitude of reciprocating motion indicated in solid and dotted lines in Fig. 6.

Referring now to Figs. 10, 13 and 14, the barrel cam 191 has a peripheral cam 231 (Fig. 13) which has a cam groove 232 formed therein. A roller 233 rotatably mounted on a pin 234 rides on the cam 231 and in the course of rotation of the barrel cam 191 drops in the cam groove 232. The pin 234 is mounted on an arm 236 rigid with a shaft 237. The other end of the shaft 237 is provided with an arm 238 rigid therewith, upon the end of which a bell crank 239 is pivoted as indicated at 241.

Referring now in particular to Fig. 10, a bottom cut-off knife 242 is provided which has a cutting edge 243 formed substantially on the arc of a circle and which is adapted to cooperate with the cut-off knife 214 as will be presently described. The bottom cut-off knife 242 is rigidly secured as indicated at 244 to a slide 246 adapted to actuate the knife. A bracket 247 suitably mounted on the face of the housing as shown in the drawings is provided with ways 248 adapted to receive the slide. The ways guide the slide into and out of cutting relation with the cylinder of tuna in timed relation with the operation of other parts of the machine. The upper end of the bell crank 239 is pivoted to the slide, as indicated at 249, and a spring 251 has one end 252 secured to the bracket 247 and the other end, as indicated at 253, secured to the lower end of the bell crank.

It will now be appreciated that as the barrel cam 191 rotates with the roller 233 on the high surface of the cam 231, the bell crank 239 is held in its downward position. In this position of the parts, the knife 242 is held in its retracted inoperative position. As soon, however, as the roller 233 drops into the groove 232 of the cam 231 the spring 251 through the bell crank 239 actuates the slide 246 to move the knife 242 into cutting relation with the cylinder of tuna. It will be appreciated that the action of the knife 242 is instantaneous; that its amplitude of movement is small; and that it is quickly retracted from operative cutting relation with the cylinder of tuna. Since the two cut-off knives are driven from the same barrel cam, their movements are accurately coordinated and synchronized in a manner which will be presently described.

Formed in the periphery of the barrel cam 191 is another cam groove 256 (Fig. 14) in which a roller 257 rides when the barrel cam is rotated. The roller is freely rotatable on a pin carried by a lever 258. The lever 258 (Fig. 15) is pivoted on a boss 259 formed on the inner wall of the housing 151. The opposite end of the lever 258 is bifurcated as shown at 260 and adapted to actuate a plunger 261 (Fig. 17).

The plunger 261 slides in a sleeve 262 mounted in the margins of a bore formed in the housing 151. The operating connection between the lever 258 and the plunger 261 includes a connector 263 which extends axially with respect to a spring 264 and is pinned, as indicated at 266, to the end of the plunger 261. A pin and slot 267 connect the bifurcated end of the arm 258 with the connector 254. Suitable washers 268 or backing plates are provided for the spring 264.

The extended end of the plunger 261 is provided with a substantially spherical groove 271 in which a ball shaped member 272 is seated. The ball is integral with a lever 273 pivoted at 274 to a boss 276 carried by a bracket presently described. The other end of the lever 273 is provided with a ball 277 which registers with a substantially spherical shaped groove 278 formed in a plunger 279 which has a plunger face 281. The plunger 279 is carried by a bracket 282 secured to the face of the housing (see Fig. 10), the bracket being provided with suitable ways 283 in which the plunger may slide.

From an examination of Fig. 10, it will be apparent that the face 281 of the plunger 279 is in alignment with a pocket or cup of the can turret, the turret being shown in that view in dotted lines. After the can has been filled with a slice or section of tuna and the turret has been actuated to shift it through 60 degrees to the position shown at 284 in Fig. 12, continued rotation of the barrel cam 191 causes a pivotal rotation of the lever 258 about its pivot 259 (Fig. 15) to move the plunger 261 to the left as viewed in Fig. 17. This action causes the plunger face 281 to be inserted in the can to tamp the tuna into the can. The spring 264 serves to dampen the action of the plunger since the spring 264 must be compressed when it meets any resistance. The tamping plunger engages the section of tuna in the can to insure that the section is adjacent the bottom of the can; it is not intended that it should exert any appreciable molding pressure on the section of tuna. While the plunger may be arranged to exert a molding pressure on the section of tuna after it is in the can, it is desirable that it not do so for the reason that a marginal space around the circumference of the section of tuna is desirable. This marginal space is adapted for the reception of oil to protect the section of tuna against scorching during retorting.

