

Feb. 9, 1937.

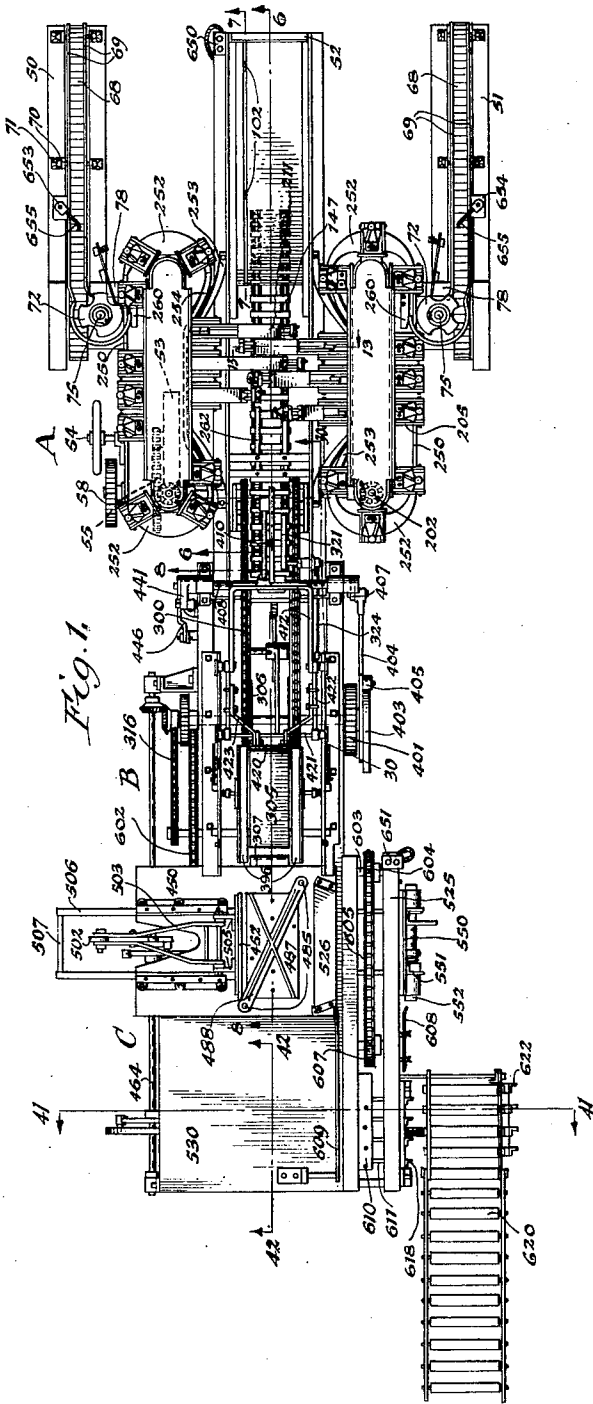
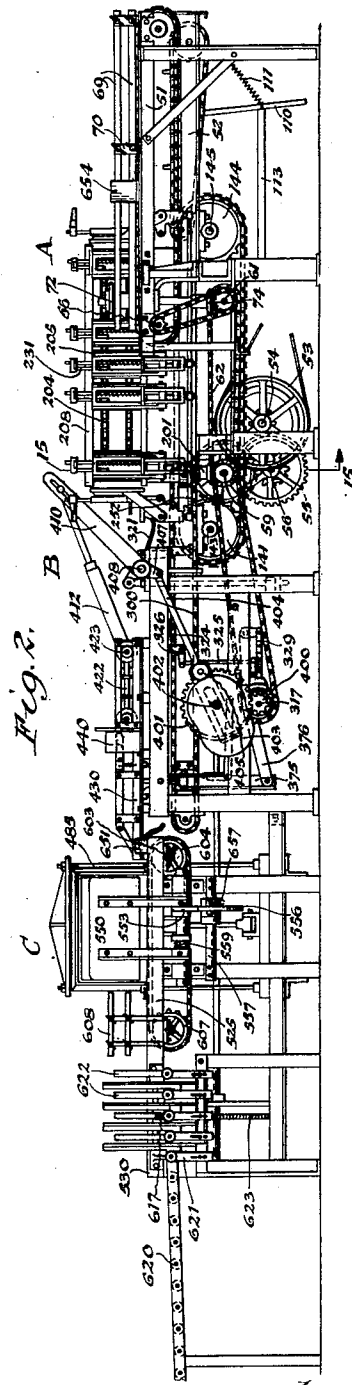
R. E. READ

2,069,926

PACKING MACHINE AND METHOD OF PACKING

Filed Sept. 12, 1933

14 Sheets-Sheet 1



Inventor
ROBERT E. READ
by *Orme E. Cheatham*
Attorney

Feb. 9, 1937.

R. E. READ

2,069,926

PACKING MACHINE AND METHOD OF PACKING

Filed Sept. 12, 1933

14 Sheets-Sheet 2

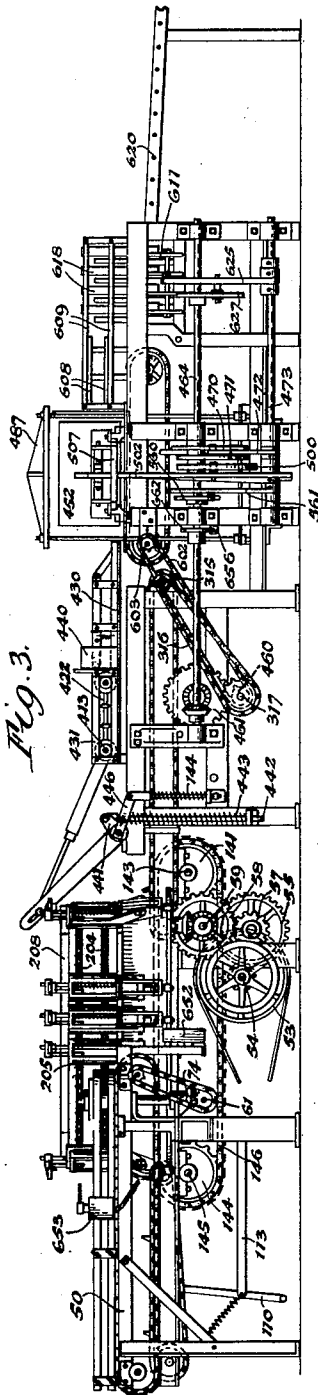


Fig. 3.

Fig. 5.

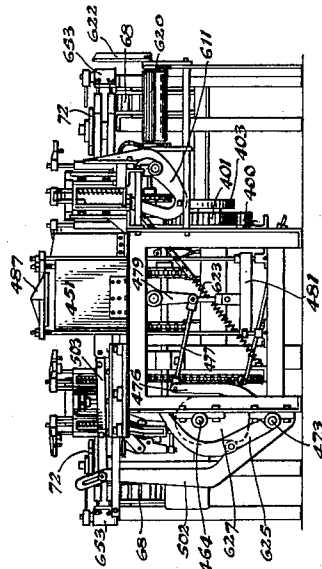
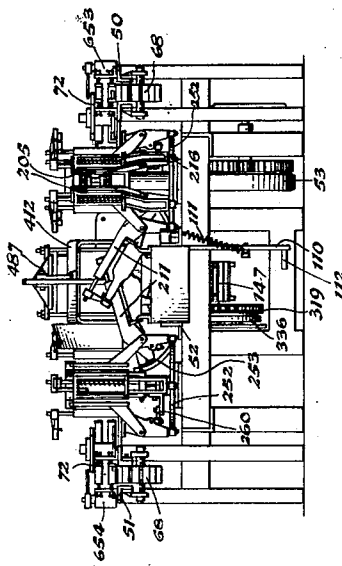


Fig. 4.



Inventor
ROBERT E. READ
by *Orme E. Cheatham*
Attorney

Feb. 9, 1937.

