United States Patent [19]

Weikert

[11] **3,789,574**

[45] **Feb. 5, 1974**

[54] **PACKAGING MACHINE**

[76] Inventor: **Roy J. Weikert,** c/o General Films, Inc., Covington, Ohio 45318

[22] Filed: **Apr. 12, 1971**

[21] Appl. No.: **133,308**

[52] **U.S. Cl.** **53/63,** 53/51, 53/183, 53/266

[51] **Int. Cl.** **B65b 1/00,** B65b 57/06

[58] **Field of Search** 53/28, 29, 180, 183, 63; 141/177, 181, 182; 272/168.5

[56] **References Cited**

UNITED STATES PATENTS

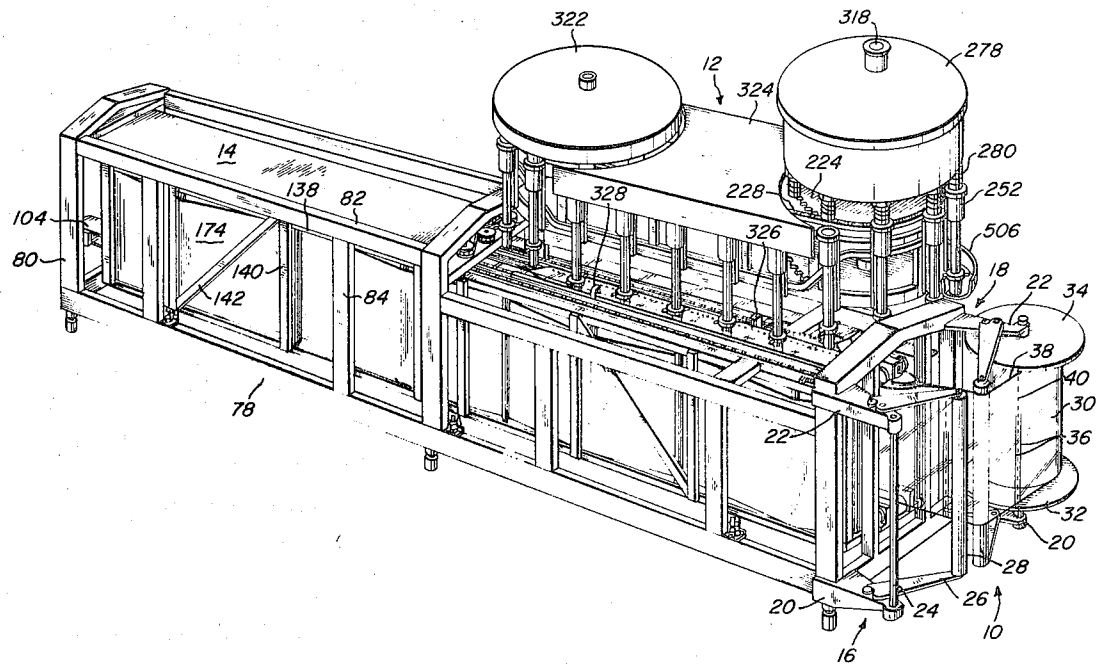
2,330,361	9/1943	Howard	53/28
3,618,286	11/1971	Membrino	53/29
3,359,703	12/1967	Quaadgras	53/180 X
2,360,510	10/1944	Murray	53/183 X
3,453,799	7/1969	Cloud et al.	53/29
3,265,251	8/1966	Lense	222/168.5

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Attorney, Agent, or Firm—Biebel, French & Bugg

[57] **ABSTRACT**

A machine for filling and sealing each bag in a web of bags on a continuous, non-intermittent basis. The web of bags is formed with the bag side seams extending from the centerfold bottom of the web of the bags to a point short of the top to provide a pair of continuous free upper edges. This permits the bags to be opened by a plow-like device which spreads the free upper edges as the bags are fed into the machine and directs them onto closely spaced teeth carried by a pair of parallel, endless carrier chains. Adjustably spaced, side support belts and a vertically adjustable center belt are also provided to support the bags as they are carried through the machine by the carrier chains. An endless track having one branch extending co-extensively with a portion of the bags' path through the machine carries a series of transfer cans which pick up a desired amount of the product to be packaged from a hopper and transfer it into the bags as they continue to move through the machine with a continuous, non-interrupted motion. After filling the bags the cans are recycled to pick up another charge, while the free edges of the filled bags are sealed and trimmed of excess bag material above the seal.