Carried by the housing 151 is a cut off or transfer collar 286. As shown most clearly in Fig. 6, the transfer collar 286 lies between the discharge throat 136 and the can turret 176. The transfer collar 286 has an axial opening which is in alignment with the discharge throat 136 and with the can pocket 177 of the can turret which is in its filling position. The transfer collar 286 is spaced from the discharge throat 136, as indicated at 287, to provide a space for the reception of the cut-off knives.

The transfer collar 286 is provided with a longitudinally extending slot 288 through which the arm of the cut-off knife may pass in moving longitudinally of the transfer collar from the solid line to the dotted line position shown in Fig. 6 for the purpose of transferring a cut off section of tuna from the transfer collar to the can.

As shown in Fig. 2, the housing 151 may be rotated from the solid line to the dotted line position shown in that view by rotating the housing on the plate 148. This action exposes both cut-off knives and the external actuating mechanism therefor and the tamper and its external actuating mechanism. Moreover, occasionally a damaged can becomes jamed in the can turret or a jam may occur in the flow and transfer of fish to the cans. Under any and all of these conditions the housing, as shown in Fig. 2, may be swung so as to expose all of these parts for adjustment, repair or cleaning.

Summarizing the operation, the loins of tuna or other material are placed on the feed belt 76 in the manner above described so as to secure a substantially continuous line of fish spread longitudinally over the feed belt in a rough approximation of uniform weight per unit of length of the feed belt as nearly as the operator can judge by eye. At the entrance end of the forming and molding chains, a wide mouth is presented for entrance of the loins of tuna by reason of the curvature of the chains and the shape of the shoe and belt 86 above the entrance to the forming tunnel. As the fish loins enter the space between the forming chains they are confined between the curved surfaces of the chain and the belts 76 and 86. When the tuna enters the space between the plates 101 and 102 it is rigidly confined both above and below. The forming chains gradually reduce the material in cross-sectional area from the entrance end in a direction toward the can filling station by reason of the adjustment of the three sets of fixed shoes above described.

As the loins of tuna or other material progress through the tubular molding space or moving tunnel, they are gradually molded and shaped to approximately cylindrical form of uniform cross-section or are shaped in cross section to conform substantially to the cross-sectional shape of the can should other than a round can be employed. At the same time, as previously mentioned, the forming chains are given a wave or serpentine motion which bends and flexes the confined mass of fish. This bending or flexing which is continuously reversed causes alternate stretching and compressing of the mass on either side of the central axis of the roll of tuna. This alternate stretching and compressing appears to cause a lengthwise slippage of the layers or flakes of the loins of tuna. Tuna, in common with other species of fish, have a natural layer or flake structure, the partings of which extend longitudinally of the fish. It would appear that a certain amount of lengthwise flow of the material takes place relative to the general forward movement of the mass. Due to the external compressive pressure, this lengthwise flow tends to move some of the material from the over-filled or overweight sections to the under-filled or underweight sections of the roll, thus bringing about substantial uniform weight over short increments of the length of the roll of tuna.

Whatever the action which occurs within the forming and molding tunnel may be, it would appear that the bending and flexing of the cylinder of tuna combined with the gradual decrease in the cross-sectional area of the tunnel aids in reducing the loins of tuna from the entrance end of the forming and molding tunnel to a structure which is molded into a substantially solid cylinder of substantially uniform weight per unit of length and of a cross-sectional shape corresponding to but slightly smaller than the shape of the can or other container. The substantially cylindrical roll of tuna is substantially continuously moved through the molding space and into the discharge throat from which it extends as indicated in Fig. 2.

The action of the cut-off knives and the tamper will be more clear from an examination of Figs. 18 to 23 inclusive. In Fig. 18 both knives **214** and **242** are shown in their retracted position with the cylinder of tuna being continuously fed through the discharge throat into the transfer collar **286**. The next step in the movement of the knives is shown in Fig. 19. In this view the cut-off knife **214** has been projected longitudinally to a position in alignment with the slot **287** between the discharge throat **136** and the transfer collar **286**. During this interval the lower cut-off knife **242** is inserted in the slot **287** and cuts part way through the material. It will be noted from this view that the knives **214** and **242** lie in the same vertical plane and that the lower cut-off knife cuts the material prior to the cut-off knife **214** entering into cutting relation with the material.