R. E. READ

2,069,926

PACKING MACHINE AND METHOD OF PACKING

Filed Sept. 12, 1933

14 Sheets-Sheet 3

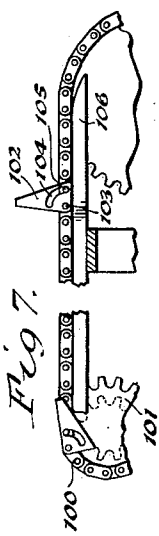
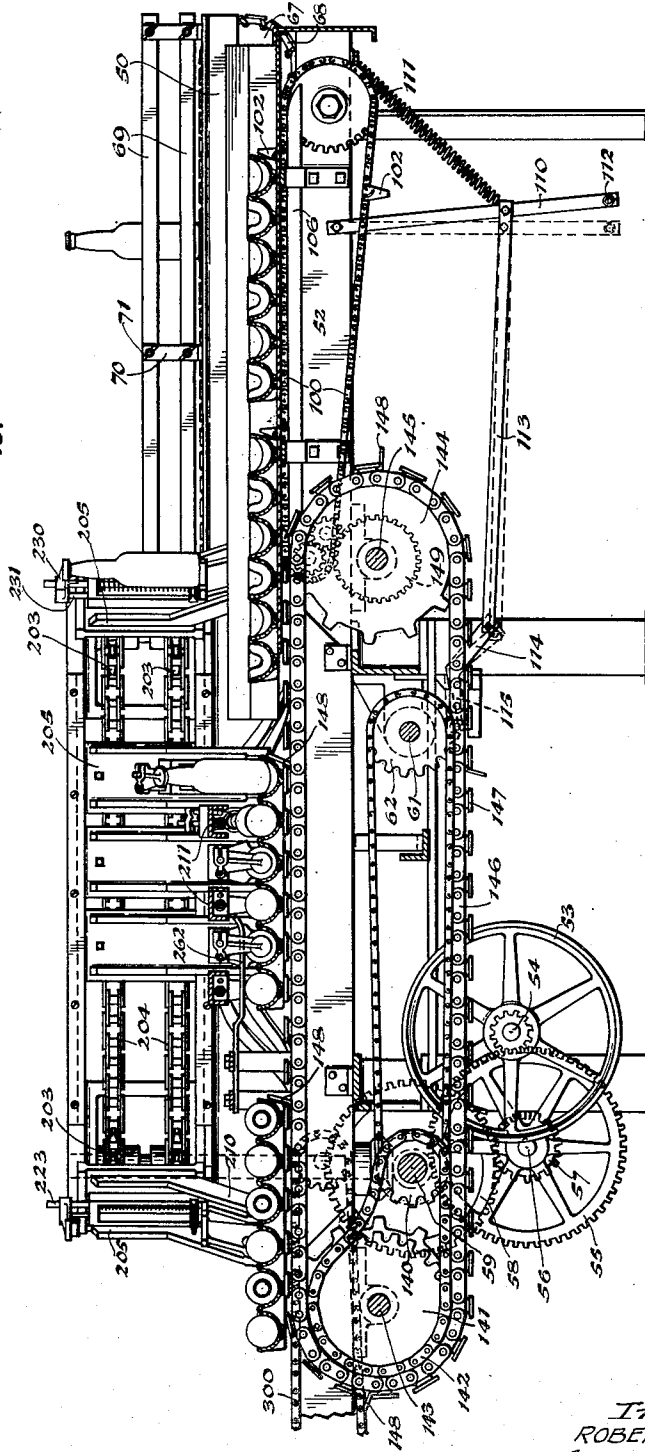


Fig. 6.



Inventor
ROBERT E. READ
by Orme C. Chestham
Attorney

Feb. 9, 1937.

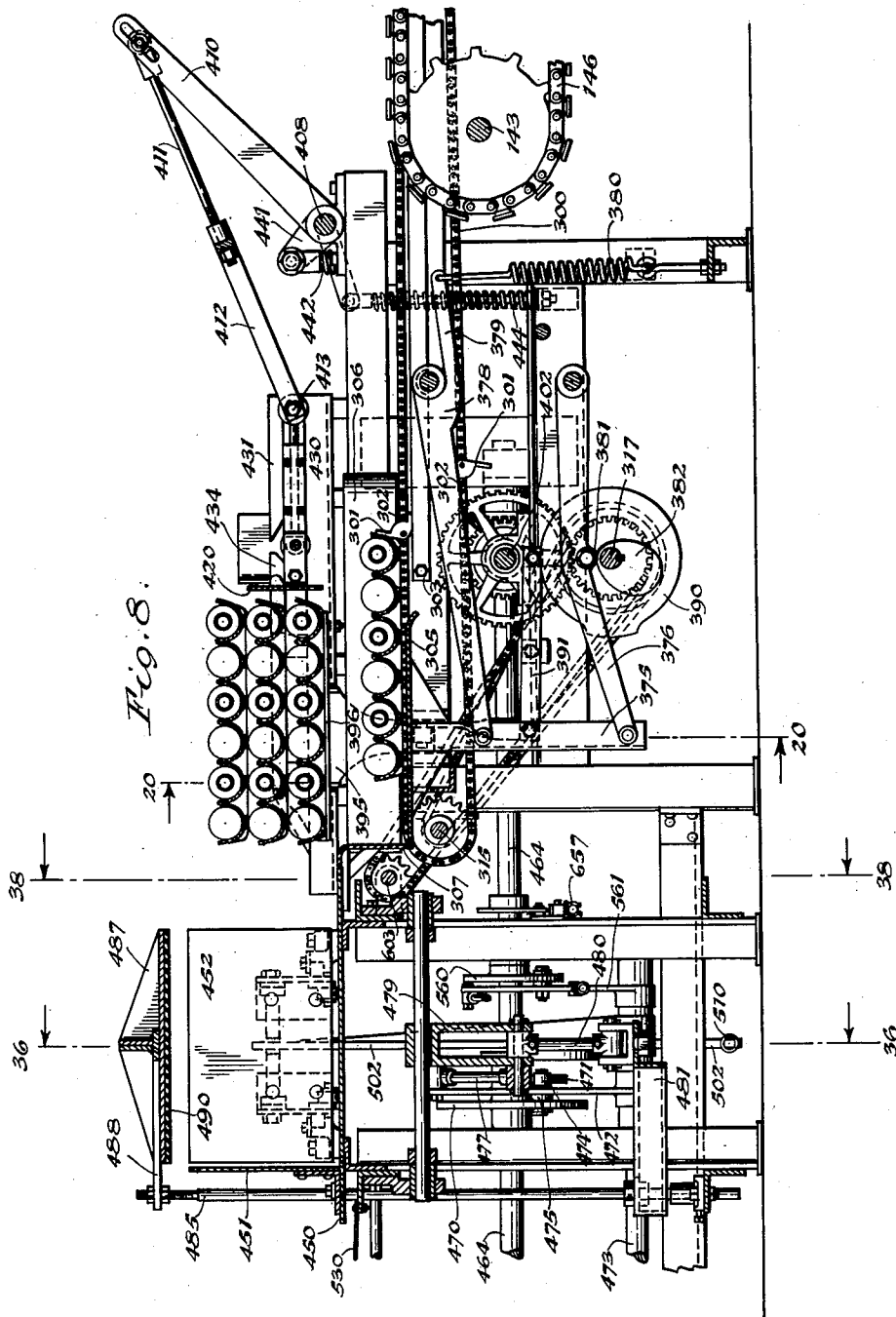
R. E. READ

2,069,926

PACKING MACHINE AND METHOD OF PACKING

Filed Sept. 12, 1933

14 Sheets-Sheet 4



Inventor
ROBERT E. READ
by Orme E. Chatham
Attorney

Feb. 9, 1937.