26 Claims, 23 Drawing Figures



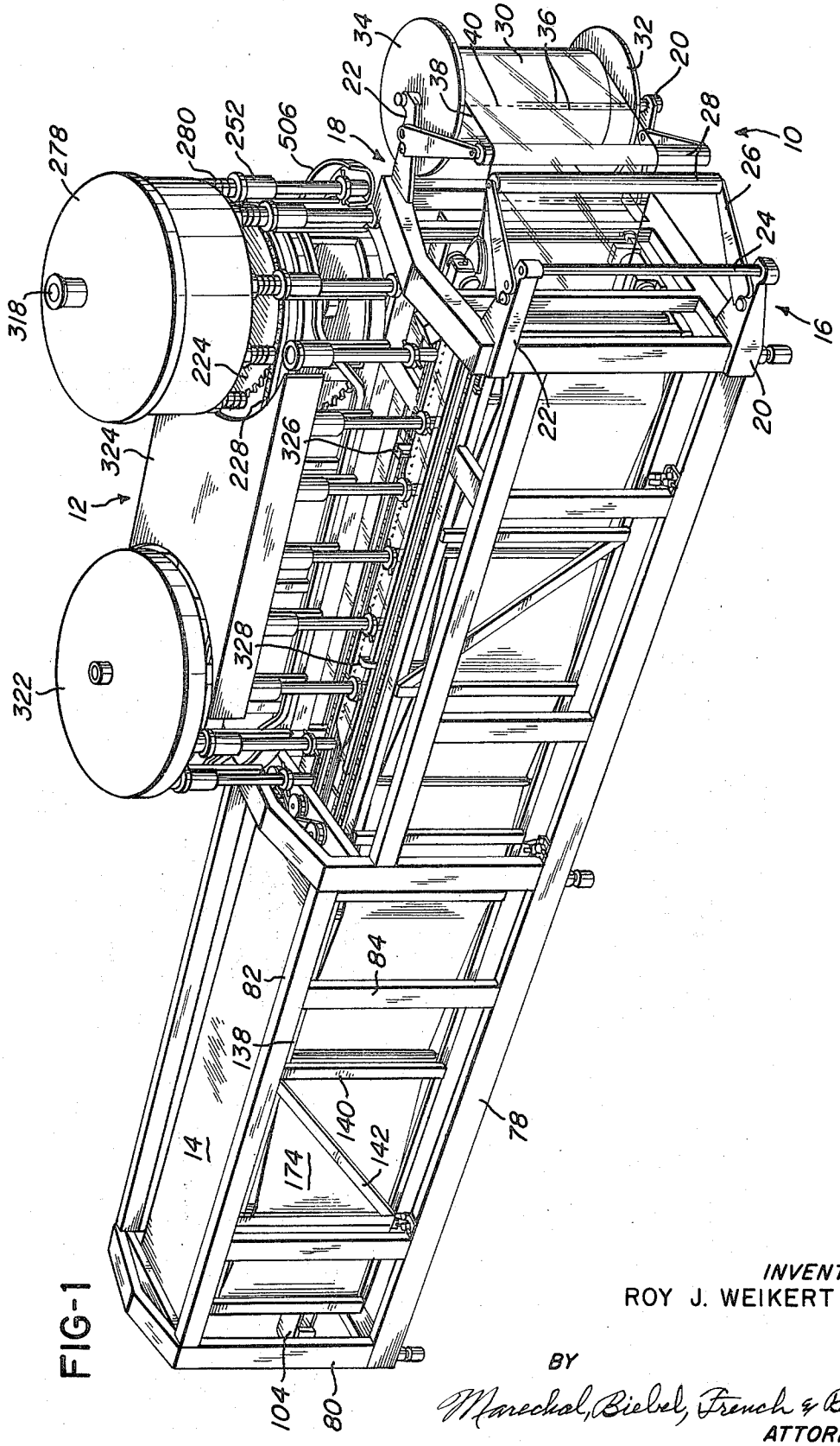


FIG-1

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ATTORNEYS

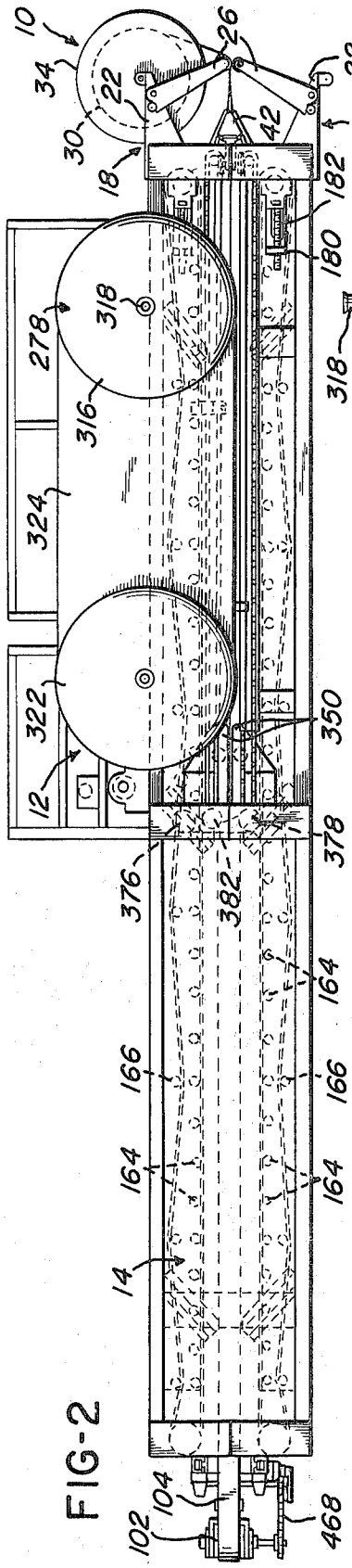


FIG-2

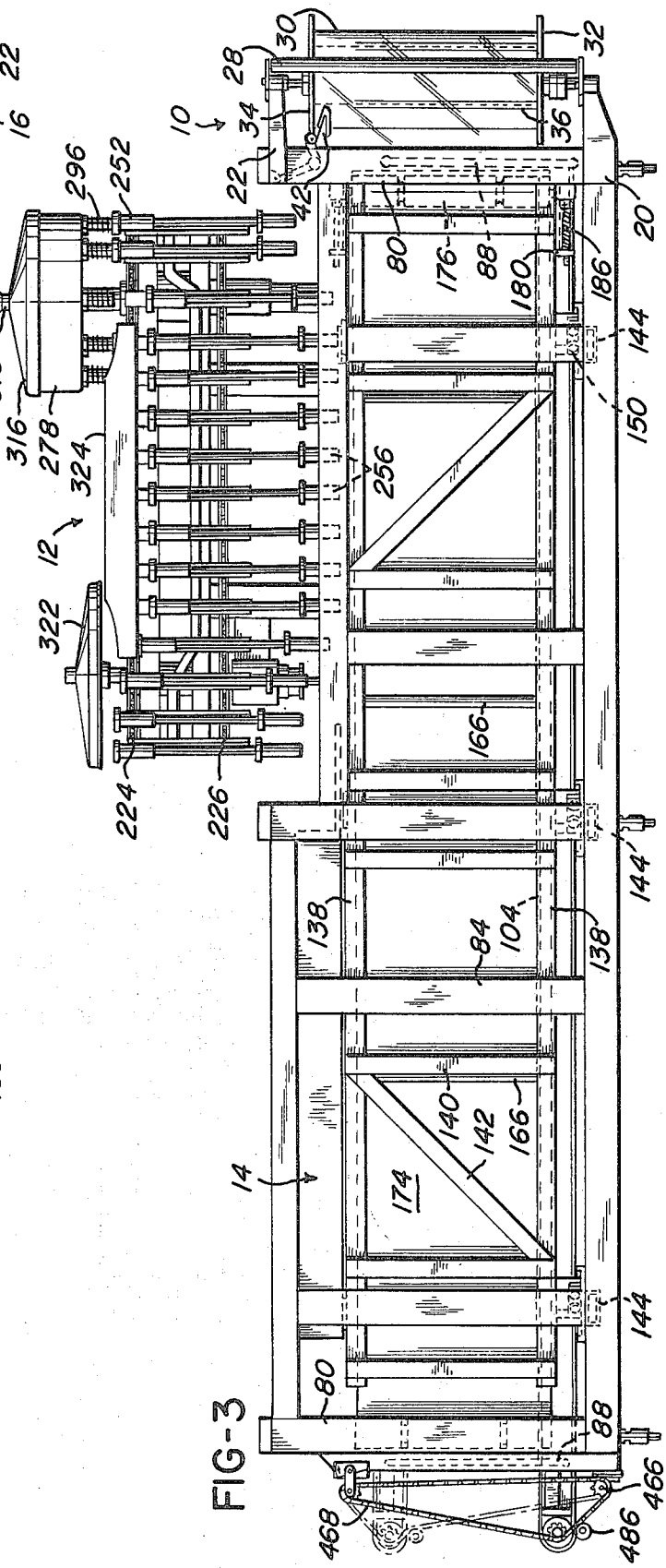


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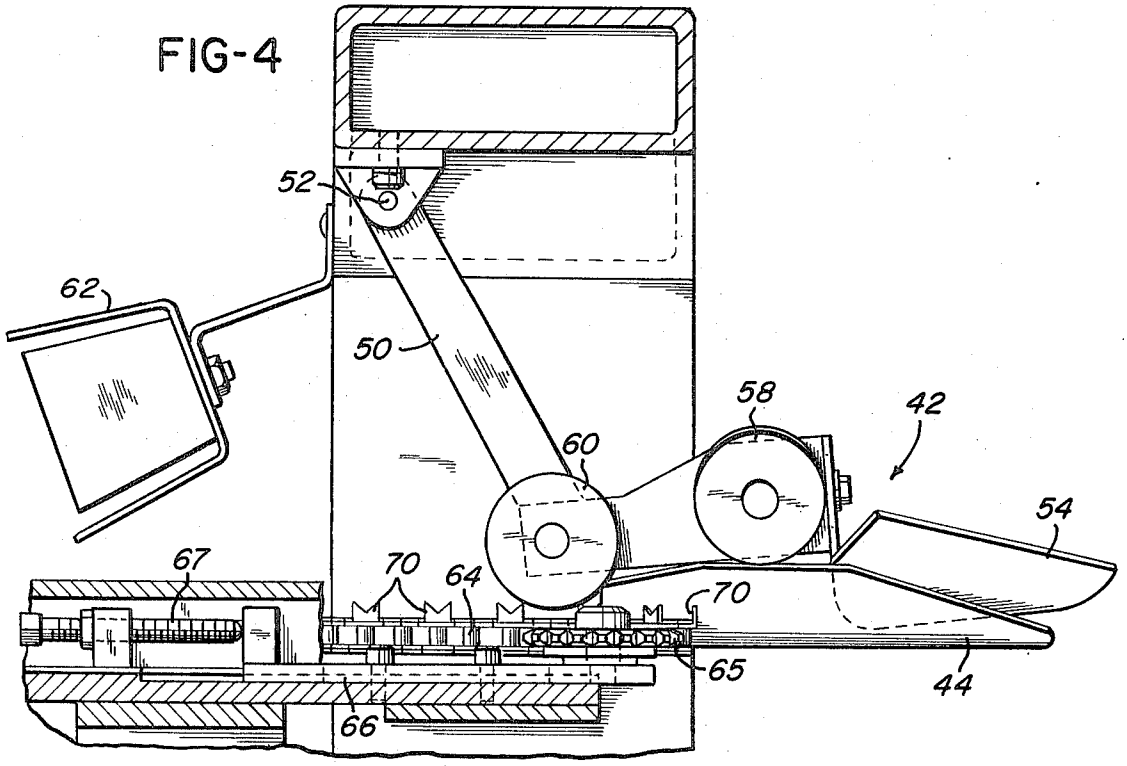

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FIG-6

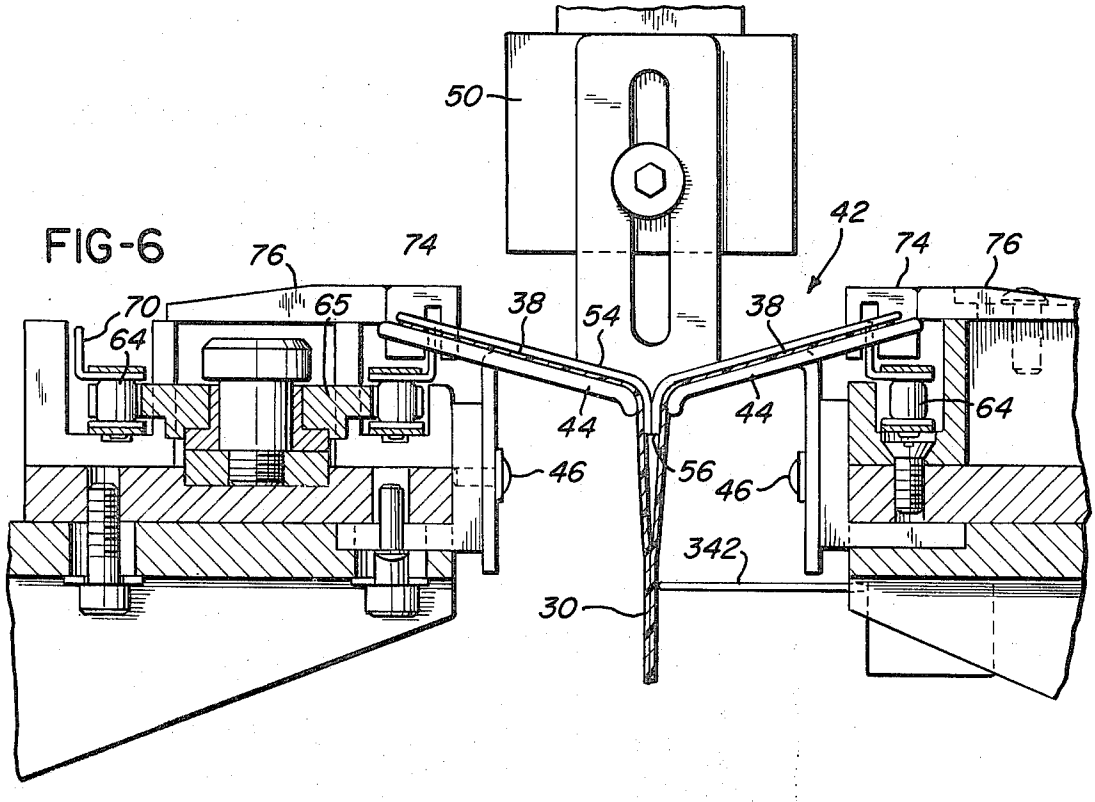

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FIG-7

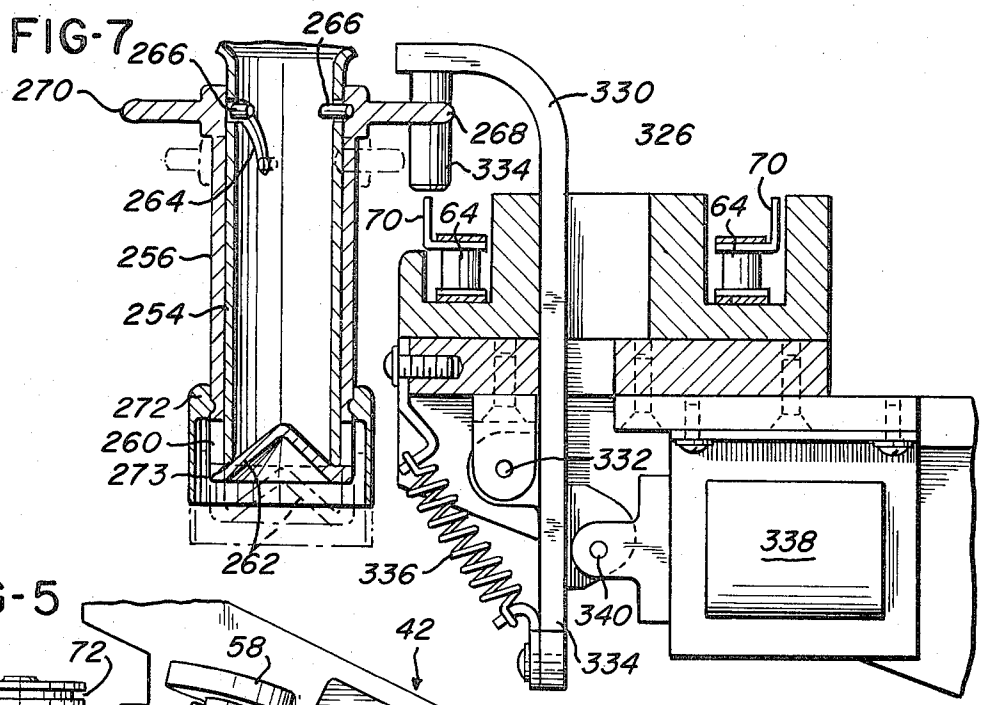


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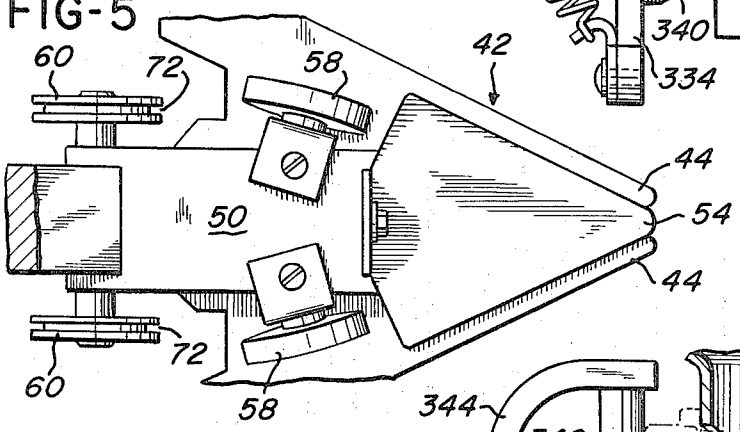
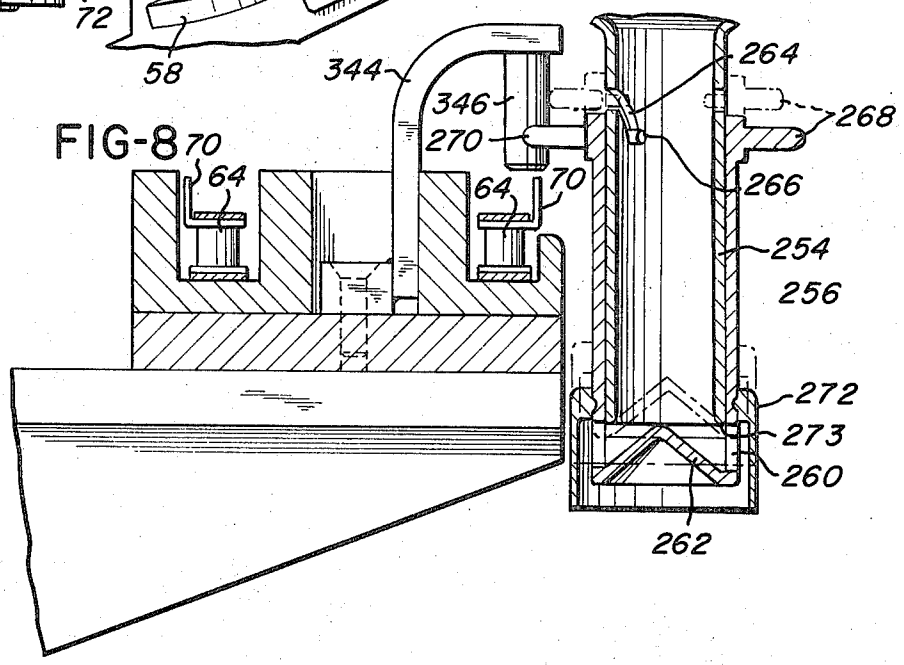


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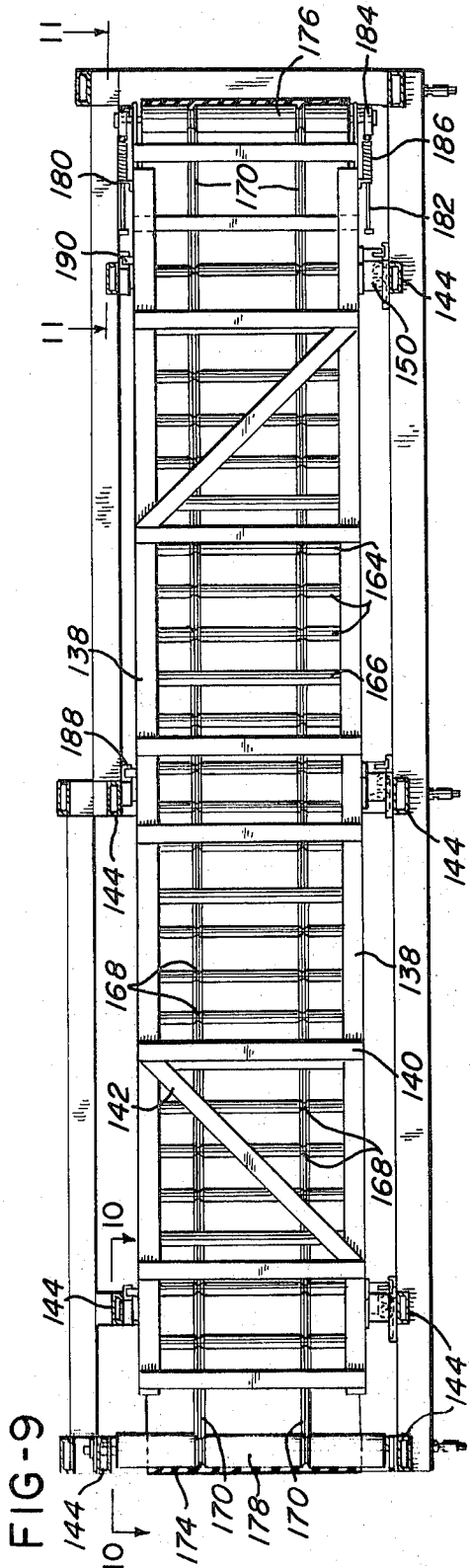