Referring now to Fig. 20, the lower cut-off knife **242** is being retracted as the upper cut-off knife **214** cuts through the material to meet the cut formed by the lower cut-off knife **242**. In this manner a section of the material is completely severed from the cylindrical roll without the knives engaging each other which would be likely to damage the cutting edges since they are in vertical alignment with each other. The tuna, as will be apparent, forms a bridge between the discharge throat and the transfer collar and the cut-off knives enter the gap between these elements to form a clean cut of the material into a section of substantially the correct weight required to be placed in the can. The cutting action of the cut-off knives is rapid and substantially instantaneous so that although the roll of material is continuously fed and the cut-off knives during their cutting operation move in a vertical plane, the interruption of the advance of the roll of tuna is only instantaneous and this slight pause is to a large extent taken up in the give of the material.

Referring now to Fig. 21, the lower cut-off knife **242** has been retracted and the upper cut-off knife **214** moves through the slot **288** to push the cut-off section into the can as illustrated in that view. During the movement of the knife **214** in transferring the cut-off section from the transfer collar into the can, the movement of the combined cut-off and transfer knife **214** is faster than the advance of the cylinder of tuna so that the cut-off section is separated from the cylinder of tuna and deposited in the can without interfering with the advancing cylinder of tuna.

In Fig. 22 I have shown the cut-off section of tuna deposited in the can and the advancing cylinder of tuna moving into the transfer collar in a position to be cut off upon the next actuation of the cut-off knives.

In Fig. 23 the cut-off knives have been retracted to the position shown in Fig. 18, a new empty can is presented in the filling position by rotation of the can turret and the filled can of tuna has been rotated to the next station prior to being deposited in the discharge chute. In this position the tamper or plunger **279** is actuated to insure that the section of tuna lies adjacent the bottom of the can. As previously mentioned, the tamper exerts no molding pressure on the tuna and is primarily employed to insure that the section of tuna will be adjacent the bottom of the can and not protrude therefrom.

In my above mentioned application, I have shown a means of varying the speed of movement of the cut-off knife to vary the weight of the sections of material cut off from the cylindrical roll. In the present application the speed of actuation of the cut-off knives is maintained constant except that the speed may be changed by changing the sprockets as above mentioned. In the machine of this application as previously described, variations in weight of the sections cut off and deposited in the cans is made by rotating the hand wheel **31** which varies the speed of all operations except those driven by the sprocket **141** (Fig. 3).

Thus the machine of my invention may be employed to form a solid pack of tuna and mold whole loins into a roll or other shape conforming substantially to the shape of the container in which it is to be packed; cut off sections of the material successively; and transfer the cut off sections successively to cans presented at the can filling station, the weight of the cut-off sections being accurately controlled by adjusting the hand wheel **31** independently of the rate of actuation of the cut-off knives.

While I have shown and described the preferred machine of my invention, it will be apparent that various changes and modifications may be made therein, particularly in the form and relation of parts without departing from the spirit of my invention as set forth in the appended claims.

I claim:

1. A machine for packing a substantially constant weight of material into each of successive containers presented to a filling position comprising, in combination, means for forming the material into an elongated structure of substantially the cross-sectional shape of that of the container, means for moving the structure toward the container filling position, a pair of cut-off knives operable in different directions to sever a section of the structure, means for operating said knives, means for moving one of said knives from its severing position toward the container to deposit the severed section in the container, and means for tamping the severed section after it is in the container.

2. A machine for packing a substantially constant weight of material into each of the successive containers presented to a filling position comprising, in combination, means for forming the material into an elongated structure of substantially the cross-sectional shape of that of the container, means for moving the structure toward the container filling position, a pair of cut-off knives operable in different directions to sever a section of the structure, means for operating said knives, means for moving one of said knives from its severing position toward the container to deposit the severed section in the container, a plunger, and means for moving the plunger into the container into engagement with the section.

3. A machine for packing a substantially constant weight of material into each of successive containers presented to a filling position comprising, in combination, means for forming the material into an elongated structure of substantially the cross-sectional shape of that of the container, means for moving the structure to-

ward the container filling position, a pair of cut-off knives operable in different directions to sever a section of the structure, means for operating said knives, means for moving one of said knives from its severing position toward the container to deposit the severed section in the container, a container turret, means for rotating said turret, a plunger, and means for moving the plunger into the container into engagement with the section after the container has been rotated by the turret from its filling position.