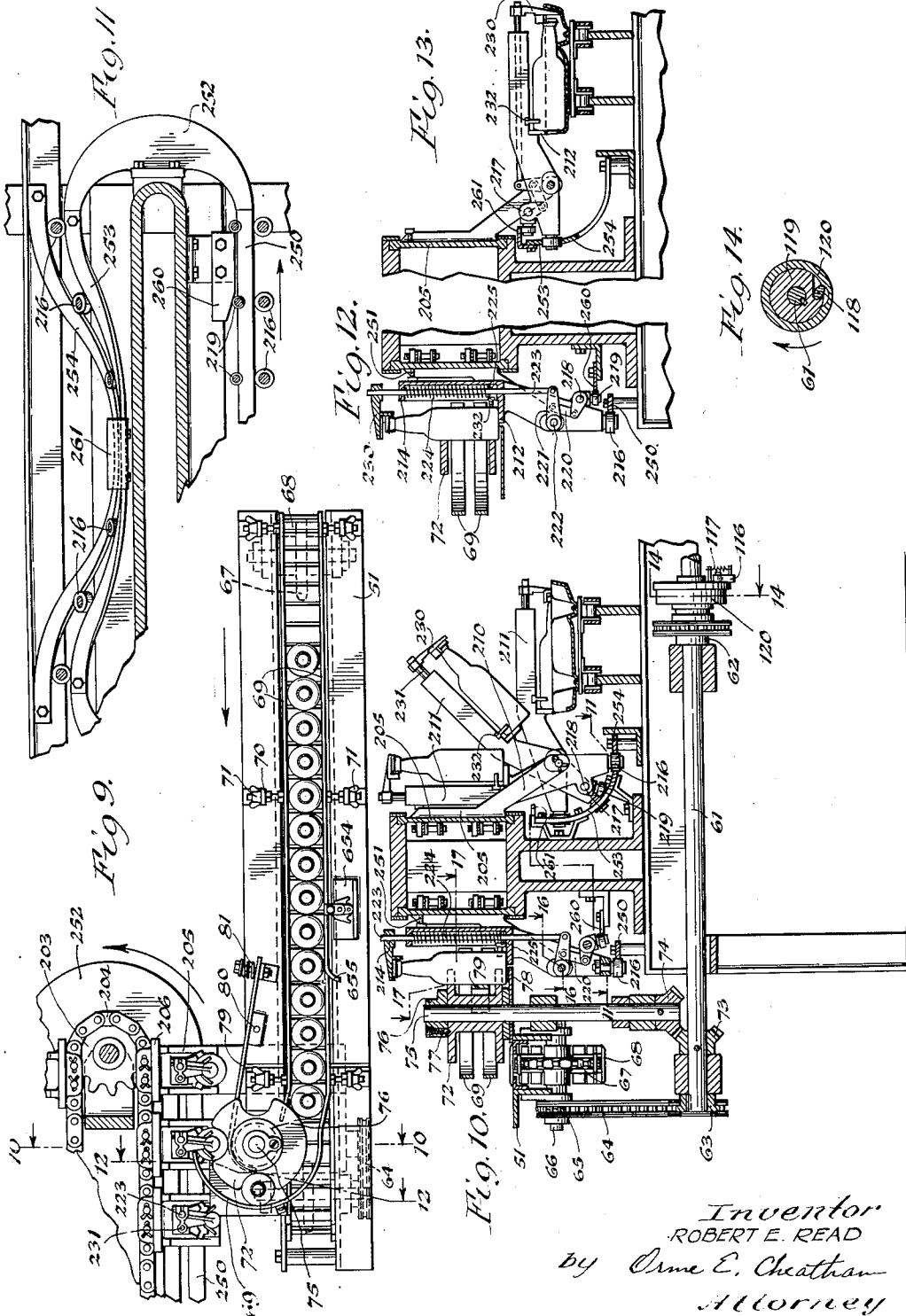
R. E. READ

2,069,926

PACKING MACHINE AND METHOD OF PACKING

Filed Sept. 12, 1933

14 Sheets-Sheet 5



Inventor
ROBERT E. READ
by Orme E. Chatham
Attorney

Feb. 9, 1937.

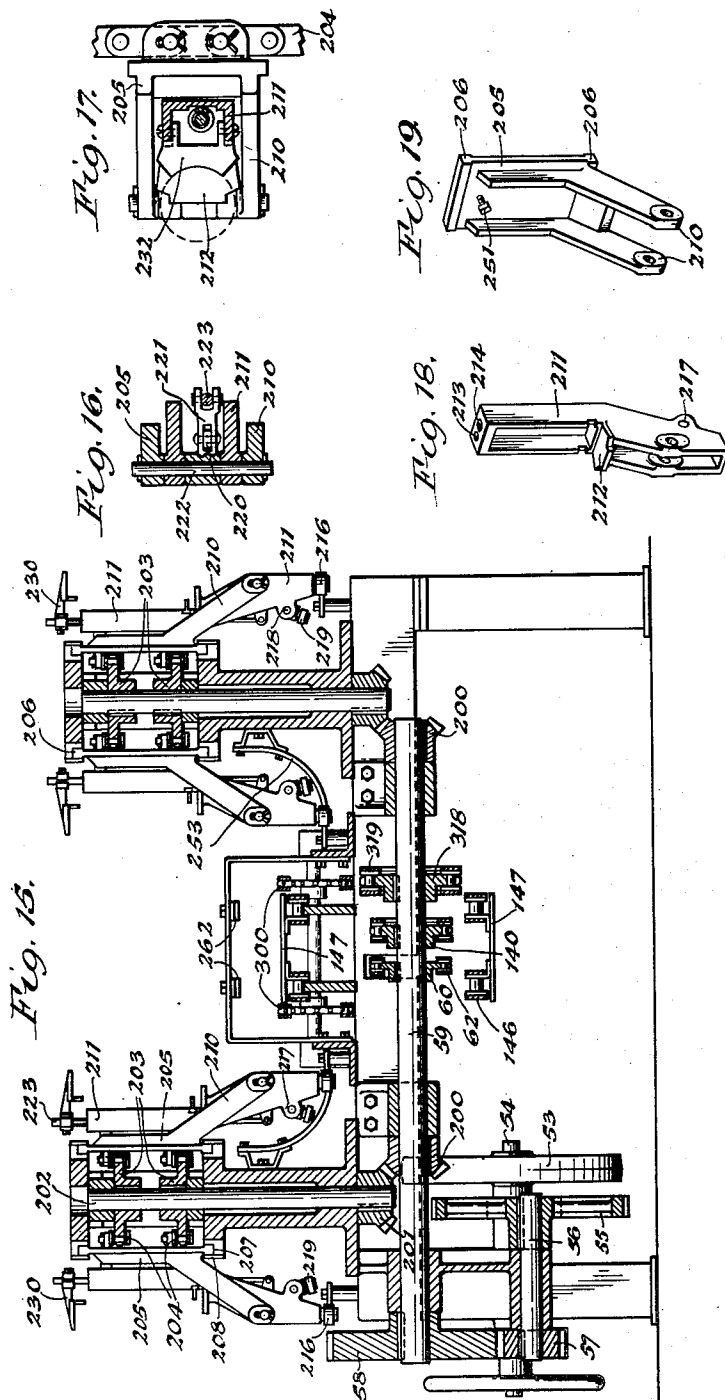
R. E. READ

2,069,926

PACKING MACHINE AND METHOD OF PACKING

Filed Sept. 12, 1933

14 Sheets-Sheet 6



Inventor
ROBERT E. READ
by Orme E. Cheatham
Attorney

Feb. 9, 1937.