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FIG-9

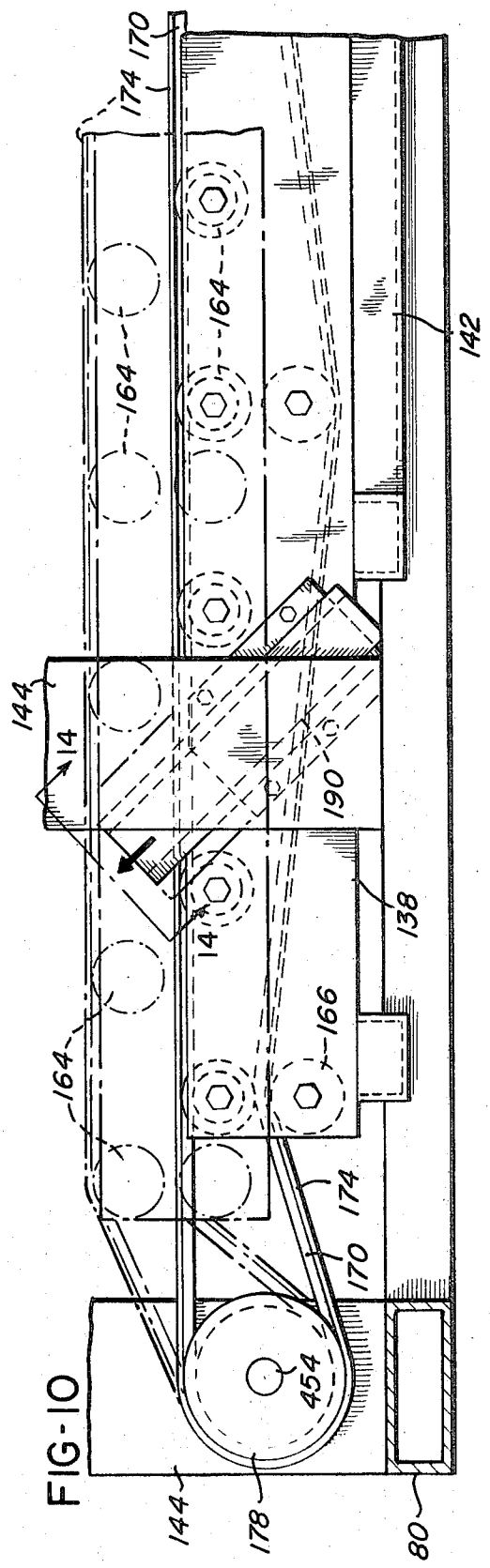

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FIG-10

FIG-11

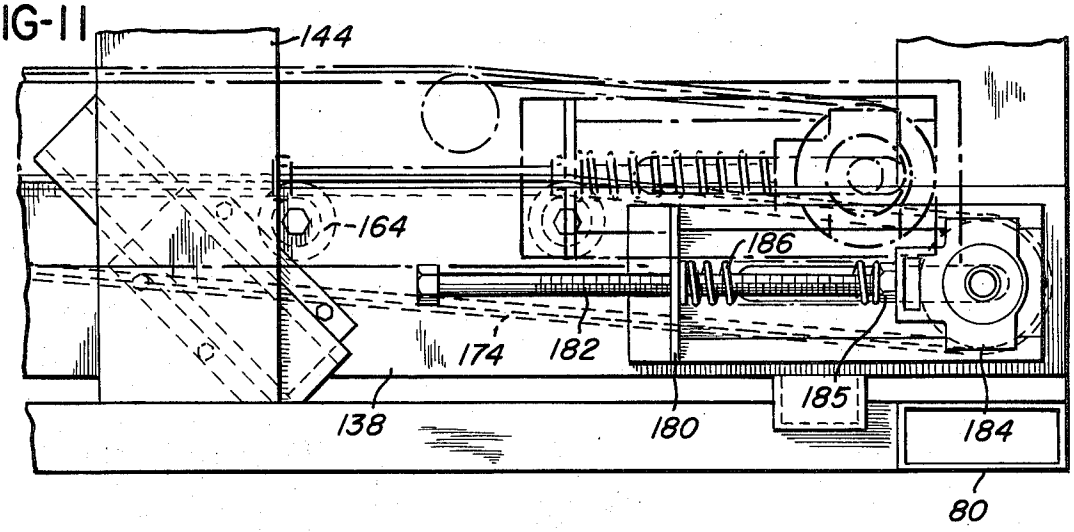


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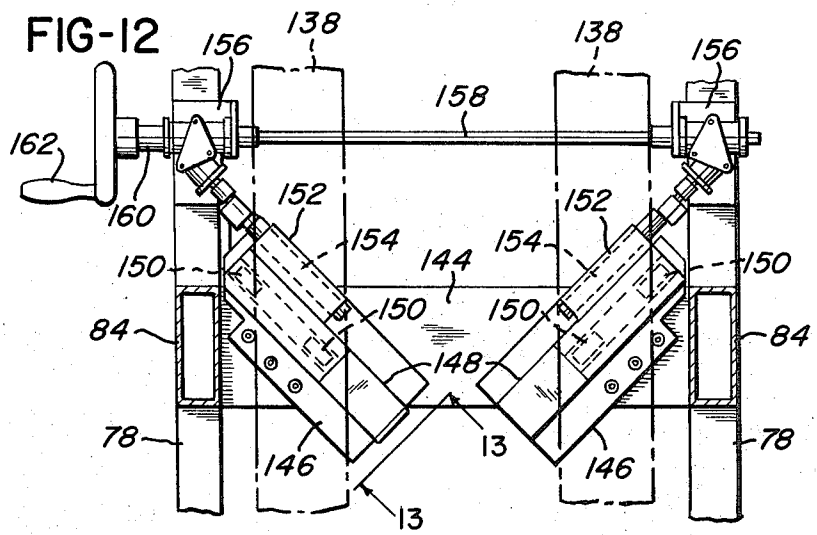


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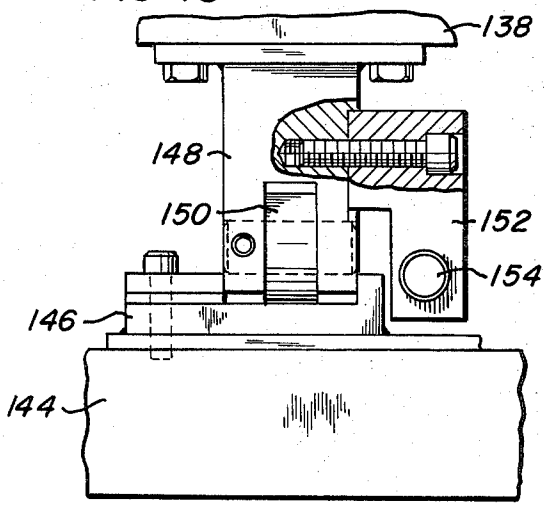
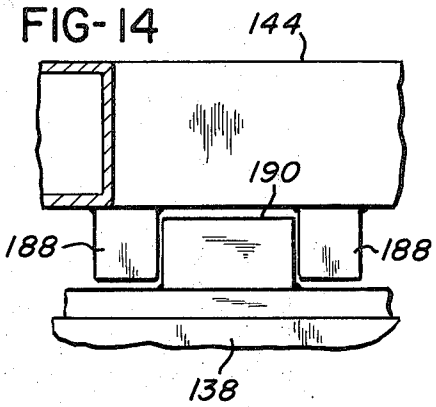