4. A machine for packing a substantially constant weight of material into each of successive containers presented to a filling position comprising, in combination, means for forming the material into an elongated structure of substantially the cross-sectional shape of that of the container, means for moving the structure toward the container filling position, a pair of cut-off knives operable in different directions to sever a section of the structure, means for operating said knives, and means for varying the speed of movement of the structure to vary the weight of the severed sections.

5. A machine for packing a substantially constant weight of material into each of successive containers comprising, in combination, a feed belt, a pair of molding chains adapted to receive the material carried by the feed belt, a pair of rigid non-yielding plates arranged in spaced relation between which the molding chains pass to form a tunnel for the reception of the material to be molded, and means for driving said feed belt and molding chains at substantially the same lineal speed.

6. A machine for packing a substantially constant weight of material into each of successive containers comprising, in combination, a feed belt, a pair of molding chains adapted to receive the material carried by the feed belt, a pair of plates arranged in spaced relation between which the molding chains pass to form a tunnel for the reception of the material to be molded, means for driving said feed belt and molding chains at substantially the same lineal speed, and means for actuating said molding chains between said plates in a direction transverse to the direction in which said molding chains are driven.

7. A machine for packing a substantially constant weight of material into each of successive containers comprising, in combination, a feed belt, a pair of molding chains adapted to receive the material carried by the feed belt, a pair of plates arranged in spaced relation between which the molding chains pass to form a tunnel for the reception of the material to be molded, means for driving said feed belt and molding chains at substantially the same lineal speed, and means for varying the speed at which said feed belt and molding chains are driven.

8. A machine for packing a substantially constant weight of material into each of successive containers comprising, in combination, a feed belt, a pair of molding chains having an entrance end adapted to receive the material carried by the feed belt, a pair of fixed plates arranged in spaced relation between which the molding chains pass to form a tunnel for the reception of the material to be molded, means for driving said feed belt and molding chains at substantially the same lineal speed, and a rotating member above the molding chains adjacent the entrance end thereof.

9. A machine for packing a substantially constant weight of material into each of successive containers comprising, in combination, a feed belt, a pair of molding chains having an entrance end adapted to receive the material carried by the feed belt, a pair of plates arranged in spaced relation between which the molding chains pass to form a tunnel for the reception of the material to be molded, means for driving said feed belt and molding chains at substantially the same lineal speed, a shiftable rotating member above the molding chains adjacent the entrance end thereof and means for varying the speed at which said feed belt, molding chains and rotating member are driven.

10. A machine for packing a substantially constant weight of material into each of successive containers presented to a filling position comprising, in combination, means including a pair of opposed forming chains for moving the material toward a container filling position while gradually forming the material into an elongated structure of a cross-sectional shape substantially conforming to that of the container, a discharge throat between the discharge ends of said forming chains and said container filling position into which said structure passes from the forming chains, a transfer collar spaced from the throat between the throat and the filling position, and means for cutting off sections of said structure and transferring them successively to containers presented in the filling position.

11. A machine for packing a substantially constant weight of material into each of successive containers presented to a filling position comprising, in combination, means including a pair of opposed forming chains for moving the material toward a container filling position while gradually forming the material into an elongated structure of a cross-sectional shape substantially conforming to that of the container, a discharge throat between the discharge ends of said forming chains and said container filling position into which said structure passes from the forming chains, a transfer collar spaced from the throat between the throat and the filling position, means comprising a pair of cooperating knives for cutting off sections of said structure, and means comprising one of said knives for transferring the cut-off sections successively to containers presented in the filling position.

12. A machine for packing a substantially constant weight of material into each of successive containers presented to a filling position comprising, in combination, means including a pair of opposed forming chains for moving the material toward a container filling position while gradually forming the material into an elongated structure of a cross-sectional shape substantially conforming to that of the container, a discharge throat between the discharge ends of said forming chains and said container filling position into which said structure passes from the forming chains, a slotted transfer collar spaced from the throat between the throat and the filling position, means comprising a pair of cooperating knives for cutting off sections of said structure, means comprising one of said knives movable through the slot in the collar for transferring cut-off sections successively to containers presented in the filling position, a plunger, and means for moving said plunger successively into the containers into engagement with the sections after the containers have been filled.

13. A machine for packing a substantially constant weight of material into each of successive containers presented to a filling position

comprising a main frame, a pair of molding chains carried by said main frame, means including a motor for driving said molding chains, a post supported from said main frame, a housing supported by said post, a pair of cut-off knives mounted externally of said housing, means within the housing and extending therethrough for actuating said cut-off knives, and means including elements extending through the post for driving said actuating means from said motor, said housing being adapted to swing on said post as an axis to expose said cut-off knives for adjustment and repair.