R. E. READ

2,069,926

PACKING MACHINE AND METHOD OF PACKING

Filed Sept. 12, 1933

14 Sheets-Sheet 7

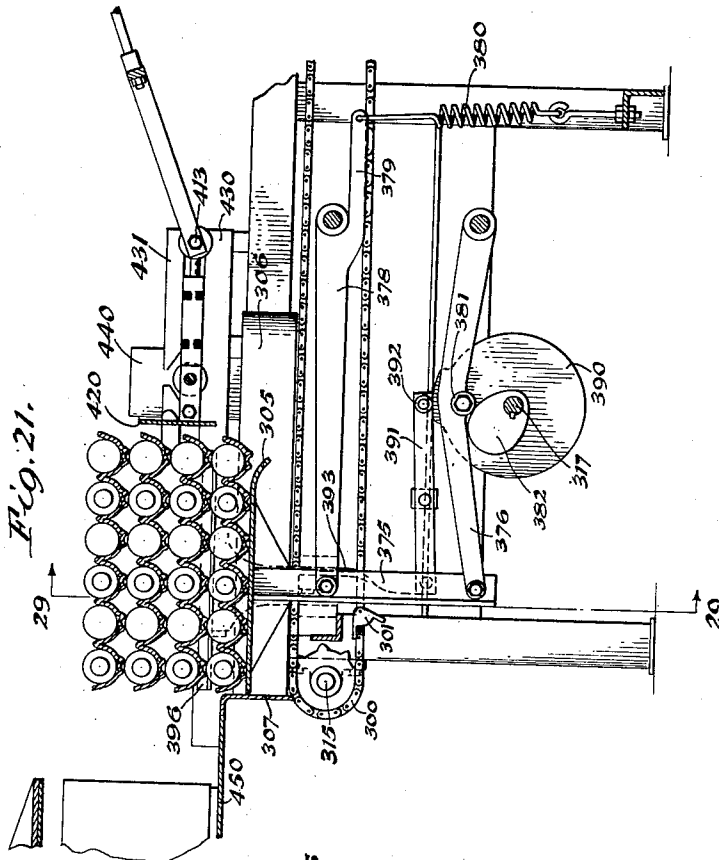
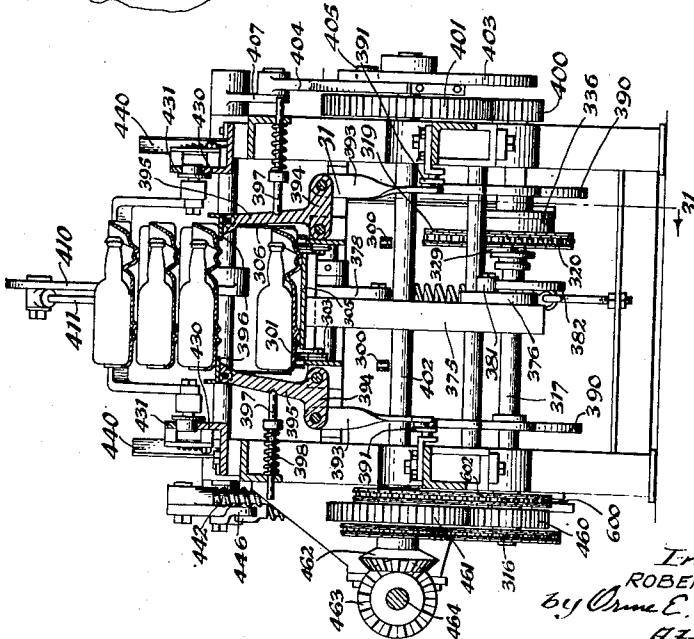


Fig. 20.



Inventor
ROBERT E. READ
by *Orme E. Cheatham*
Attorney

Feb. 9, 1937.

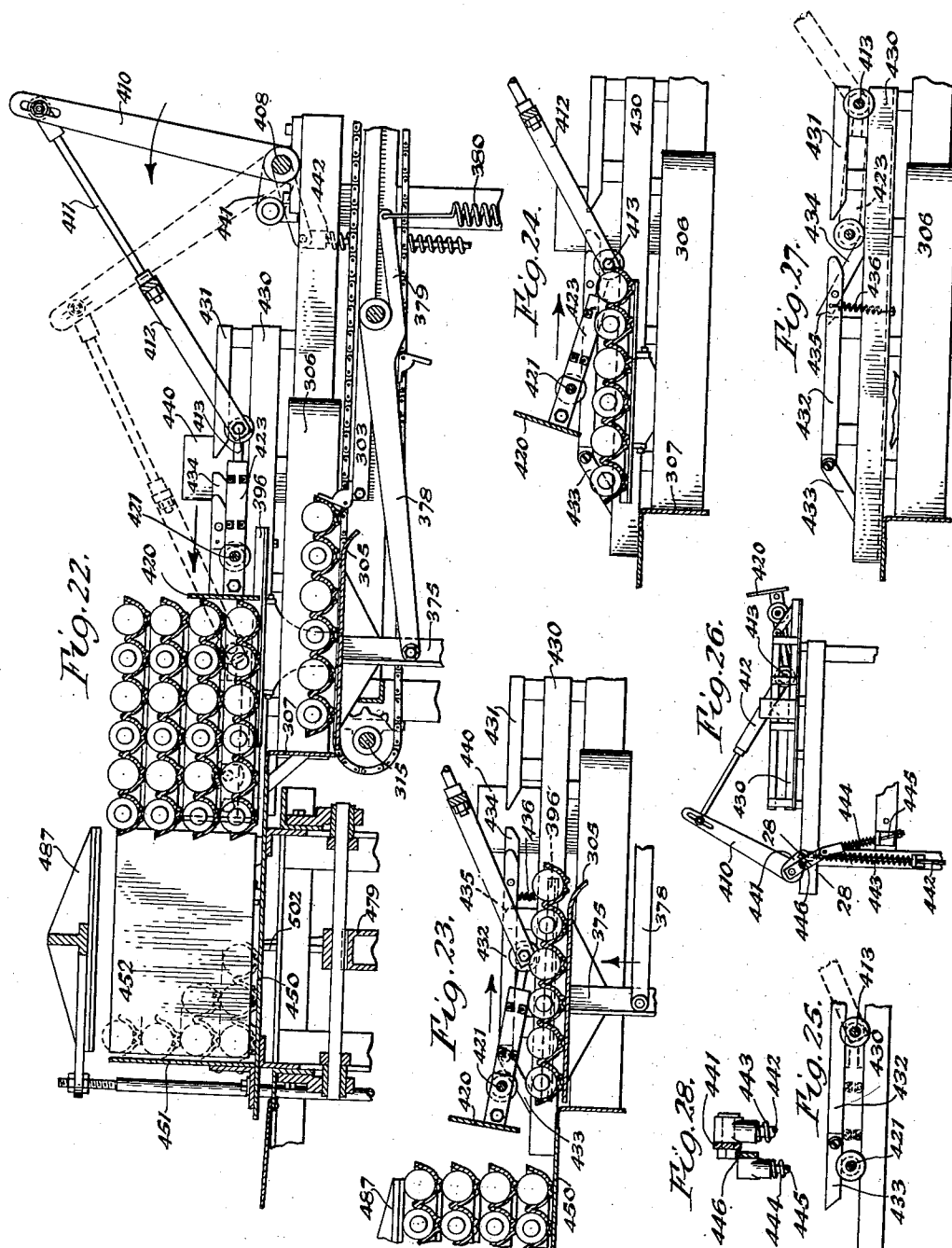
R. E. READ

2,069,926

PACKING MACHINE AND METHOD OF PACKING

Filed Sept. 12, 1933

14 Sheets-Sheet 8



Inventor
ROBERT E. READ
Orme E. Cheatham
Attorney

Feb. 9, 1937.