FIG-14



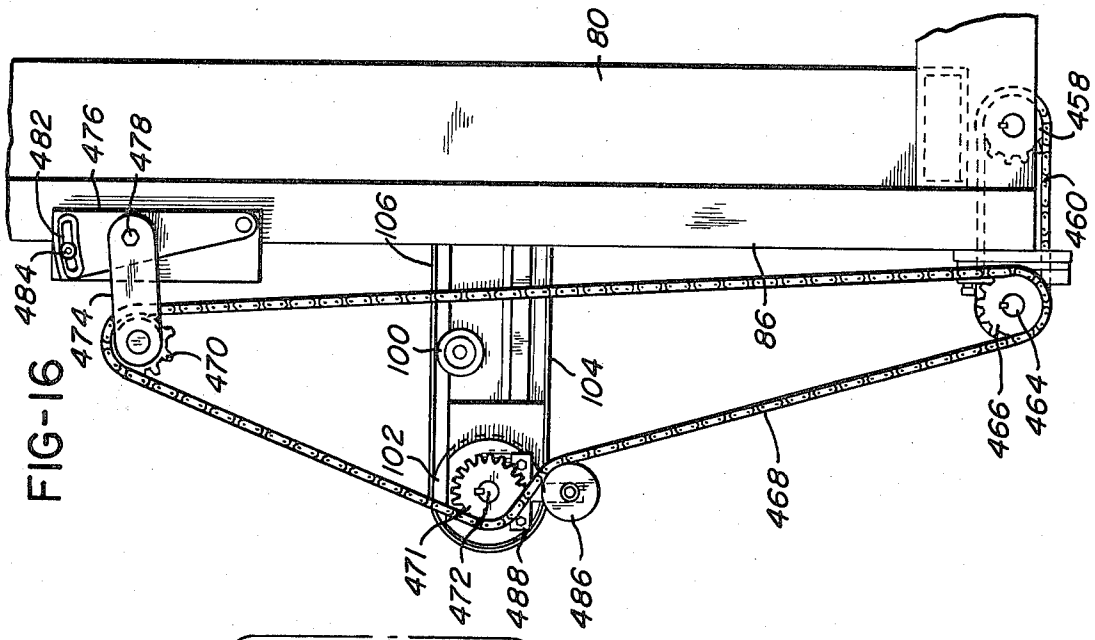

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FIG-16

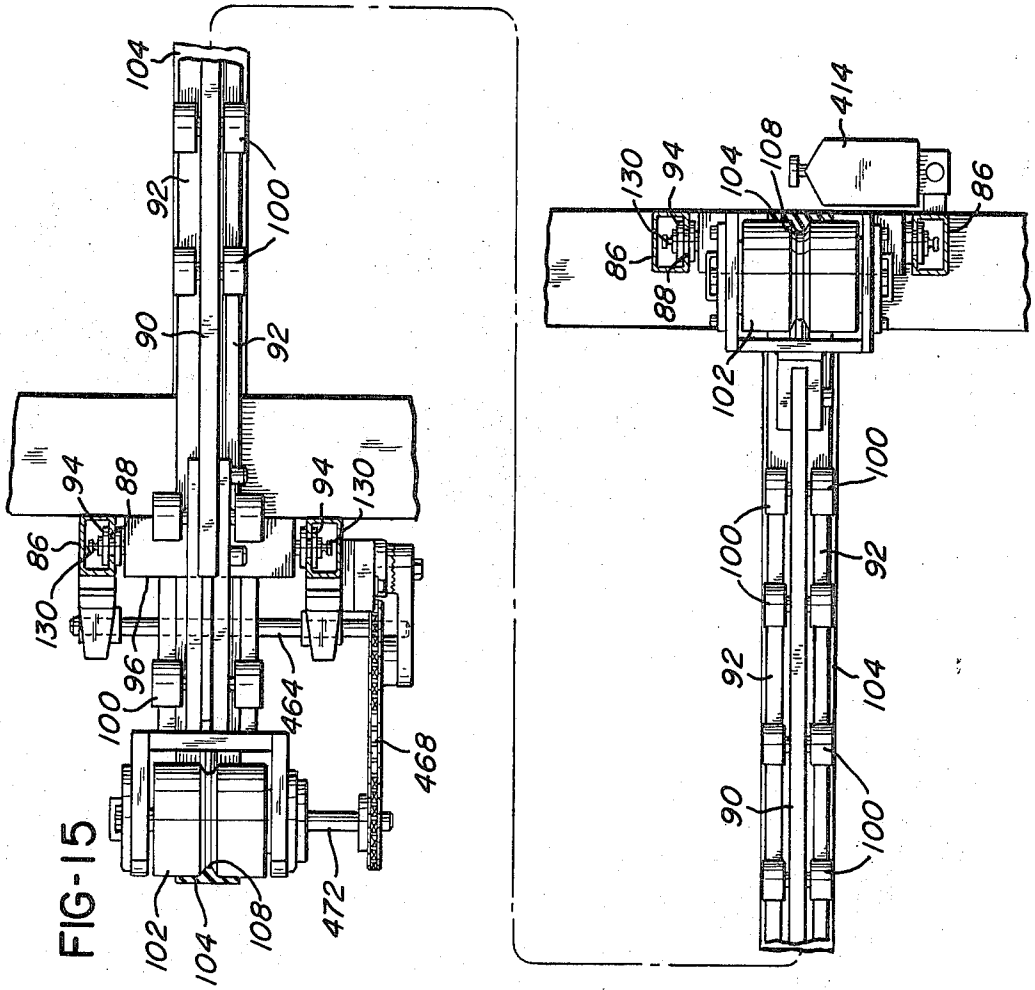

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FIG-15

FIG-17

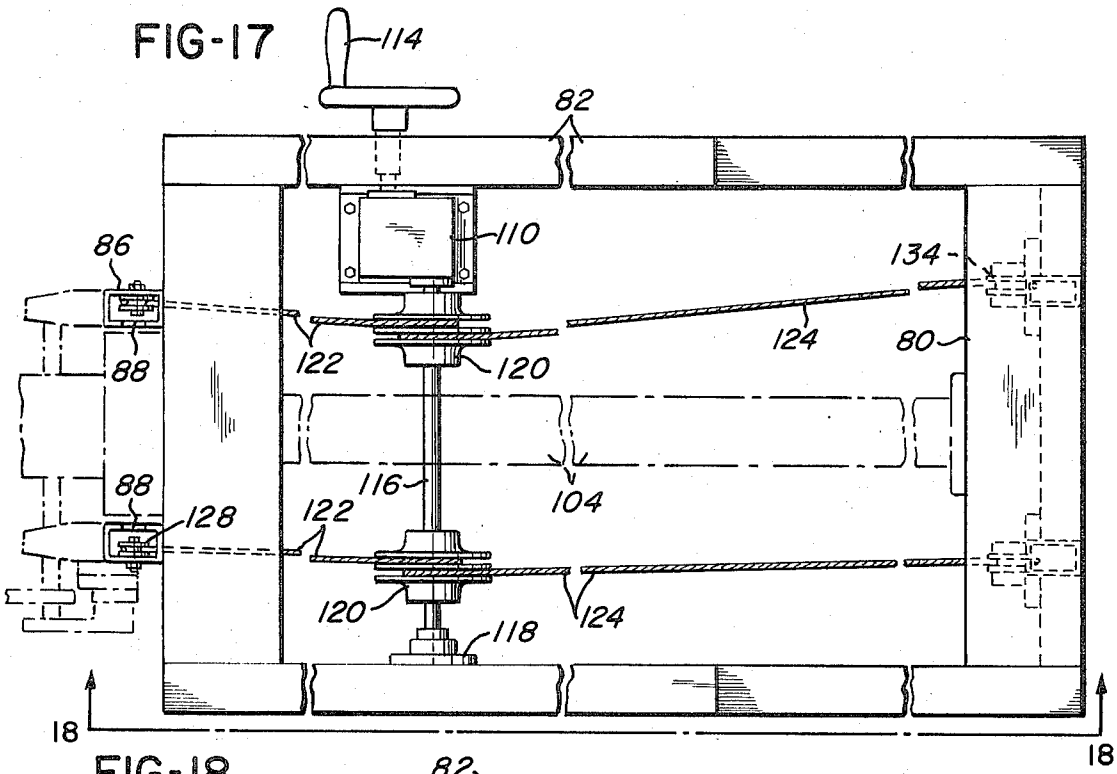
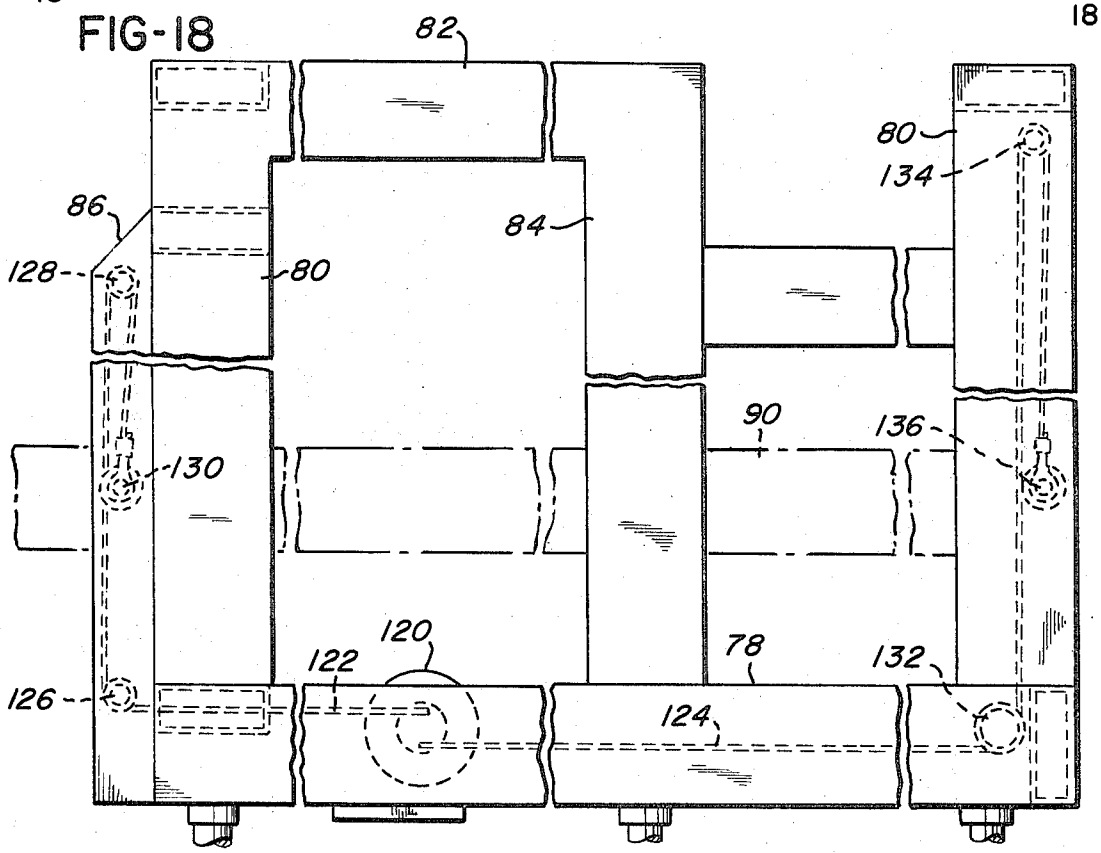

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FIG-18


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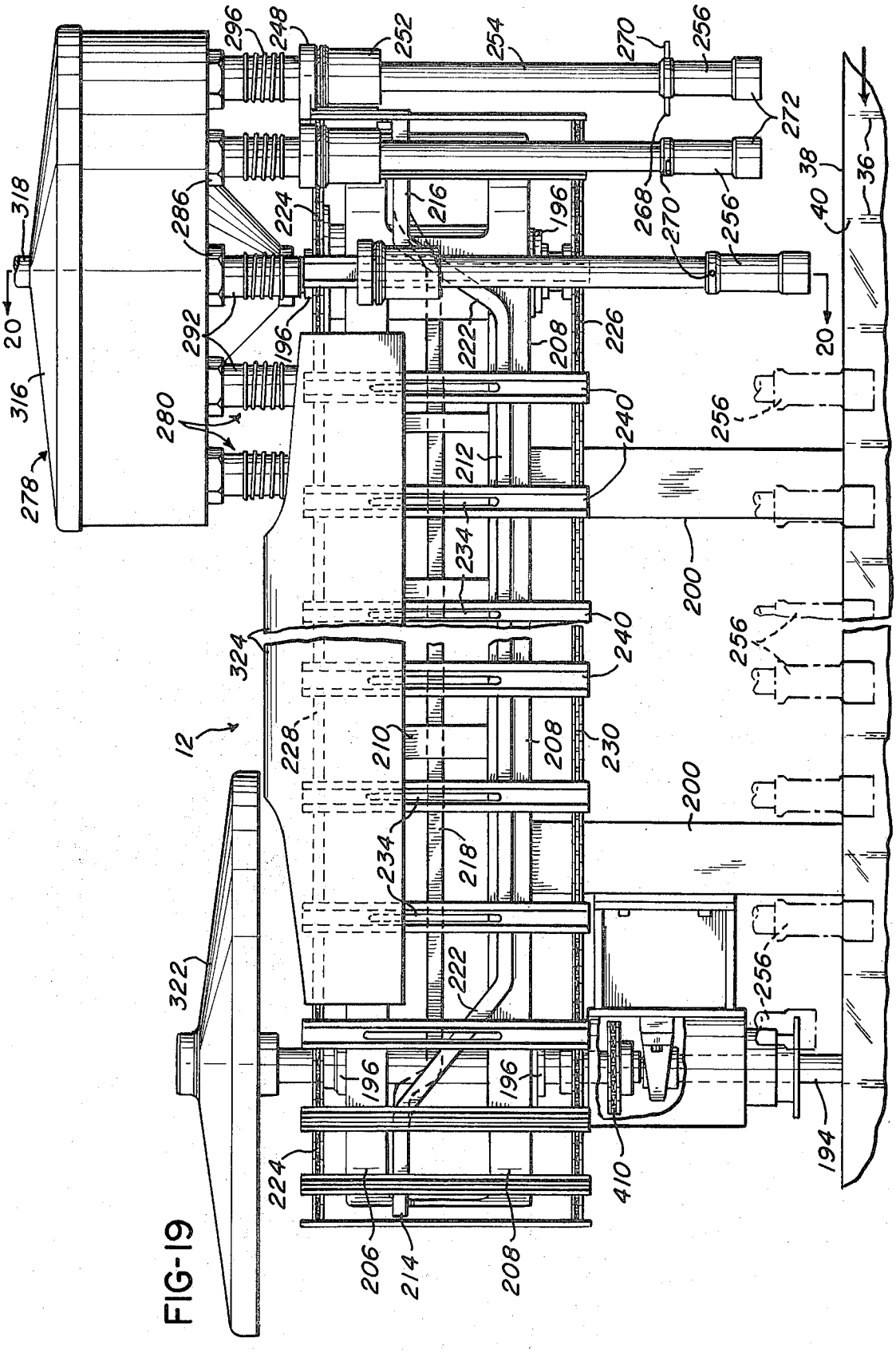