14. A machine for packing a substantially constant weight of material into each of successive containers presented to a filling position comprising a main frame, a pair of molding chains carried by said main frame, means including a motor for driving said molding chains, a post supported from said main frame, a housing supported by said post, a pair of cut-off knives, a container turret and a plunger mounted externally of said housing, a slotted transfer collar mounted on the housing adjacent said cut-off knives, means within the housing and extending therethrough for actuating said cut-off knives, container turret and plunger, and means including elements extending through the post for driving said actuating means from said motor, said housing being adapted to swing on said post as an axis to expose said cut-off knives, container turret, plunger and collar for adjustment and repair.

15. A machine for packing a substantially constant weight of material in each of a series of containers comprising, in combination, a conveyor upon which the material is placed, means forming with the conveyor an enclosure for the product, said means comprising a pair of members having molding elements the molding surfaces of which face each other and a pair of plates mounted in spaced relation with the molding elements between them, means for driving said members continuously with the molding surfaces exerting a molding action on the product to mold it into a cross-sectional shape similar to but slightly smaller than the open end of the container in which the material is to be packed, means for cutting off predetermined lengths of the product while the product is substantially continuously advanced, means for transferring the cut-off lengths in succession to the series of containers, adjustable shoes engaging said members, and means including movable shoes for imparting a wave-like motion to said members as the molding elements advance toward the cutting off position.

16. In a machine for the purpose described, a pair of material molding chains each comprising a multiplicity of molding elements, each of said molding elements having a concave material molding surface, pivot links connecting adjacent molding elements, said molding chains being arranged so that the molding surfaces of said molding elements face each other, means for driving said molding chains at substantially the same lineal speed, and means for flexing said chains in a direction transversely to the direction in which they are driven.

17. A machine for molding products comprising, in combination, a pair of material molding chains each comprising a multiplicity of molding elements, each of said molding elements having a molding surface which is a partial cylinder with the molding chains being arranged so that the molding surfaces of one chain face the molding surfaces of the other chain, the cylindrical molding surface of each molding element terminating at one end in a convexly curved edge and at its other end in a concavely curved edge and with the convexly and concavely curved edges of adjacent molding elements interfitting with each other so that when the molding elements of a chain are assembled with respect to each other an elongated partial cylinder is formed with smooth joints between adjacent molding elements, and means for driving said molding chains.

18. A machine for packing a substantially constant desired weight of material in each of a series of containers comprising, in combination, molding means forming a tunnel having walls at least some of which are movable in a direction such as to feed the material in an unbroken flow, driving elements for advancing the molding means so that the material is fed toward a cut-off position, said molding means exerting pressure on the material in a direction transverse to the direction in which the material is fed to mold the material into a substantially homogeneous structure of a desired cross-sectional shape, a pair of cut-off devices beyond the end of the tunnel, means for moving the cut-off devices relative to each other and in a direction substantially normal to the direction in which the material is fed to sever a section of the material, and means for operating said cut-off devices in synchronism with the speed of operation of said driving elements.

19. A machine in accordance with claim 18 in which means are provided for varying the cross-sectional area of the tunnel.

20. A machine in accordance with claim 18 in which the tunnel is formed by two stationary walls and two movable walls oppositely disposed with respect to each other.

21. A machine in accordance with claim 18 in which the tunnel is formed by two stationary walls and two movable walls oppositely disposed with respect to each other with the movable walls moving between and being guided by the stationary walls.

22. A machine in accordance with claim 20 in which the speed of operation of the driving elements for the molding means may be varied with relation to the speed of operation of the cut-off devices to vary the thickness of the section of material cut off.

23. A machine for packing a substantially constant desired weight of material in each of a series of containers comprising, in combination, molding means forming a tunnel having walls at least some of which are movable in a direction such as to feed the material in an unbroken flow, driving elements for advancing the molding means so that the material is fed toward a cut-off position, said molding means exerting pressure on the material in a direction transverse to the direction in which the material is fed to mold the material into a substantially homogeneous structure of a desired cross-sectional shape, a pair of cut-off knives at the cut-off position, means for moving the cut-off knives toward each other and in a direction substantially normal to the direction in which the material is fed to sever a section of the material, means for operating said cut-off knives in synchronism with the speed of operation of said driving elements, means for moving each of a series of containers into a filling position in synchronism with the operation of said cut-off knives, and means for moving one

of said knives from its severing position toward the container to deposit the severed section in the container.