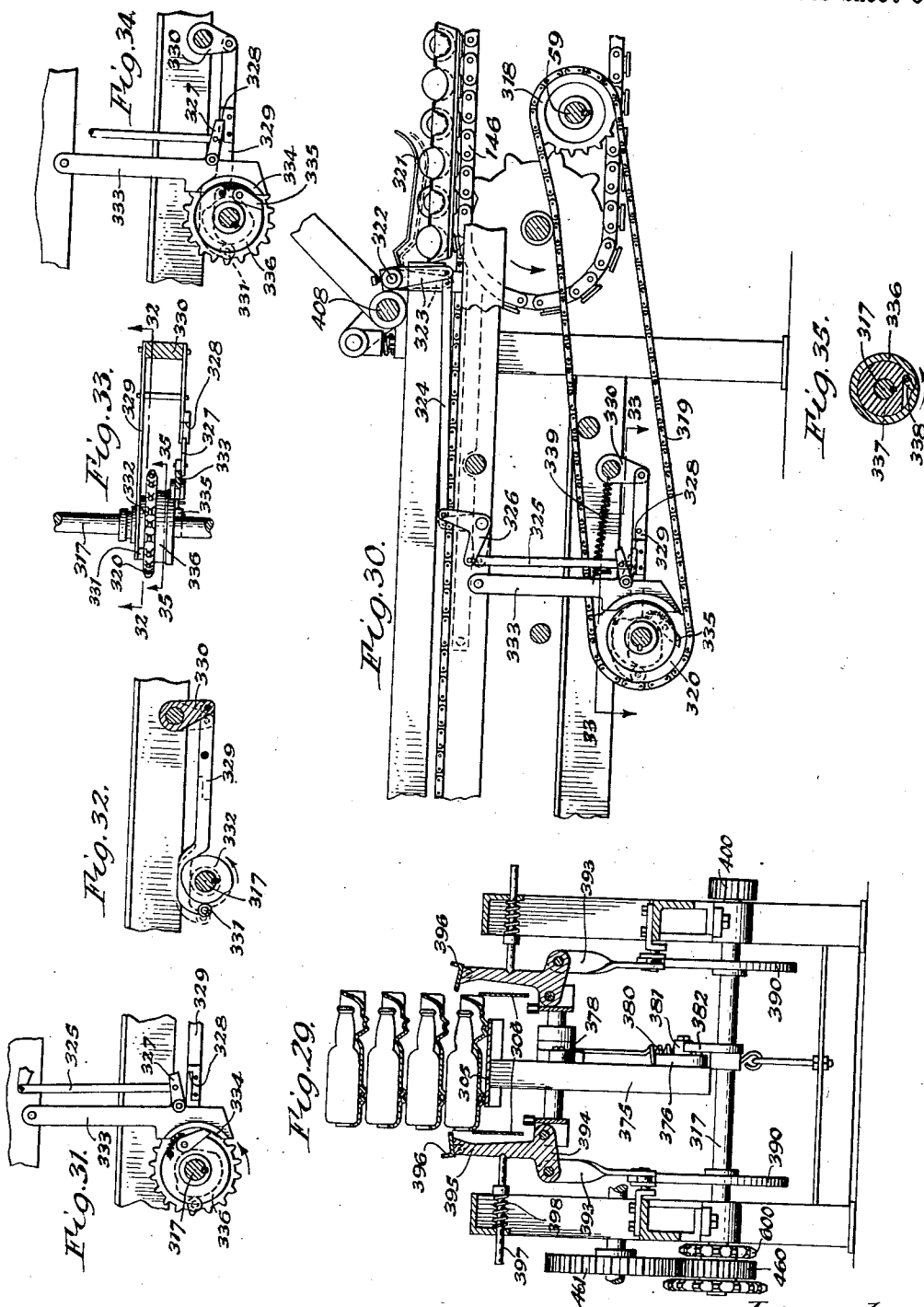
R. E. READ

2,069,926

PACKING MACHINE AND METHOD OF PACKING

Filed Sept. 12, 1933

14 Sheets-Sheet 9



Inventor
ROBERT E. READ
by Orme E. Cheatham
Attorney

Feb. 9, 1937.

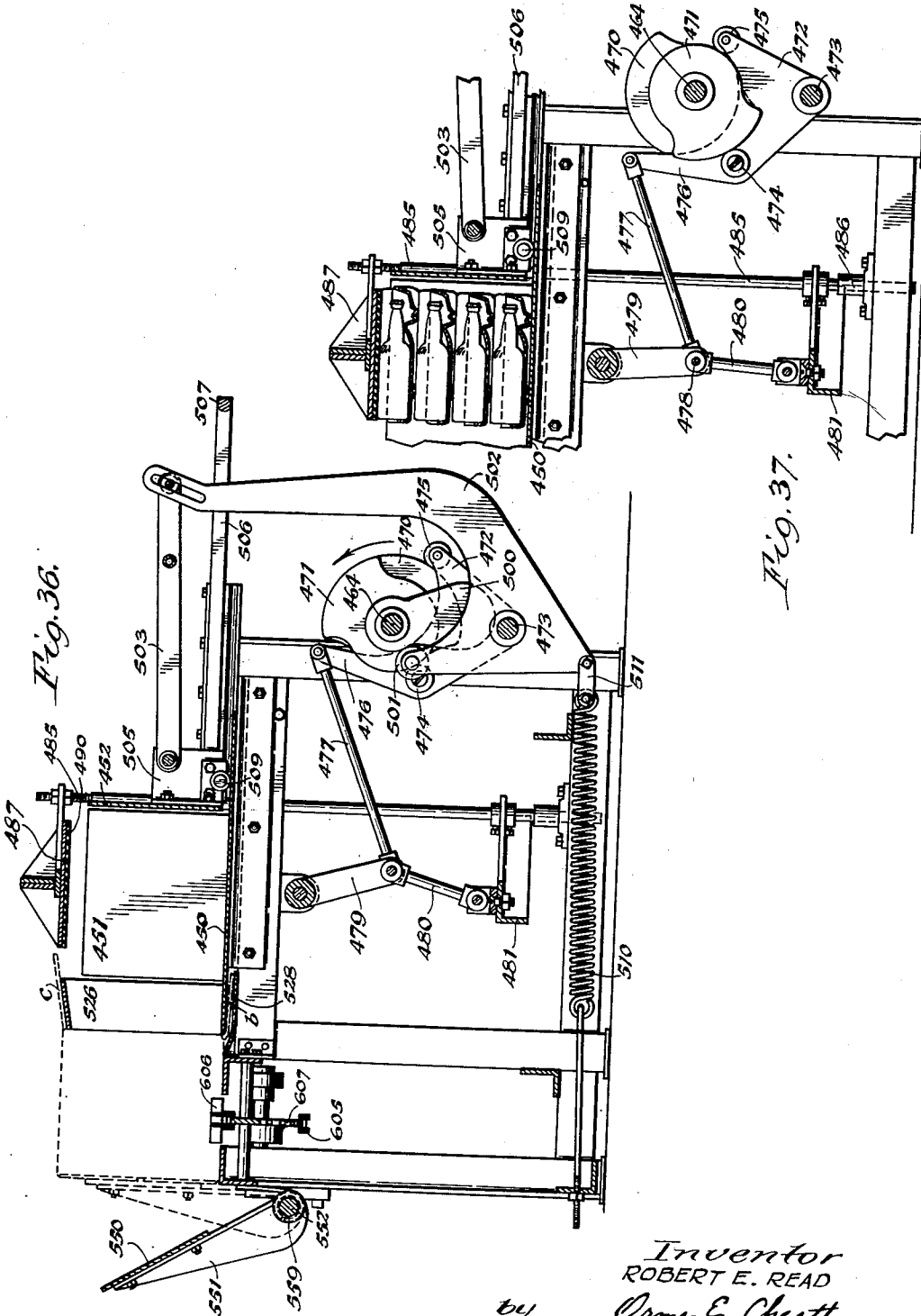
R. E. READ

2,069,926

PACKING MACHINE AND METHOD OF PACKING

Filed Sept. 12, 1933

14 Sheets-Sheet 10



Inventor
ROBERT E. READ
Orme E. Cheatham
Attorney

Feb. 9, 1937.

R. E. READ

2,069,926

PACKING MACHINE AND METHOD OF PACKING

Filed Sept. 12, 1933

14 Sheets-Sheet 11

Fig. 39.

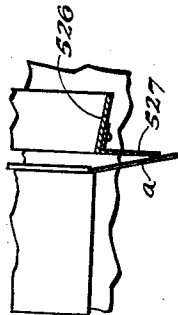


Fig. 40.

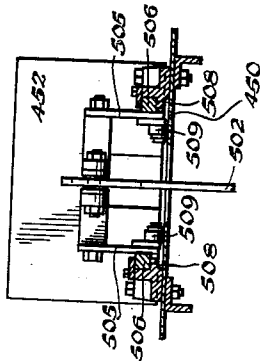
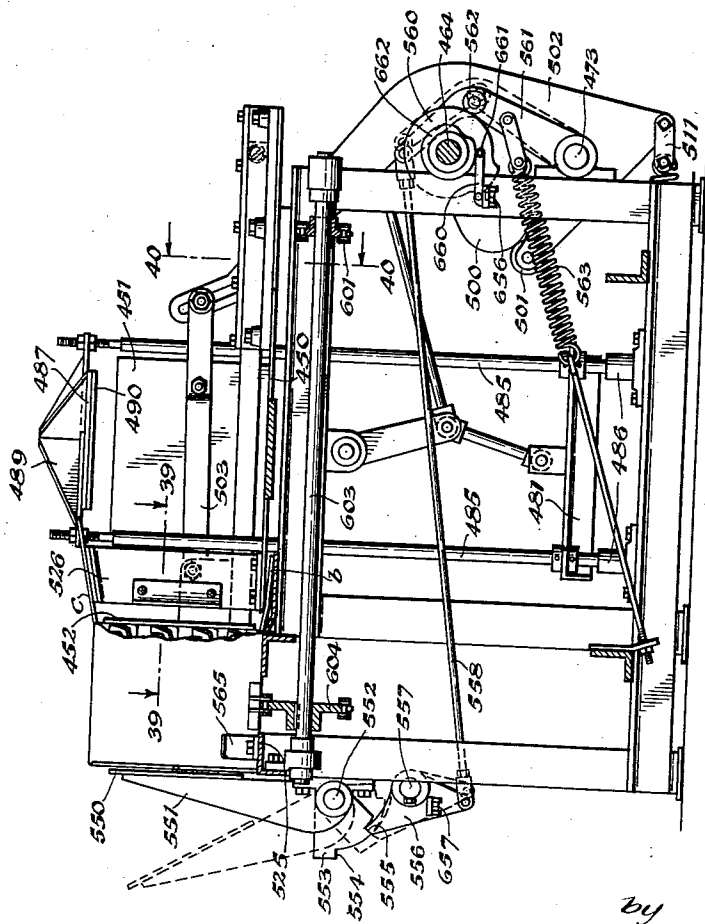


Fig. 38.