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FIG-19

FIG-20

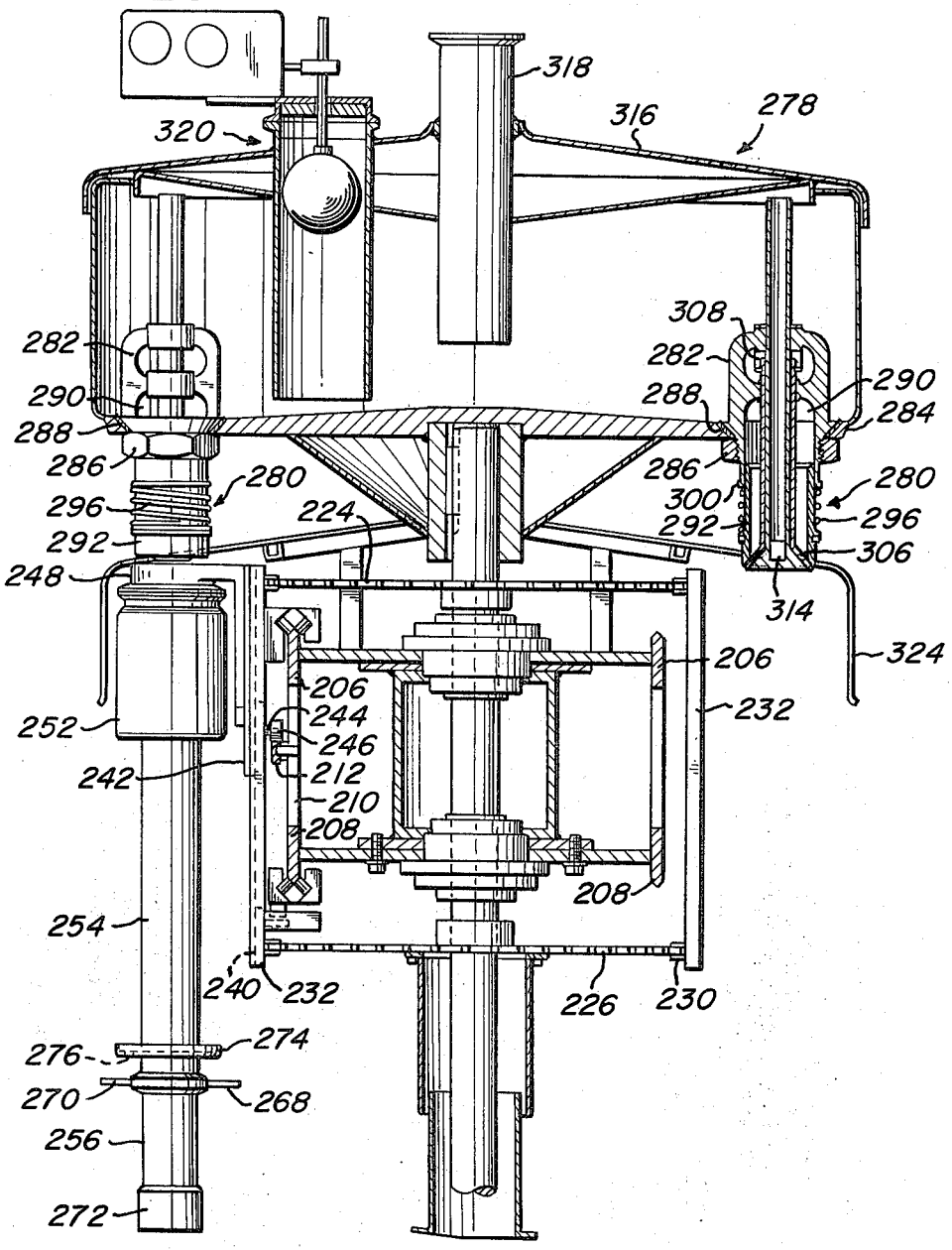

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FIG-21

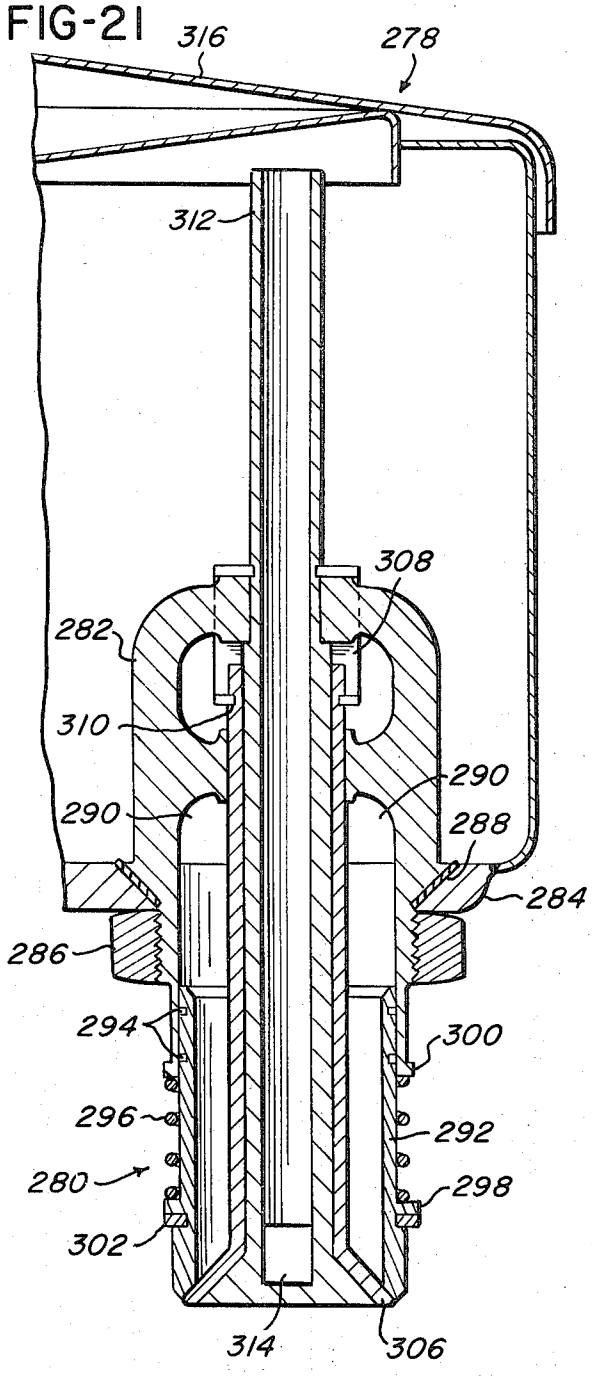
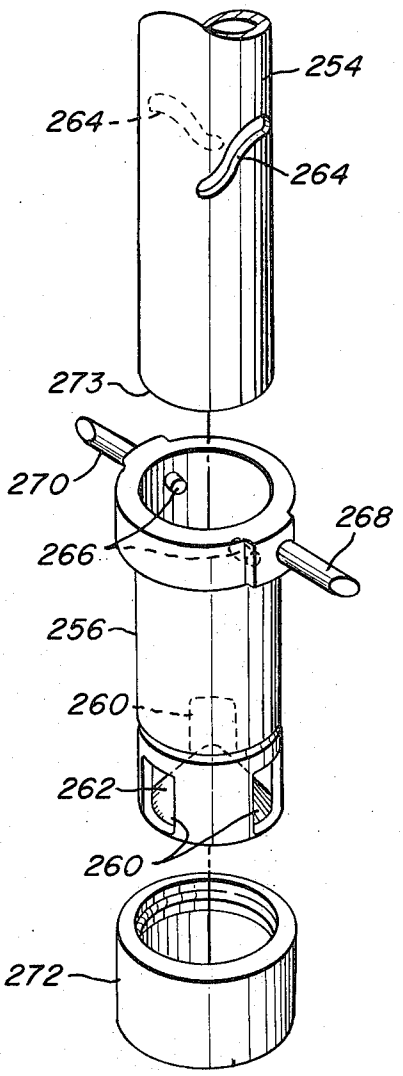
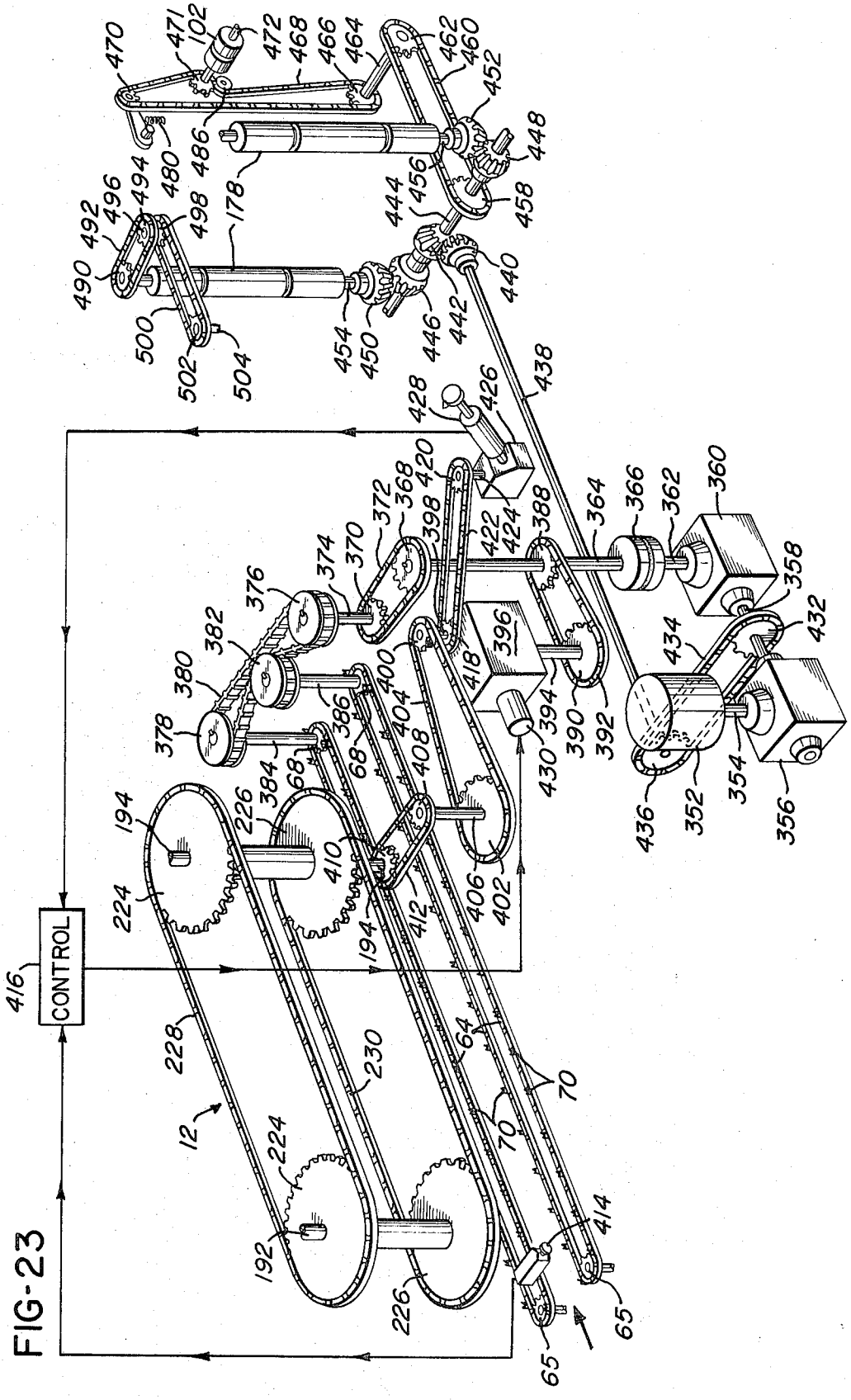

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FIG-22


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FIG-23

PACKAGING MACHINE

BACKGROUND OF THE INVENTION

The use of plastic materials, such as polyethlyene, polyproypropylene and coextruded multifilms to name a few, has found widespread acceptance in the packaging of a number of diverse products For example, applicant's prior U.S. Pat. No. 3,212,681, discloses a container which is ideally suited for packaging milk, ice cream mix and other food products, and which consists of an inner flexible liner of polyethylene supported by an outer, relatively rigid structure of polypropylene.

As noted in the patent, by using a disposable plastic inner bag a great many of the disadvantages attendant to the use of reusable metallic containers and the like are eliminated. With the increased use of plastic maJerials for packaging considerable effort has been expended in the design of methods and apparatus for packaging products in plastic materials on a high volume basis. One type of approach has been o form a web of bags which are thereafter filled and sealed in a variety of ways.

For example, U.S. Pat. No. 2,923,111 discloses a packaging machine in which a web of bags formed of regenerated cellulose, coated paper or metal foil is folded lengthwise to form a double strip which thereafter be sealed at intervals to form a web of bags having common side seams. The bags are then severed from the web and each individual bag moved through the packaging machine where it is filled with a product and sealed.

U.S. Pat. No. 3,269,278 discloses a web of bags formed of inner and outer plys of polyethylene and glassine, respectively, which is intermittently moved through a filling and sealing machine to provide the packaged product.

Another example of packaging machine is shown in U.S. Pat. No. 3,381,446, which purports to be an improvement on the packaging machine shown in the above noted U.S. Pat. No. 2,923,111. In the later patent individual bags are severed from a web of such bags and engaged by cooperating grippers which convey the individual bags through the machine so that they may be filled with the desired product and then sealed.

A fourth patent in this field is U.S. Pat. No. 3,492,783, which again, discloses apparatus for filling and sealing on an intermittent basis a succession of bags joined along common side seams.

In each of the patents noted above it will be seen that the bags are either first separated from the web of such bags and handled separately, or if the bags are retained in continuous web form, the movement of the web through the machine is on an intermittent basis with the various filling and sealing operations taking place while the web is stationary.

It will be seen, therefore, that prior art filling and sealing apparatus usually requires the provision of mechanism for separately engaging and handling each individual bag or performs the filling and sealing function only during periods of non-movement by the web as it is fed through the machine on an intermittent basis.

Thus, it will be apparent that it is desirable, to reduce the complexity of the mechanism involved and increase the speed, efficiency and flexibility of the equipment,

to provide packaging machinery which fills and seals bags in a continuous web of such bags as the web moves through the packaging machine with a continuous, nonintermittent motion.

SUMMARY OF THE INVENTION

The present invention provides apparatus for filling a continuous web of bags on a continuous, nonintermittent basis. The web of bags is formed with the side seams of the bags extending upwardly from the centerfold bottom of the web to a point short of the top of the web to provide a pair of continuous free upper edges. The web is fed into the packaging machine from a unwind stand with the bags oriented vertically, that is with the side seams extending upwardly from the bottom toward the free upper edges.

As the web of bags is fed into the machine a plow-like device spreads the free upper edges and directs them towards a pair of continuous carrier chains which extend downstream from the spreading device. The chains carry upwardly projecting teeth and the free upper edges of the web are pressed into engagement with the teeth by means of grooved rollers positioned just downstream of the plow member.

A pair of channels are positioned over the downstream moving reaches of the chains from a point just downstream of the grooved rollers to a point just upstream of the sealing device associated with the machine and serve to retain the free upper edges in engagement with the upwardly projecting teeth as the bags are carried through the machine to the sealing mechanism.

A pair of spaced apart side belts are trained around rollers having vertically extending axes positioned adjacent th upstream and downstream ends of the machine to provide a pair of downstream moving, parallel side reaches which support th faces of the bags as they move through the machine. A third belt is positioned between the two side belts to engage the bottom of the web of bags and further support it as the web moves through the machine and the distance between the side belts and the vertical position of the center belt are adjustable to accommodate bags of various sizes.

As the web of bags moves downstream in the run defined by the carrier chains and supporting belts the bags in the webs are filled by means of transfer canos which move along an endless track at a speed synchronized with the speed of the web through the machine. The endless track has a downstream branch, coincident with the above mentioned downstream run defined by the carrier chains and supporting belts, an upstream branch extending parallel to the downstream branch, and semi-circular return branches interconnecting the upstream and downstream branches.

A series of carriers are mounted on and driven along the track and carry the transfer cans, which receive a charge from a central hopper or hoppers located at one or both of the return branches and then transfer the load which they receive from the hopper or hoppers to the bags. As noted above, different sizes and widths of bags may be accommodated by adjusting the height and spacing, respectively, of the center and side conveyor belts.

Additionally, it will be seen that the length of the package can be varied to accommodate various multiples of the transfer can spacing so that a single bag may receive a discharge from a plurality of transfer cans.

Also several sets of different capacity cans are provided. Thus, particularly where large capacity cans are being used, a high speed operation can b maintained by using two hoppers and placing a portion of th charge into the transfer cans at one hopper and the remainder of the charge at the second hopper.

The hopper or hoppers positioned at one or both of the return branches of the track are provided with downwardly projecting valves which are actuated by upward movement of the transfer cans into engagement with the valves. Initial engagement between the cans and the valves provides a sealing engagement therebetween, with further upward movement of the cans first opening a vent line and then opening a discharge valve to cause a product flow into the transfer cans. As the cans move along the track from either of the return branches to either the upstream or downstream branches of the track they descend and cause the valve sealing, venting and discharging operations described above to proceed in reverse order.

As the cans descend to the downstream branch of th track they encounter valve opening mechanism which, if a bag is positioned to receive a charge from a particular transfer can, opens a valve on the lowermost end of the nozzle carried by the cans to permit the product to be discharged from the cans into the bag so positioned. Of course, if a bag is not positioned to receive a charge from the can, the valve opening mechanism is deactivated to prevent loss of the product.

Where a food product such as milk, ice cream mix, etc., is being packaged, sanitary considerations are, of course, of great importance. Therefore, in accordance with a further feature of the invention, ultraviolet scanning means are positioned adjacent the upstream end of the machine to radiate the separated edges of the web of bags with ultraviolet light and further ultraviolet means are positioned adjacent the upstream branch of the endless track to radiate the valves and nozzles of the transfer cans.

All of the drives for the bag carrier chains, side and center belts, transfer can carriers, sealing means, etc., are derived, through appropriate gearing, from a single power source. While this assures that the various components move with synchronism through the packaging machine, it will be appreciated that some irregularities may occur in manufacturing the web of bags, so that the side seam spacing on the web is not precisely uniform.

To accommodate such nonuniformities, a photoelectric scanning unit is mounted at the upstream end of the run to detect indicia associated with each bag and transfer a signal to a control device each time the indicia passes. At the same time, the speed of the drive for the can carriers is also transferred to the control unit where the two signals are compared and, if out of phase to an unacceptable degree, an appropriate advancing or retarding signal is generated to a differential unit, which then speeds up or retards the rate of travel of the transfer cans with respect to the movement of the web of bags through the machine.

After the bags have received a charge from one or more of the transfer cans they are carried by the chains and supporting belts through a sealing mechanism, which may be of conventional construction, where the free upper edges of the bags are sealed and excess bag material above the seal trimmed.

Throughout the operation movement of the bags is continuous, will all of the operations necessary to open, fill and seal the bags being performed as the bags continue tomove through the machine. This not only improves operating efficiency and speed but also eliminates potential sources of vibration which might occur if the bags were moved through the machine on an intermittent basis. Additionally, since the bags are fed into the machine as a continuous web, the necessity of handling each of the bags separately is eliminated, with a consequent simplification of the machinery necessary.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view showing certain components of the apparatus of the present invention with portions removed for clarity;

FIG. **2** is a plan view of the apparatus of the present invention;

FIG. **3** is a side elevational view of the apparatus of FIG. **2**;

FIG. **4** is a side elevational view of the components for separating the free upper edges of the web of bags;

FIG. **5** is a top plan view of the apparatus of FIG. **4**;

FIG. **6** is a front elevational view of a portion of the upstream end of the apparatus;

FIG. **7** is a view showing the valve opening mechanism;

FIG. **8** is a view similar to FIG. **7** but showing the valve closing mechanism;

FIG. **9** is a side elevational view of the supporting structure for the side supporting belts;

FIG. **10** is a view taken on line **10—10** of FIG. **9**;

FIG. **11** is a view taken on line **11—11** of FIG. **9**;

FIG. **12** is a top view of mechanism for adjusting the spacing between the side supporting belts;

FIG. **13** is a view taken on line **13—13** of FIG. **12**;

FIG. **14** is a view taken on line **14—14** of FIG. **10**;

FIG. **15** is a top view of the center supporting belt structure;

FIG. **16** is a side view of the downstream end of the center supporting belt showing a portion of the drive and adjusting mechanism therefor;

FIG. **17** is a top view of the adjusting mechanism for the center support belt;

FIG. **18** is a view taken on line **18—18** of FIG. **17**;

FIG. **19** is a side view of the filling section of the apparatus of the present invention;

FIG. **20** is a view taken on line **20—20** of FIG. **19**;

FIG. **21** is an enlarged view of a portion of a central hopper and valve assembly therefor;

FIG. **22** is an exploded view of a portion of a transfer can and nozzle assembly therefor; and

FIG. **23** is a perspective view showing the interconnected drives for the various components of the apparatus of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

With reference initially to FIG. **1** of the drawings, it will be seen that the principal components of packing apparatus in accordance with the present invention include an unwind section **10**, a filling section **12**, and a sealing and trimming section, which may be of conventional construction and which is referenced in its entirety by the numeral **14**.