24. A machine for packing a substantially constant desired weight of material in each of a series of containers, comprising, in combination, molding means forming a tunnel having walls at least some of which are movable in a direction such as to feed the material in an unbroken flow, driving elements for advancing the molding means so that the material is fed toward a cut-off position, said molding means exerting pressure on the material in a direction transverse to the direction in which the material is fed to mold the material into a substantially homogeneous structure of a desired cross-sectional shape, a pair of cut-off knives at the cut-off position, means for moving the cut-off knives toward each other and in a direction substantially normal to the direction in which the material is fed to sever a section of the material, means for operating said cut-off knives in synchronism with the speed of operation of said driving elements, means for moving each of a series of containers into a filling position in synchronism with the operation of said cut-off knives, means for moving one of said knives from its severing position toward the container to deposit the severed section in the container, a plunger, and means for operating said plunger in synchronism with the operation of said cut-off knives to move the plunger into the container into engagement with the severed section after the severed section has been deposited therein.

25. A machine in accordance with claim 24 in which the tunnel is formed by two stationary walls and two movable walls oppositely disposed with respect to each other with the movable walls moving between and being guided by the stationary walls.

26. A machine in accordance with claim 24 in which the speed of operation of the driving elements may be varied with relation to the speed of operation of the cut-off knives to vary the thickness of the section of material cut off.

27. A machine for packing a substantially constant desired weight of tuna fish in each of a series of containers comprising, in combination, molding means forming a tunnel having walls at least some of which are movable in a direction such as to feed the fish, said molding means being constructed and arranged so as to feed loins of tuna in over-lapping relation in a perfectly unbroken flow, driving elements for advancing the molding means so that the loins of tuna are fed toward a cut-off position, said molding means exerting pressure on the loins of tuna in a direction transverse to the direction in which the loins are fed to mold the overlapping loins into a substantially homogeneous structure of a desired cross-sectional shape, cut-off means adjacent the cut-off position for cutting off successive slices of the molded tuna, said cut-off means being movable on its cutting stroke in a direction substantially normal to the direction in which the tuna being molded is fed, driving elements for actuating the cut-off means, the driving elements for the molding means and the driving elements for the cut-off means being driven in a relationship to each other such that the thickness of the slice cut off may be retained normally at a constant, and means for varying the speed of operation of the driving elements for the molding means with relation to the speed of operation of the driving elements for the cut-off means to vary the thickness of the slice cut off.

28. A machine for molding products comprising, in combination, a pair of material molding chains each comprising a multiplicity of molding elements having molding surfaces which face each other, a discharge throat, means for driving said molding chains to mold the material and feed it toward the discharge throat, the distance across said discharge throat being greater than the distance between the facing molding surfaces adjacent said discharge throat whereby the material is moved by the molding chains into the discharge throat without extruding the material.

29. A machine in accordance with claim 28 in which the molding surface of each molding element is a partial cylinder.

30. A machine in accordance with claim 28 in which the molding surface of each molding element is a partial cylinder and the molding chains operate between and are guided by two oppositely disposed rigid plates.

31. A machine for molding products comprising, in combination, a pair of material molding chains each comprising a multiplicity of molding elements having molding surfaces which face each other, a discharge throat, a pair of sprockets adjacent the discharge throat around which the chains pass, said discharge throat having two discharge chutes extending inward to substantially meet the chains at the points where the chains take a circular path around the sprockets, the distance across said discharge throat being greater than the distance between facing molding surfaces adjacent said discharge throat whereby the transition of the material from the molding chains into the discharge throat is accomplished smoothly and without extruding the material.

32. A machine in accordance with claim 31 in which the molding surface of each molding element is a partial cylinder.

33. A machine in accordance with claim 31 in which the molding chains operate between and are guided by two oppositely disposed rigid plates.

34. A machine for packing a substantially constant weight of material into each of successive containers presented in a filling position comprising, in combination, means for forming the material into an elongated structure of a predetermined desired shape, means for moving the structure toward the container filling position while it is being formed, a pair of cut-off devices located adjacent the container filling position, and means for moving the cut-off devices relative to each other in a direction substantially normal to the direction in which the structure is fed to sever a section of the structure, said means being independent of said structure moving means but being operated in synchronism therewith.

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