Inventor
ROBERT E. READ
by Orme E. Cheatham
Attorney

Feb. 9, 1937.

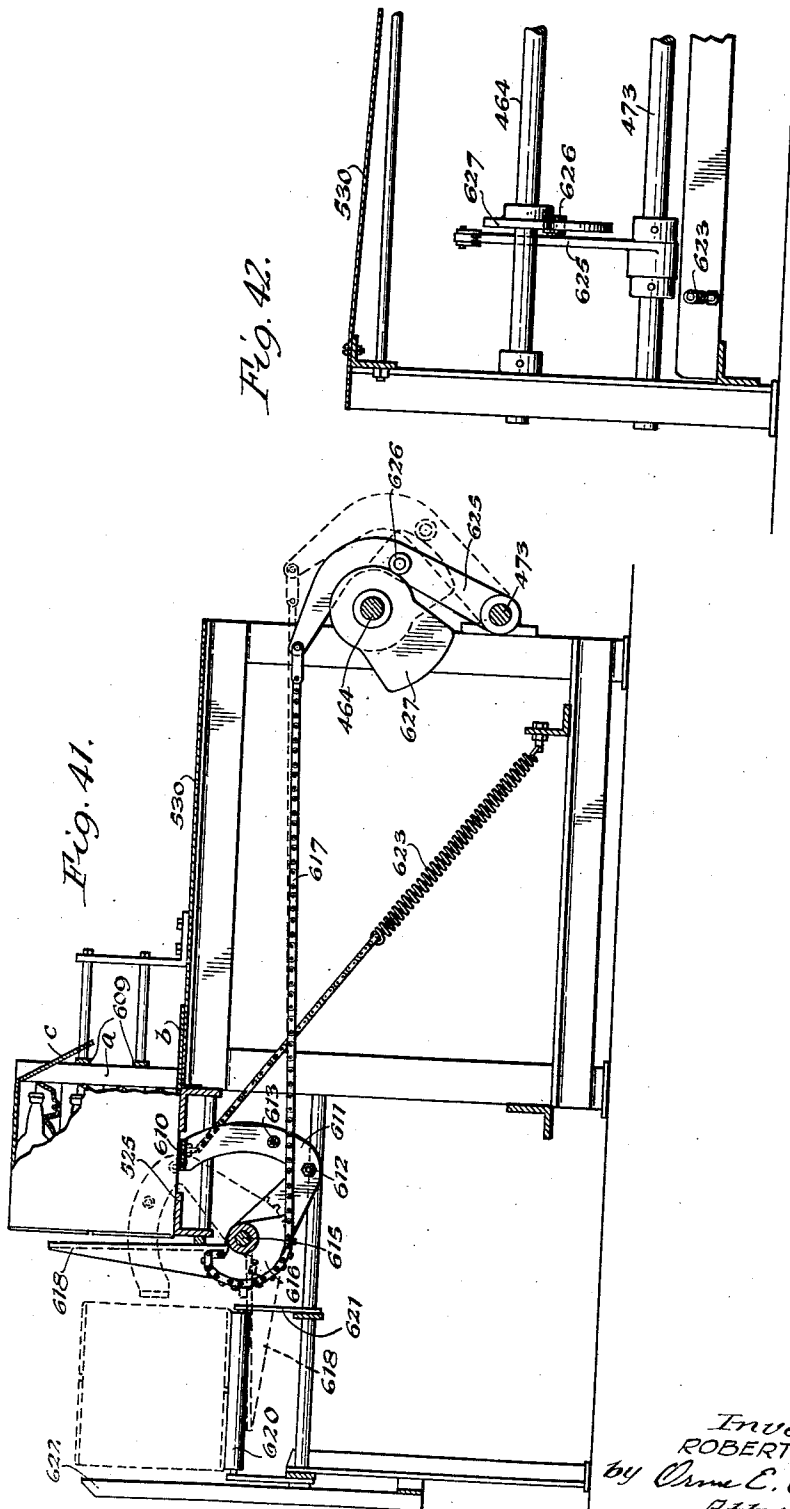
R. E. READ

2,069,926

PACKING MACHINE AND METHOD OF PACKING

Filed Sept. 12, 1933

14 Sheets-Sheet 12



Feb. 9, 1937.

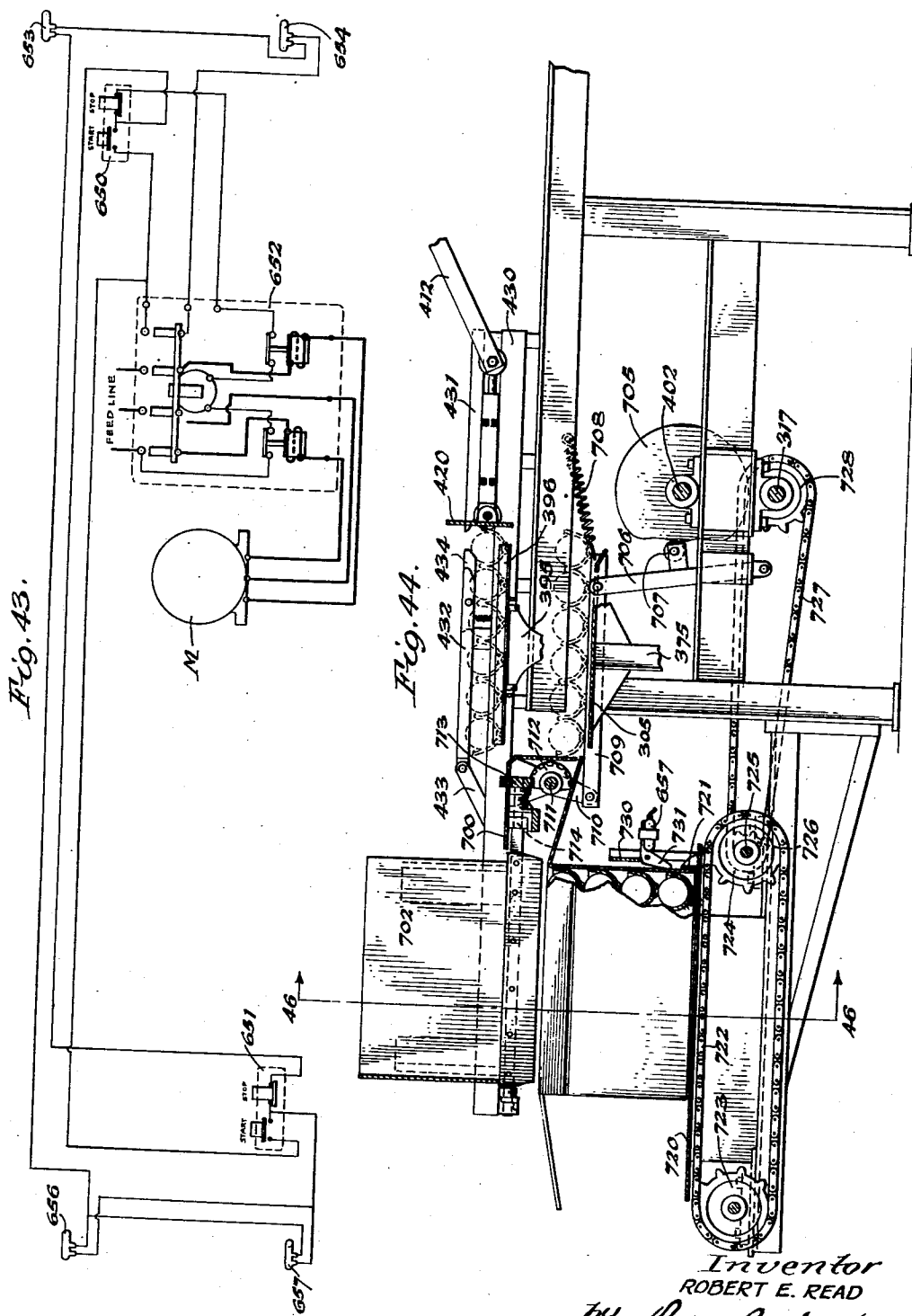
R. E. READ

2,069,926

PACKING MACHINE AND METHOD OF PACKING

Filed Sept. 12, 1933

14 Sheets-Sheet 13



Feb. 9, 1937.