The unwind section 10, as seen in FIGS. 1–3, includes a pair of unwind stands 16 and 18, each of which comprises a pair of spaced arms 20 and 22 journalling a shaft 24, and a second pair of arms 26 pivotally attached to the arms 20 and d 22 and having turning rollers 28 rotatably mounted on the outer ends thereof. A web of bags 30, in roll form, is shown as mounted on the unwind stand 18 and coverplates 32 and 34 are also provided to prevent contamination of the web of bags by airborne dust particles, washing liquids and the like.

The web itself, as best seen in FIG. 1 of the drawings, is conveniently formed of polyethylene or otrher suitable plastic material and is divided up into a series of interconnecting bags by side seams 36 which extend from the bottom edge of the web to a point short of the top thereof to provide a pair of continuous free upper edges 38 (see also FIGS. 6 and 19 of the drawings). Additionally, to faciitate seperation of the individual bags from the web thereof after filling, the web may be provided with lines or serrations, as at 40, intermediate each of the side seams 36. It will also be noted that although the side seams 36 are shown as separate heat seal lines the bags could instead by joined by a single, wider heat seal line with the line of perforations extending medially thereof.

Regardless of the specific construction of the side seams of the bags, however, the web is provided with a pair of continuous, free upper edges 38 which, as the web is withdrawn from the supply thereof on the unwind stand, are fed into a plow like separating device 42. As best seen in FIGS. 4–6 of the drawings, the separating device 42 includes a pair of stationary plate members 44 bolted, as at 46, to portions of the framework of the packaging machine with their inner edges 48 positioned in spaced apart relationship to each other.

A bracket member 50 is pivotally mounted, as at 52, to a portion of the framework of the machine and has bolted to its upstream end a substantially triangular plate member 54 which has a central depending portion received between the spaced apart edges 48 of the bottom plate members 44. Bracket member 50 also rotatably mounts a pair of canted tensioning rollers 58 and a pair of grooved rollers 60. It will also be noted with reference to FIG. 4 of the drawings that an ultraviolet light 62 may be mounted on the same cross frame member as the bracket 60, projecting in a downstream direction toward the free upper edges 38 of the web of bags to radiate them with ultraviolet light for sanitizing purposes.

A pair of endless chains 64 are trained about a pair of sprockets 65, only one of which is shown in FIGS. 4 and 6, adjustably mounted by means of slidable base plates 66 and adjusting bolts 67 adjacent the upstream end of the machine. Chains 64, as best seen in FIG. 23, are also trained about a second pair of sprockets 68 mounted adjacent the upstream and of the sealing unit 14. Each of the chains bears a plurality of closely spaced, upwardly projecting teeth 70. At the upstream end of the two downstream moving, parallel chain reaches the teeth 70 are received in grooves 72 in the grooved roller 60. Additionally, channel members 74 are attached to the framework of the machine by means of spaced clips 76 in overlying relationship to the downstream moving reaches of the chains 64 and provide a track within which the upwardly projecting teeth 70 ride as they move downstream through the machine.

The supporting framework for the packaging machine includes spaced, parallel, horizontally extending frame members 78, upright end posts 80 and a plurality of interconnecting members, as at 82 and 84. Attached to this framework at the upstream and downstream ends of the machine, as best seen in FIGS. 3 and 15–18 of the drawings, are vertically extending members 86, substantially rectangular in cross section, and having formed on the inner opposing walls thereof elongated. vertically extending slots 88. (See FIG. 15).

An elongated plate member 90 having reinforcing angle members 92 attached to opposite sides thereof extends from one end to the other of the machine and has grooved rollers 94 attached to opposite sides thereof adjacent each end by means of brackets 96 and 98 with the grooved rollers 94 received in the elongated, vertically extending slots 88. The bar 90 also has journalled thereon a series of spaced apart pairs of rollers 100 and large diameter, grooved rollers 102 at each end thereof. A center support belt 104 is trained about the rollers 100 and 102 with its upper, downstream moving reach 106 supported by the rollers 100 and 102 and its rib 108 received in the grooves in the rollers 102.

As seen in FIGS. 17 and 18 of the drawings, a gear box 110 is mounted one one of the lower frame members 78 and has an input shaft 112 projecting from one side thereof to which is attached a hand crank 114 and an output shaft 116 projecting from the opposite side thereof and journalled on an opposite side of the frame, as at 118. The shaft 116 carries a pair of double grooved pulleys 120 to which are affixed cables 122 and 124.

Each cable 122 extends downstream to a roller 126 rotatably mounted within the member 86, thence upwardly and about a second roller 128, and thence downwardly where it is attached, as at 130, to he center belt supporting structure at a point adjacent the point of attachment of the grooved rollers 94. Each of the cables 124 extends upstream to a turning roller 132, thence upwardly and around a second turning roller 134, and thence downwardly to a point of attachment 136 on the center belt supporting structure at a point adjacent the upstream grooved rollr 94. It will be apparent from the above that by rotating the hand crank 114 the cables 122 and 124 are wound and unwound upon the pulleys 120 to cause thee vertical position of the center support belt 104 to be varied as desired.

Positioned on opposite sides of the center support belt 104 are a pair of spaced apart, longitudinally extending side belt supporting frames, each of which includes upper and lower angle shaped members 138 interconnected by vertically and diagonally extending struts 140 and 142, respectively. As best seen in FIGS. 1 and 9–13 of the drawings, cross members 144 are provided at spaced intervals along the top and bottom of the machine.

Mounted on the upper surface of the bottom cross members 144 are three pairs of diagonally extending, bottom track members 146. At corresponding intervals along the lower angle members 138 are fixed downwardly depending brackets 148, each of which journals a pair of rollers 150 positioned in rolling contact with the tracks 146. Also attached to the brackets 148 are

substantially inverted L-shaped members **152**, which threadably receive threaded shafts **154**.

Mounted on the bottom frame member **78** adjacent the upstream cross member **144** are a spaced apart pair of gear boxes **156** interconnected by a cross shaft **158** and having an input shaft **160** bearing a hand crank **162**. The outer ends of each of the threaded shafts **154** are received in the gear boxes **156** so that rotation of the hand crank **162** will cause rotation of each of the threaded shafts **154**. This in turn,will cause the side belt supporting frames to move either inwardly in an upstream direction or outwardly in a downstream direction, depending upon the direction of rotation of the hand crank **162**, to thereby vary the spacing between the two frames.

The upper and lower roller frame members **138**, as best seen in FIGS. 2 and **9–11** of the drawings, journal closely spaced, vertically extending rollers **164** and a second set of rollers **166**, also vertically extending but spaced apart a greater distance than the rollers **164**. Each of the rollers **164** are grooved, as at **168**, to receive the parallel ribs **170** projecting inwardly from the belt **174** trained about the rollers **164**.

Top and bottom support members **138** also journal, adjacent their upstream end, somewhat larger diameter grooved rollers **176** which are also wrapped by the belt **174** while the cross member **144** at the downstream end of the machine journals second, relatively large diameter grooved rollers **178**, which are also wrapped by the belt **174**.

Since the side supporting belts **174** are trained about both the fixed roller **178** and the movable rollers **164**, some means must be provided for accommodating movement of the belts as th spacing therebetween is varied, as shown in phantom lines in FIGS. **10** and **11** of the drawings, and this function is provided by the take up mechanism now to be described.

Adjacent their upstream ends the angle members **138** have affixed thereto by welding or the like bracket members **180**, centrally apertured to slidably receive the threaded bolt members **182**. The bolt members **182** are attached at one end to brackets **184** which rotatably mount the rollers **176** and a coil spring **186** encircles the bolt member **182** and bears against the two brackets **180** and **184**, tending to urge the roller **176** in an upstream direction. The amount of tension on the belt **174** can, of course, be adjusted by turning the nut **185** on th rod **182** while the spring **186** accommodates movement of the belts.

As best seen in FIGS. **9** and **14**, the top cross members **144** of the supporting framework carry downwardly projecting guide members **188** which receive between them upwardly projecting members **190** mounted on the upper surfaces of the upper frame members **138**. The cooperating members **188** and **190** merely serve to guide the supporting frames as they are moved inwardly and outwardly with the weight of the assembly being taken by the rollers **150**.

Turning now to FIGS. **19–21** of the drawings, the filling section **12** of the packaging apparatus of the presen invention will be described. As seen particularly in FIGS. **19** and **20**, the filling section **12** includes a pair of vertically extending shafts **192** and **194**, mounted for rotation in bearings **196**. The bearings **196** are in turn mounted in the upper and lower webs of a longitudinally extending box beam **198** secured to two vertically extending supporting columns **200**.

Beam **198** also supports upper and lower outwardly extending plate members **202** and **204**, to the outer edges o which are attached upper and lower track sections **206** and **208**, respectively. Vertical struts **210** extend between the upper and lower track members and also carry a cam track **212**. Both the upper and lower track members **206** and **208** and the cam track **212** are race track shaped in plan view, consisting of spaced, parallel, upstream and downstream branches interconnected by semi-circular return branches.

While the upper and lower track sections **206** and **208** extend horizontally, the return sections **214** and **216** of the cam track are positioned at a higher elevation than the upstream branch **218** thereof. The downstream branch **220** is positioned at a lower elevation than either the upstream or return branches and boh the upstream and downstream branches of the camming track are connected to the return sections by means of transition sections **222**.

Also fixed to each of the shafts **192** and **194** are upper and lower sprockets **224** and **226**, and trained about the sprockets are upper and lower chains **228** and **230**. Attached to and extending between the upper and lower chains **228** and **230** are a series of vertically extending track members **232**, which are slotted, as at **234**, and carry opposed pairs of upper and lower rollers **236** and **238**, which engage the upper and lower tracks **206** and **208**, respectively.

The track members **232** are undercut in their outer faces to provide vertically extending dove tail slots or trackways **240**. Carriers **242** having complementarily shaped portions which engage the dove tail shaped tracks **240** are thus slidable upwardly and downwardly within the vertically extending track members **232**. Each of the carriers **242** has mounted on the rear face thereof a short stub shaft **244**, which extends through the slot **234** in the carriers **232** and carries a roller **246** rotatably mounted thereon and engageable with the cam track **212**. Each of the carriers **242** is also provided with an upwardly projecting portion **248** to which is attached by means of a split ring clamp or the like **250**, a transfer can **252** having a downwardly extending nozzle **254**.

Each of the nozzles **254**, as best seen in FIGS. **7**, **8** and **22**, terminates in a valve sleeve **256**. Valve sleeve **256** includes a substantially straight sided cylindrical portion **258** having a series of openings **260** formed therein and an inwardly projecting conical section **262**. Each nozzle **254** is provided with opposed slots **264** milled in its outer surface thereof extending spirally with respect to its axis and the valve sleeves **256** are provided with inwardly projecting portions **266** which are received in an ride along the grooves **264**.

Adjacent their upper ends the valve sleeves **256** are provided with diametrically positioned, outwardly projecting ears **268** and **270**, while adjacent their lower ends the valve sleeves are provided with deflecting collars **272** which snap fit into place over the ends of the valve sleeves **256**. With the above construction it will be apparent that turning a valve **256** by means of the ears **268** and **270** will cause the valve to move upwardly and downwardly with respect to the nozzle **254** upon which it is mounted, thereby breaking the seal between the lower edge **273** of the nozzle and th conical section **262** to allow material to flow from the transfer can. The deflecting shield **270**, of course, redirects the product

flow to a downward direction and prevents excessive splashing.

It will also be noted from FIG. 20 of the drawings that the transfer cans may be provided with condensate collecting trays 274. These trays, which may be made of rubber or some other resilient material, snugly embrace the nozzles 254 and receive any condensate which may collect on the surface of the transfer cans 252 and run downwardly. Preferably the trays 274 are apertured, as at 276, to permit the collected condensate to drain from the trays at a point outwardly of the bags being filled.

Attached to the upper end of the shaft 192 is a central hopper 278, which includes a plurality of downwardly extending valves 280, each of which is spaced about the lower surface of the hopper 278 at a distance corresponding to the spacing of the transfer cans 252. Each of the valves 280, as best seen in FIG. 21 of the drawings, includes a main body portion 282 fixed to the bottom wall 284 of the tank 278 by means of the locknut 386. Of course, suitable gasket material 288 is interposed between the body 282 of the valve and the opposing portions of the bottom wall 284.

The interior of the valve body 282 communicates with the interior of the hopper 278 by means of openings 290 formed in the valve body. Slidably received within the valve body is a cylindrical section 292 carrying O-rings or the like 294, in sliding, sealing relationship with the valve body 282. A coil spring 296 encircles the cylindrical member 292 and bears against an outwardly projecting lip 298 and an outwardly projecting shoulder 300 on the lower end of the valve body 282. The cylindrical member 292 also carries a gasket member 302 received in a groove formed adjacent the lower end thereof.

Also slidably received within the valve body 282 is a second cylindrical member 304 having an outwardly flared lower end 306. A leaf spring 308 engages the upper end of the valve body 282 and is received in a groove 310 in the upper end of the member 304 with the spring 308 tending to raise member 304 upwardly with respect to the valve body in opposition to the downward force exerted by the spring 296. Since the spring 296 exerts greater force than the spring 308 the members 292 and 304 tend to stay in a position shown in FIG. 21 of the drawings.