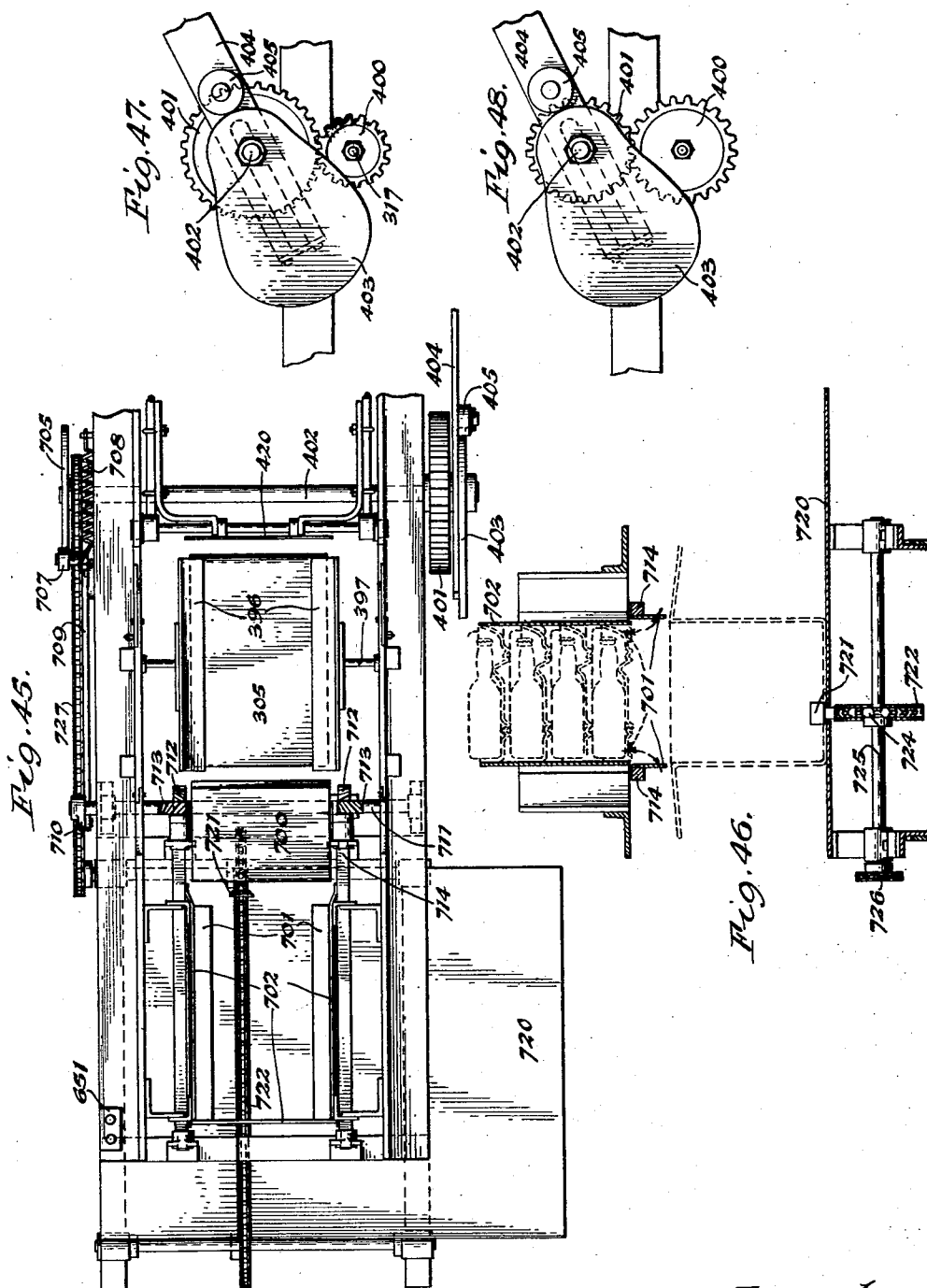
R. E. READ

2,069,926

PACKING MACHINE AND METHOD OF PACKING

Filed Sept. 12, 1933

14 Sheets-Sheet 14



Inventor
ROBERT E. READ
by *Orme E. Chatham*
Attorney

UNITED STATES PATENT OFFICE

2,069,926

PACKING MACHINE AND METHOD OF
PACKING

Robert E. Read, White Plains, N. Y.

Application September 12, 1933, Serial No. 689,098

41 Claims. (Cl. 226—14)

My present invention relates to a machine and method for the automatic packing of bottles in cartons. This invention is designed to place filled or empty bottles in protecting means, such as, for example, pulp trays having recesses each designed to hold a single bottle and protect it from others, and to place these protecting means containing the bottles in cartons or boxes. Although it is obvious that various forms of protecting means may be utilized, the illustrated embodiment is designed to accommodate the form of protecting means commonly known as a bottle tray and formed of moulded wood pulp. It is also to be understood that these protecting means may be utilized to protect empty bottles or other articles such as, for example, radio tubes, but that the present embodiment comprises a machine peculiarly designed to pack filled standard bottles, such as are used in the beverage industries. Also, any form of box or carton may be utilized while the present machine merely illustrates a form of carton commonly known as the flap end carton which is made of straw board or other light manufactured board. For the sake of consistent terminology, the machine will be described in connection with filled bottles which are placed in bottle trays and deposited in cartons.

An object of my invention is to economically pack bottled goods in trays whereby they are protected from breakage, and thereupon to pack the filled trays in cartons within which they are to be shipped. Heretofore bottles have been protected against breakage in various manners, and as far as I am aware, any present method of packaging bottles in protecting means is carried out manually. By means of my device filled bottles are placed in pulp trays and the trays are placed within cartons with a minimum of manual effort being required. With my machine only two attendants are required, one to insert trays to receive the bottles and another to place cartons in position to receive the filled trays. It is obvious that a tremendous saving in packaging costs is effected by the use of my machine.

A second object of my invention is to enable bottling plants to consistently follow the practice of sanitarily bottling their goods. In the present practice of most plants it is customary to sterilize the bottles and the caps and to fill the bottles and cap them under sterile atmospheric conditions without the bottle being touched by human hands. After having been filled it is also customary to pasteurize the bottles in a pasteurizing machine. However, due to the present lack of carton filling facilities it is considered necessary to have the

bottles manually removed from the delivery end of the sterilizing machine and placed in boxes or cartons. With my automatic packing machine it becomes possible for the first time to have the bottles sent to the consumer without having been touched by human hands from the moment they are first sterilized.

Another advantage of my machine is that the output of a bottling plant may be materially increased without the necessity for increasing the present floor space to accommodate carton packing tables, etc. One of my machines is capable of receiving bottles from a plurality of filling, capping, labeling, or other machines, and as heretofore related, two attendants will package this output. The normal working capacity of my machine is 120 bottles per minute, but it may operate at much slower or faster speeds, the normal speed being merely controlled by normal standard practice in bottling plants. These bottles are placed in trays each capable of receiving six bottles. These trays may then be packaged in cartons capable of receiving one, two, three or preferably four trays, although obviously any number of trays may be packaged in a carton designed therefor. With the preferred carton holding four trays, the output of the machine at normal speed will be five filled cartons per minute.