A vent line 312 is fixed in the valve body 282 an has a series of openings 314 formed in its lower end while its upper end extends upwardly through the transfer can 278 a distance sufficient to place it above the highest level of a product contained in the hopper 278. The hopper 278 is also provided with a cover 316, through which a feed line 318 projects. Conveniently, the hopper 278 can also be provided with a float type switch, referenced in its entirely by the numeral 320, and the feed line connected to a constant supply of the product being packaged so that a constant level of the material in the hopper can be maintained.

Fixed to the upper end of the shaft 194 is an outwardly projecting cover 322 which serves to protect the open transfer cans as they move around the return branch of the track and prevent the contamination of the cans by airborne foregin materials. Similarly, a canopy 324 extends from the cover 322 to the hopper 278 to protect the open transfer cas as they move along the downstream and upstream branches of the track.

As will be seen from FIG. 1 of the drawings, valve opening and closing mechanisms 326 and 328 are positioned adjacent the upstream and downstream ends, respectively of the downstream run defined by the downstream reaches of the carrier chains 64, side support belts 174 and center support belt 104.

Member 326, as best seen in FIG. 7 of the drawings, includes a substantially L-shaped member 330 pivotally mounted on the machine frame, as at 332 and carrying a downwardly projecting finger 334. A spring 336 is attached to the machine frame and to the lower end of the member 330 and tends to pivot the member 330 clockwise as seen in FIG. 7 of the drawings to an inactive position wherein the finger 334 is moved from the path of the outwardly projecting ear 268 on the valve 256. Pivoting of the member by the spring 336 is resisted by the solenoid valve 338, which is pivotally attached, as at 340, to the lower end of the plate member 330.

At a point just upstream of the valve opening member 326 a feeler rod 342 (FIG. 6) projects across the path of th web of bags and controls the solenoid 338. Thus, if the feeler 342 is engaged by the web of bags it carries the solenoid 338 which causes the valve opening mechanism to assume that the position shown in FIG. 7 of the drawings. On the other hand, if the feeler 342 is not depressed, that is, if there are no bags present at the point adjacent the valve opening mechanism 326, the solenoid is not actuated and the spring 336 will pivot the valve opening mechanism 326 to an inactive position.

The valve closing mechanism 328 includes, as seen in FIG. 8 of the drawings, a stationary, substantially L-shaped member 355 fixed to the framework of the machine and carrying a downwardly projecting finger 346 positioned to engage the outwardly projecting ear 270 on the valve 256.

The sealing and trimming section shown at 14 in FIGS. 1 and 3 of the drawings receives the web of bags at the downstream end of the filling section 12 and heat seals the free upper edges and, if desired, trims off excess bag material above the heat seal line. As noted above, the unit 14 may be a commercially available piece of equipment of conventional construction. For example, a sealing and trimming unit known as the model CBS–CH Chain Band Sealer, manufactured by Doughboy Industries Incorporated has been found to function satisfactorily and the infeed plates of a unit of this type are shown at 350 in FIGS. 2 and 3 of the drawings. The only modification of the chain band sealer 14 desirable, although not necessary, is to eliminate the motor and gear box which is standard equipment with this unit and instead drive the chain band sealer from the same power source as the remainder of the packaging apparatus.

In this regard, and with reference to FIG. 23 of the drawings, it will be seen that the drive for the entire system can be derived from a single motor 352 having an output shaft 354 thereof connected to a right angle gear box 356.

An output shaft 358 of the gear box 356 feeds into a second, right angle gear box 360, the output shaft 362 of which is connected to second shaft 364 by means of an electrically operated clutch 366.

Clutch 366 may be controlled by suitable mechanism, not shown, to selectively transmit the drive from the motor 352 to the drive shaft 364. On its upper end

the drive shaft 364 has fixed thereto a sprocket 368 and entrained about the sprocket 368 and a second sprocket 370 is a chain 372. The sprocket 370 is fixed to a shaft 374 which carries at its opposite end a pulley 376.

Wrapped about the pulley 376 and a second pulley 378 is a gear belt 380. Also meshing with the outer face of the gear belt 380 is a third pulley 382. The pulleys 378 and 382 are mounted on shafts 384 and 386, respectively, which in turn have affixed to their lower end sprockets 68. Trained about the sprockets 68 at their downstream ends and bout the sprockets 64 at their upstream ends are the carrier chains 64 bearing the upwardly projecting teeth 70.

Thus it will be seen that the drive from the motor 352 is transmitted to drive the carrier chain 64, nd by positioning the pulleys 378 and 382 in engagement with the inner and uter surfaces of the gear belt 380, the inner opposed parallel reaches of the carrier chains moved in unison downstream towards the sealing section 14.

Drive shaft 364 also has mounted thereon intermediate its ends a drive sprocket 388 and trained about this sprocket and a second sprocket 390 is a chain 392. Sprocket 390 is mounted on a shaft 394 feeding into a gear box 396 having an output shaft 398. Mounted on the upper end of the shaft 398 is a sprocket 400 and trained about the sprocket 400 and a second sprocket 402 is an endless chain 404.

Sprocket 402 is fixed to one end of a shaft 406 which, at its opposite end, has affixed thereto a sprocket 408 and about the sprocket 408 and a second sprocket 410 is wrapped and endless chain 412. Sprocket 410 is mounted on the lower end of the shaft 194 which, as noted above in connection with the description of FIGS. 19–21 of the drawings, has mounted thereon large sprockets 224 and 226.

The chains 228 and 230 wrap the large sprockets in th shaft 194 at the downstream end of the filling section 12 and also the corresponding sprockets 224 and 226 mounted on th shaft 192 at the upstream end of section 12. It will be seen, therefore, that by engaging the clutch 366 both the drive for the filling section 12 and the drive for the carrier chains 64 are activated.

While the gearing arrangement described above is such that the chains 228 and 230 and the chains 64 will move in unison, in practice it has been found that some nonuniformity will usually be found in the length of bags used. While differences in bag lengths will be small, these differences could, through accumulation, become great enough to cause problems in properly inserting the can nozzles in the bags. It is desirable, therefore, to be able to vary the relative speeds of the chains 228 and 230 and the chains 64 to synchronize the movement of the filling section with the passage of bags through the machine so that the nozzles of the transfer cans are inserted substantially in the center of each of the bags as the bags move through the machine.

This is accomplished in accordance with the present invention by providing a scanning device 414 (see also FIG. 15 of the drawings) adjacent the upstream end of the packaging machine. The scanning device 414, which may conveniently be a reflected light photoelectric unit, scans the web of bags as it is fed into the machine and pulses a signal to a control unit 416 each time some indicia associated with each of the bags passes by the unit 414. This indicia might be one of the bag side seams or a specially printed index mark on each bag.

On the shaft 398 extending from the gear box 396 is a second sprocket 418 and trained about this sprocket and a second sprocket 420 is an endless chain 422. Sprocket 420 is mounted on the end of shaft 424 which feeds into a gear box 426 which provides an angular take-off to a signal generating device 428 mounted in the control console of the packaging machine or other convenient position.

Since the unit 428 will generate a signal upon each revolution thereof, it will be seen that signals are generated and fed to the control unit 416 from the unit 428 which are proportional to the rate of speed of the chains 228 and 230. Control unit 416 then compares the signals received from the scanning device 414 and the unit 428 and, if there is a discrepancy between the signals outside some preselected range, genrates a control signal to the differential unit 430 mounted on the gear box 396 which causes the speed of the chains 228 and 230 to be either advanced or retarded as necessary to provide synchronism between the filling section and the travel of the web of bags through the packaging achine.

With continued reference to FIG. 23 of the drawings it will be seen that shaft 358 has mounted thereon a sprocket 432 about which is trained a chain 434. Chain 434 also wraps a sprocket 436 mounted on one end of a shaft 438 which carries a bevel gear 440 on its opposite end. Bevel gear 440 meshes with a second bevel gear 442 mounted on a shaft 444 which also carries, adjacent each of its ends, additional bevel gears 446 and 448.

Each of the gears 446 and 448 are in turn in mesh with bevel gears 450 and 452 mounted on the ends of shafts 454 and 456, which also has fixed thereto the large diameter grooved rollers 178. Shaft 444 also has mounted thereon a sprocket 458 about which is wrapped an endless chain 460. Chain 460 is also trained about a sprocket 462 mounted on a shaft 464 which carries a sprocket 466 at its opposite end.

As may also be observed from FIG. 16 of the drawings, a chain 468 wraps the sprocket 466, an upper sprocket 470 and a sprocket 471 mounted on one end of a shaft 472 carrying the downstream center support belt roller 102. It will also be noted that sprocket 470 is mounted on an arm 474 pivotally attached to the mounting bracket 476, as at 478, and resiliently urged upwardly by the spring 480.

It will also be noted that bracket 476 is adjustable by means of the arcuate slot 482 and locking bolt 484. Additionally, to provide a greater wrap of the sprockets 471 by the chain 468 a roller 486 may be positioned as shown by means of a mounting bracket 488.

Shaft 454, at its upper end, preferably carries a shaft 490 about which is trained a chain 492. Chain 492 also wraps a sprocket 494 mounted on a shaft 496 which has a second sprocket 498 mounted on its lower end. A chain 500 wraps the sprocket 498 and a sprocket 502 mounted on one end of a shaft 504, which, in the embodiment described, drives the sealing unit 14. As noted above, it is preferable, although not necessary, to drive the chain band sealer 14 from the same source of power as that from which the other components of the machine are driven, although the specific sealing unit mentioned above can be purchased with a separate power source. If it is desired to utilize this separate

power source, then of course, the system of sprockets and chains 490–502 is unnecessary.

In any event it will be apparent from FIG. 23 that the center and side conveying belts as well as the sealing unit, if it is incorporated as described above, must be in operation before the chains 228 and 230 and the carrier chains 64 are activated, even though all the components are driven from the same power source 352.

In operation, the spacing between the side belts 174 and the height of the center supporting belt 104 are adjusted for the size of bags to be filled in the machine. To assist in making these adjustmennt scales may be provided, preferably near the hand cranks for the adjusting mechanisms, which indicate the spacing of the side belts and the position of the center belt. The operator, therefore, can observe the scales to asist him in adjusting the elt positions. Preferably, several sets of different size transfer cans 252 will be provided with each machine and a set of cns of the desired size will then be selected and attached to the brackets 248 by means of the clamps 250.

A supply of bags in roll form, as at 30 in FIG. 3 of the drawings, is next placed on one of the unwind stands 16 or 18, trained about one of the turning rollers 28 and threaded past the separating device 42 and into engagement with the upstanding teeth 70 on the carrier chain 64. Once the free upper edges 38 of the web are in engagement with the teeth 70 the operation may commence.

As the web of bags is withdrawn from its supply and fed into the machine, the plow like device 42 continuously spreads apart the free upper edges 38, tensions them by means of the canted rollers 58, and, by means of the grooved rollers 60, presses the edges 38 onto the upstanding teeth 70 on the carrier chains 64. As the downstream moving reaches of the chains 64 convey the web of bags toward the sealing section 14 the inverted channels 74 serve to maintain the free upper edges 38 in firm engagement with the upstanding teeth 70. Additionally the bags are supported on opposite faces by the side support belts 174 and along their bottoms by the center supporting belt 104.

As the bags move along the downstream run defined by the carrier chains and supporting belts the transfer cans are moving about the endless track defined by the track members 206 and 208, with the downstream branch of the track coincident with the downstream run just described. As the cans move along the upstream branch of their endless track the cam followers 246 ride along the cam track 212 and as the transfer cans approach the hopper 278 they are raised upwardly into engagement with the downwardly projecting valves 280.

Upward movement of the cans 252 overcomes the force exerted by the springs 296 to cause the valves 280 to open in the manner described above and permit a portion of the contents of the hopper 278 to be deposited in thhe transfer cans 252. The transfer cans are filling as they move about the return branch connecting the upstream ends of the upstream and downstream branches of the track and the capacity of the cans is very carefully calibrated to perform the function of volumetrically controlling the content of the filled packages within prescribed legal tolerances.

As they move towards the downstream branch of the track the cam followers 246 ride down the transmition section 222 of the cam track causing the valve 280 to close. Further movement by the cam follower down the transmistion section 222 will cause the nozzle 254 to enter a bag positioned thereunder. Synchronism between th bags and transfer cans is, of course, maintained by means of the control apparatus described above.

The cans continue to move downstream with the cam followers now rolling along the lowermost portion 212 of the cam track and with the valves 256 received in the bags as shown in phantom lines in FIG. 19 of the drawings. As the bags and cans thus move downstream the innersmot ear 268 of each valve is engaged by the downwardly extending finger 334 to twist the valve 256 with respect to the nozzle 254 and cause the valve 256 to move downwardly and permit product flow from the transfer can into the bag.

Continued movement downstream will cause the opposite outwardly projecting ear 270 to engage the downwardly projecting finger 346, twisting the valve in the opposite direction and closing the lower end of the nozzle of the transfer can. The cam follower then engages the downstream transition section 222, riding upwardly threreon to withdraw the nozzles from the bag and recycle the cans back toward the hopper 278. As the transfer cans move toward the hopper a drip pan, a portion of which is shown in FIG. 1 at 506, catches any product dripping from the nozzles. Ultraviolet means may conveniently be mounted on the drip pan to treat the nozzles with ultraviolet radiation.

It may be also be noted that if unusually large bags are being filled, necessitating large transfer cans, the speed of the operation can b nsreased by positioning a second hopper 278 on the downstream shaft 194, so that the transfer cans may receive a portion of their filling at the downstream return branch and the remainder of their filling as they pass around the upstream return branch.

As the web of bags moves past the downstream end of the filling section 12 the free upper edges 38 pass between the infeed plates 350 of the sealing unit 14, which guides them between moving heated sealing bands associated with the unit 14 to provide a heat seal along the upper edges of the web. Excess bag material can then be removed on a continuous basis after the top seal has been made. Although the carrier chains extend from only adjacent the separating member 42 to adjacent the upstream end of the sealing unit 14 it will be noted that the side and center supporting belts extend continuously from one end of the machine to the other to provide support for the bags during the entire operation.

It has been found that filling and sealing equipment in accordance with the present invention provides extremely versatile apparatus and that the speed of the filling operation and the size of package to be filled and sealed may be varied over a considerable range. Thus, in an actual installation the size of the containers capable of being filled varies between one-half gallon and 12 gallons. This is possible because of the fact that different size transfer cans can be used and, through the adjustability of the side and center support belts, a wide range of bag sizes may be utilized.

Theoretically, the length of the bags can assume any multiple of the transfer can spacing so that extremely long bags could also be used with each bag being filled by charges from several cans. It will also be noted that movement of the bags during filling and sealing is on a

continuous, nonintermittent basis and that the necessity of handling each of the bags in the web separately is obviated.

While the methods and forms of apparatus herein described constitute perferred embodiments of the invention, it is to be understood that the invention is not limited to these precise methods and forms of apparatus, and that changes may be made therein without departing from the scope of the invention.

What is claimed is:

1. Packaging apparatus comprising:
a. means for holding a supply of an elongated web formed of a plurality of interconnected bags having continuous free upper edges,
b. means for continuously spreading apart said free upper edges of said web as it is withdrawn from said holding means,
c. means for continuously engaging said web along said free edges thereof as said edges are spread apart by said spreading means,
d. means for moving said bag engaging means along a downstream run with a continuous, nonintermittent motion,
e. rotatable hopper means moving at substantially the same speed as said bag engaging means,
f. a plurality of transfer cans,
g. means for cycling said transfer cans between said hopper means and said bags in said downstream run at a speed substantially the same as the rotational speed of said hopper means and the speed of said bag engaging means,
h. nozzles insertable into said bags as said bags and nozzles move along said downstream run with a continuous, nonintermittent motion,
i. means positioned downstream of said downstream run for sealing said free upper edges,
j. a plurality of uniformly spaced, downwardly projecting valves on said hopper openable through contact with said transfer cans, and
k. means for moving said transfer cans upwardly into contact with said valves and thereafter downwardly a distance sufficient to insert said nozzles into said bags.

2. Packaging apparatus comprising:
a. means for holding a supply of an elongated web formed of plurality of interconnected bags having continuous free upper edges,
b. means for continuously spreading apart said free upper edges of said web as it is withdrawn from said holding means,
c. means for continuously engaging said web along said free edges thereof as said edges are spread apart by said spreading means,
d. means for moving said bag engaging means along a downstream run with a continuous, nonintermittent motion,
e. means moving in synchronism with said engaging means for depositing charges of material into said bags as they move along said downstream run,
f. means positioned downstream of said downstream run for sealing said free upper edges,
g. an endless center belt trained about spaced rollers and defining a horizontally extending center belt reach coincident with said downstream run, and
h. means for raising and lowering said center belt.

3. The apparatus of claim 1 wherein said depositing means further includes:
a. means defining a track having a downstream branch coincident with said downstream run, an upstream branch extending in sapced parallel relationship to said downstream branch and return branches interconnecting said upstream and downstream branches, and
b. means for transporting said transfer cans about said track with a continuous, nonintermittent motion.

4. The apparatus of claim 3 wherein said means for moving said transfer cans upwardly and downwardly comprises:
a. camming surface having upper sections coincident with said return branches of said track, a lower section coincident with a medial portion of said downstream branch of said track and transition sections interconnecting said upper and lower sections,
b. carriers mounted on and movable along said track,
c. means attaching said transfer cans to said carriers, and
d. cam followers on said carriers in engagement with said camming surface, whereby movement of said carriers along said tracks causes said transfer cans to move upwardly into opening engagement with said hopper valves and downwardly with said nozzles inserted into said bags.

5. The apparatus of claim 4 further comprising:
a. selectively operable valves on said nozzles for controlling flow from said transfer cans,
b. means for opening said nozzle valves as said nozzles are inserted into said bags, and
c. means for closing said nozzle valves as said nozzles are withdrawn from said bags.

6. The apparatus of claim 5 wherein said valves comprise:
a. means defining cam surfaces formed in aid nozzles extending angularly with respect to the axes thereof,
b. closed end valve sleeves slidably engaging said nozzles,
c. means defining outlets through the walls of said valve sleeves, and
d. cam means mounted on said sleeves in engagement with said cam surfaces.

7. The apparatus of claim 6 further comprising:
a. outwardly projecting ears mounted on said valve sleeves.

8. The apparatus of claim 5 further comprising:
a. means for detecting the presence or absence of a bag at a point adjacent said nozzle valve opening means, and
b. means for activating or deactivating said nozzle valve opening means in response to the detection of the presence or absence, respectively, of a bag by said detecting means.

9. Packaging apparatus comprising:
a. means for holding a supply of an elongated web formed of a plurality of interconnected bags having continuous free upper edges,
b. means for continuously spreading apart said free upper edges of said web as it is withdrawn from said holding means,
c. means for continuously engaging said web along said free edges thereof as said edges are spread apart by said spreading means,

d. meanss for moving said bag engaging means along a downstream run with a continuous, nonintermittent motion,

e. means moving in synchronism with said engaging means for depositing charges of material into said bags as they move along said downstream run,

f. means positioned downstream of said downstream run for sealing said free upper edges,

g. an endless center belt trained about spaced rollers and defining a horizontally extending center belt reach coincident with said downstream run, and

h. a pair of side belts each trains about spaced apart hertically extending rollers and defining opposed, vertically extending side belt reaches on opposite sides of said center belt reach.

10. The apparatus of claim 9 further comprising:

a. means for varying the spacing between said side belt reaches.

11. Packaging apparatus comprising:

a. means for holding a supply of an elongated web formed of a plurality of interconnected bags having continuous free upper edges,

b. means for continuously spreading apart said free upper edges of said web as it is withdrawn from said holding means including a pair of bottom plate members positioned in spaced apart relationship to receive said free upper edges therebetween and a flat, substantially triangularly shaped top plate member positioned in overlying relationship to said bottom plate members and adapted to be received between said free upper edges,

c. means for continuously engaging said web along said free edges thereof as said edges are spread apart by said spreading means,

d. means for moving said bag engaging means along a downstream run with a continuous, nonintermittent motion,

e. means moving in synchronism with said engaging means for depositing charges of material into said bags as they move along said downstream run, and

f. means positioned downstream of said downstream run for sealing said free upper edges.

12. The apparatus of claim 11 further comprising:

a. a bracket member pivotally mounted for movement toward and away from said bottom plate member,

b. means mounting said top plate member on said bracket member, and

c. rollers rotatably mounted on said bracket member and cooperatinj with said engaging means to direct said free edges into engagement therewith.

13. Packaging apparatus comprising:

a. means for holding a supply of an elongated web formed of a plurality of interconnected bags having continuous free upper edges,

b. means for continuously spreading apart said free upper edges of said web as it is withdrawn from said holding means,

c. means for continuously engaging said web along said free edges thereof as said edges are spread apart by said spreading means,

d. means for moving said bag engaging means along a downstream run with a continuous, nonintermittent motion,

e. a plurality of transfer cans moving in synchronism with said engaging means and having nozzles insertable into said bags for depositing charges of material into said bags as said bags and said nozzles move along said downstream run with a continuous, nonintermittent motion,

f. a hopper having a plurality of uniformly spaced, downwardly projecting valves openable through contact with said transfer cans,

g. means for moving said transfer cans upwardly into contact with said valves and thereafter downwardly a distance sufficient to insert said nozzles into said bags, and

h. meanspositioned downstream of said downstream run for sealing said free upper edges.

14. The apparatus of claim 13 wherein said depositing means further includes:

a. means defining a track having a downstream branch coincident with said downstream run, an upstream branch extending in spaced parallel relationship to said downstream branch and return branches interconnecting said upstream and downstream branches, and

b. means for transporting said transfer cans about said track with a continuous, nonintermittent motion.

15. The apparatus of claim 14 wherein said means for moving said transfer cans upwardly and downwardly comprises:

a. camming surface having upper sections coincident with said return branches of said track, a lower section coincident with a medial portion of said downstream branch of said track and transition sections interconnecting said upper and lower sections,

b. carriers mounted on and movable along said track,

c. means attaching said transfer cans to said carriers, and

d. cam followers on said carriers in engagement with said camming surface, whereby movement of said carriers along said tracks causes said transfer cans to move upwardly into opening engagement with said hopper valves and downwardly with said nozzles inserted into said bags.

16. The apparatus of claim 15 further comprising

a. selectivelyy operable valves on said nozzles for controlling flow from said transfer cans,

b. means for opening said nozzle valves as said nozzles are inserted into said bags, and

c. means for closing said nozzle valves as said nozzles are withdrawn from said bags.

17. The apparatus of claim 16 wherein said valves comprises:

a. means defining cam surfaces formed in said nozzles extending angularly with respect to the axes thereof,

b. closed end valve sleeves slidably engaging said nozzles,

c. means defining outlets through he walls of said valve sleeves, and

d. cam means mounted on said sleeves in engagement with said cam surfaces.

18. The apparatus of claim 17 further comprising:

a. outwardly projecting ears mounted on said valve sleeves.

19. The apparatus of claim 16 further comprising:

a. means for detecting the presence or absence of a bag at a point adjacent said nozzle valve opening means, and

b. means for activating or deactivating said nozzle valve opening means in response to the detection

of the presence or absence, respectively, of a bag by said detecting means.

20. Packaging apparatus comprising:

a. means for holding a supply of an elongated web formed off a plurality of interconnected bags having continuous free upper edges, free upper edges of said web as it is withdrawn from said holding means,

b. means for continuously spreading apart said free upper edges of said web as it is withdrawn from said holding means,

c. a pair of endless chains each trained about a pair of spaced sprockets and defining downstream reaches for continuously engaging said web along said free edges thereof as said edges are spread apart by said spreading means ,

d. each of said chains having a plurality of upwardly projecting, bag engaging teeth,

e. means overlying said upwardly projecting teeth on said downstream reaches of said chains for maintaining said free edges of said web of bags in engagement with said teeth,

f. means for moving said bag engaging teeth along a downstream run with aa continuous, nonintermittent motion,

g. means moving in synchronism with said bag engaging teeth for depositing charges of material into said bags as they move along said downstream run, and

h. means positioned downstream of said downstream run for sealing said free upper edges.

21. Packaging apparatus comprising:

a. means for holding a supply of an elongated web formed of a plurality of interconnected bags having continuous free upper edges,

b. means for continuously spreading apart said free upper edges of said web as it is withdrawn from said holding means,

c. means for continuously engaging said web along said free edges thereof as said edges are spread apart by said spreading means,

d. means for moving said bag engaging means along a downstream run with a continuous, nonintermittent motion,

e. means moving in synchronism with said engaging means for depositing charges of material into said bags as they move along said downstream run,

f. means positioned downstream of said downstrea run for sealing said free upper edges,

g. an endless center belt trained about spaced rollers and defining a horizontally extending center belt reach coincident with said downstream run, and

h. means for raising and lowering said center belt.

22. Packaging apparatus comprising:

a. means for holding a supply of an elongated web formed of aa plurality of interconnected bags having continuous free upper edges,

b. means for continuously spreading apart said free upper edges of said web as it is withdrawn from said holding means,

c. means for continuously engaging said web along said free edges thereof as said edges are spread apart by said spreading means,

d. means for moving said bag engaging means along a downstream run witl a continuous, nonintermittent motion,

e. means moving in synchronism with said engaging means for depositing charges of material into said bags as they move along said downstream run,

f. means positioned downstream of said downstream run for sealing said free upper edges,

g. an endless center belt trained about spaced rollers and defining a horizontally extending center belt reach coincident with said downstream run, and

h. a pair of side belts each trained about spaced apart vertically extending rollers and defining opposed, vertically extending side belt reaches on opposite sides of said center belt reach.

23. The apparatus of claim **22** further comprising

a. means for varying the spacing between said side belt reaches.

24. Packaging apparatus comprising:

a. means for holding a supply of an elongated web formed of a plurality of interconnected bags having continuous free upper edges,

b. a pair of bottom plate members positioned in spaced apart relationship to receive said free upper edges therebetween,

c. a flat, substantially triangularly shaped top plate member positioned in overlying relationship to said bottom plate members and adapted to e received between said free upper edges,

d. said plate members comprising spreading means for continuously spreading apart said free upper edges of said web as it is withdrawn from said holding means,

e. means for continuously engaging said web along said free edges thereof as said edges are spread apart by said spreading means,

f. means for moving said bag engaging means along a downstream run with a continuous, nonintermittent motion,

g. means moving in synchronism with said engaging means for depositing charges of material into said bags as they move along said downstream run, and

h. means positioned downstream of said downstream run for sealing said free upper edges.

25. The apparatus of claim **24** further comprising:

a. a bracket member pivotally mounted for movement toward and away from said bottom plate member,

b. means mounting said top plate member on said bracket member, and

c. rollers rotatably mounted on said bracket member and cooperating with said engaging means to direct said free edges into engagement therewith.

26. Packaging apparatus comprising:

a. means for holding a supply of an elongated web formed of a plurality of interconnected bags having continuous free upper edges,

b. means for continuously spreading apart said free upper dges of said web as it is withdrawn from said holding means,

c. a pair of endless chains each trained about a pair of spaced sprockets and defining downstream reaches of said chains,

d. a plurality of upwardly projecting, bag engaging teeth mounted on said chains for continuously engaging said web along said free edges thereof as said edges are spaced apart by said spreading means,

e. means overlying said upwardly projecting teeth on said downstream reaches of said chain for maintaining said free edges of said web of bags in engagement with said teeth,

f. means for moving said chains along a downstream run coincident with said downstream reaches of said chains with a continuous, nonintermittent motion,

g. rotatable hopper means moving at substantially the same speed as said chains,

h. a plurality of transfer cans,

i. means for cycling said transfer cans between said hopper means and said bags in said downstream run at a speed substantially the same as the rotational speed of said hopper means and the speed of said chains, and

j. means positioned downstream of said downstream run for sealing said free upper edges.

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