These and other advantages of my machine will be obvious from the following description, taken in connection with the accompanying drawings wherein like numerals refer to like parts throughout:

In the drawings,

Fig. 1 is a plan view of the entire machine drawn to a small scale in order to show all of the component parts;

Fig. 2 is a front elevation of Fig. 1;

Fig. 3 is a rear elevation of Fig. 1;

Fig. 4 is an end elevation of the entire machine looking at the right end of Fig. 1 or the bottle receiving end;

Fig. 5 is an end elevation of the entire machine looking at the left end of Fig. 1 or the carton ejecting end;

Fig. 6 is a section in elevation of a portion of Fig. 1 taken along the line 6—6 and enlarged in order to show details;

Fig. 7 is a view of a detail of the machine taken along line 7—7 of Fig. 1;

Fig. 8 is a section taken along the line 8—8 of Fig. 1 and illustrating details of the tray stacking and carton packing mechanism;

Fig. 9 is a plan view of one of the bottle feeding mechanisms with certain parts broken away

in order more clearly to illustrate details thereof;

Fig. 10 is a vertical section taken along the line 10—10 of Fig. 9 and showing the manner of placing bottles in the trays;

Fig. 11 is an irregular section taken along line 11—11 of Fig. 10 and showing a portion of the mechanism for placing the bottles in the trays;

Fig. 12 is a view similar to Fig. 10 taken along line 12—12 of Fig. 9 and illustrating the bottle gripping mechanism before it has fully received a bottle;

Fig. 13 is a section taken along line 13—13 of Fig. 1 and showing one of the bottle gripping mechanisms releasing a bottle which it is placing in a tray;

Fig. 14 is a section along the line 14—14 of Fig. 10;

Fig. 15 is a section taken along line 15—15 of Fig. 2 and looking toward the right end of the machine;

Fig. 16 is a partial section taken along line 16—16 of Fig. 10 showing details of the bottle gripping mechanism;

Fig. 17 is a section of the bottle gripping mechanism taken along line 17—17 of Fig. 10;

Fig. 18 and Fig. 19 are perspective views of parts of the bottle gripping mechanism;

Fig. 20 is a vertical section taken along line 20—20 of Fig. 8;

Fig. 21 is a view similar to Fig. 8 but illustrating a later relationship of parts;

Fig. 22 is a view similar to Fig. 8 and showing a slightly more advanced relationship than that of Fig. 21;

Fig. 23 is a partial view similar to Fig. 8, but showing the mechanism in a stage later than the position of Fig. 22;

Fig. 24 is a still later stage;

Fig. 25 illustrates the relationship of parts between the stages of Figs. 22 and 23;

Fig. 26 is a partial rear elevation which illustrates a portion of the mechanism of Fig. 8 at the position of Fig. 23;

Fig. 27 is a view similar to Fig. 24 and showing a later relationship of parts;

Fig. 28 is a section taken along the line 28—28 of Fig. 26;

Fig. 29 is a vertical section taken along line 29—29 of Fig. 21;

Fig. 30 is a vertical section taken along line 30—30 of Fig. 1;

Fig. 31 is a vertical section taken on line 31—31 of Fig. 20 and showing a portion of a safety clutch device;

Fig. 32 is a section taken along line 32—32 of Fig. 33;

Fig. 33 is a section taken along line 33—33 of Fig. 30;

Fig. 34 is a view similar to Fig. 31 but showing a different relationship;

Fig. 35 is a section taken along line 35—35 of Fig. 33;

Fig. 36 is a vertical section taken along line 36—36 of Fig. 8;

Fig. 37 is a view similar to Fig. 36 but showing the operation of mechanism whereby a stack of trays is compressed into its proper height;

Fig. 38 is a section taken along line 38—38 of Fig. 8;

Fig. 39 is a section taken along line 39—39 of Fig. 38;

Fig. 40 is a section taken along line 40—40 of Fig. 38;

Fig. 41 is a section taken along line 41—41 of

Fig. 1 and showing a filled carton being ejected from the machine;

Fig. 42 is a section taken along line 42—42 of Fig. 1;

Fig. 43 is a wiring diagram for the machine;

Fig. 44 is a vertical section of a modified form of carton packing device;

Fig. 45 is a top plan view of Fig. 44;

Fig. 46 is a vertical section taken along line 46—46 of Fig. 44;

Fig. 47 is a modified form of tray advancing cam and gears adapted to pack two trays in a carton; and

Fig. 48 is a similar view of a cam adapted to pack one tray.

Referring to Figs. 1 and 2, my machine comprises three main sections, section A being the tray filling mechanism, section B being the tray stacking mechanism, and section C being the carton packing mechanism. Section A of the machine will first be described, and the description will thereafter follow the progress of a bottle through the machine.

Tray filling mechanism

This portion of the machine comprises two bottle receiving conveyor tables indicated at 50 and 51, located on either side of a tray receiving table 52. The bottle receiving conveyors are continuously advancing and each receives a continuous line of bottles from the filling, capping and labeling mechanisms (not shown). The bottles are taken from the conveyors by grippers which are mounted on continuously advanced chains which carry the grippers into opposed relationship on opposite sides of the center of the machine and above the trays which are advanced from the table 52.

Referring to Figs. 6 to 15 inclusive, it is seen that the mechanism referred to heretofore is driven from a main drive pulley 53 mounted on a shaft 54 which carries a gear and a hand-wheel. This gear meshes with gear 55 on shaft 56 which carries a gear 57. Gear 57 drives gear 58 fixed to the main conveyor drive shaft 59. A sprocket 60 attached to shaft 59 drives a shaft 61 through a chain and sprocket 62 on shaft 61. Shaft 61 extends from one side of the machine through to the other and sprocket 62 which drives the shaft is attached to a collar fixed to one part of a clutch which will be described later. In Fig. 10 one end of shaft 61 is illustrated, the opposite end being identical but reversed. A sprocket 63 at the end of the shaft drives the bottle receiving conveyor through sprocket chain 64 and sprocket 65 on a shaft 66. Shaft 66 is mounted on bearings attached to angle bars forming the bottle receiving table 51 and carries a centrally located sprocket 67 driving the bottle feeding conveyor 68. This conveyor consists of a sprocket chain, the links of which carry flat plates adapted to bring the bottles forward by frictional contact with their lower ends. The bottles are received from the capping and other machines and guided between adjustable guides 69 supported by brackets 70 and adjustable bolts 71 so that the guides may be set to receive and align various sizes of bottles. The plates of the conveyor 68 may slip beneath the line of bottles so that the bottles are constantly edged forward in abutting relationship but are not positively forced forward. It is obvious that the conveyor will best serve its purpose when driven at a speed slightly greater than that necessary to remove

the bottles from the preliminary machines. It is also clear that any form of belt conveyor will serve this purpose and that the form illustrated is merely the best form whereby the above results are accomplished. The guides 69 extend forwardly and adjacent a star wheel 72 which is adapted to convey the bottles in sets of three and position them within the bottle gripping apparatus which eventually places them in the pulp trays. For this purpose star wheel 72 is driven by bevel gears 73, 74 from shaft 61. Gear 74 drives an upright shaft 75 which has a member 76 fixed to its uppermost end. A bore in member 76 carries a spring pressed ball 77 which fits in a depression in the star wheel 72 to rotate the wheel under ordinary working pressure. However, if a bottle should for any reason jam, the ball 77 will slip out of its depression and the star wheel will remain stationary while the remainder of the machine continues to operate. In this way any breakage of bottles is prevented. The star wheel consists of a hub portion surrounding the shaft 75 and two integral discs spaced above and below the guides 69. The star wheel has bottle receiving spaces around its circumference which are so spaced as to bring a bottle opposite each of one of the bottle gripping mechanisms and to present a blank space to the corresponding blank space on the bottle placing conveyor. The bottle gripping mechanisms are so positioned that three bottles are received on one side of the machine and brought into position adjacent the spaces between three bottles on the other side of the machine. When tipped forward to be placed within the pulp trays it will be obvious that six bottles will be placed in alternate neck to bottom relationship for which the pulp tray is designed. The inner guide 69 is cut short while the outer guide 69 extends around the star wheel and ends adjacent the bottle gripping mechanism to hold the bottles in the star wheel. A bottle will be forced into the star wheel holding space under the frictional force of conveyor 68 and will be held in this space by the outer guide 69 as the star wheel brings the bottle around into proper relationship with the gripping mechanism. The star wheel is positioned above a small table or plate 78 which extends from the conveyor 68 to a position adjacent the bottle gripping mechanism. It is difficult without further means to properly seat the bottle squarely within the gripping means, and for this reason a pivoted arm 79 extends over table 78 and is curved around the hub of star wheel 72. This arm is pivoted to table 51 at 80 and is biased by a spring 81 to force the bottles away from the star wheel and properly seat them in the bottle gripping mechanism.

While I have illustrated and described a form of feeding device whereby three bottles are positioned by star wheel 72 at one side of the machine to be alternately placed with a set of three bottles positioned by the star wheel 72 at the opposite side of the machine, various other numbers of bottles may be positioned and placed within trays or protecting means so designed to accommodate such other numbers. In connection therewith, star wheel 72 in the drawings is formed with three bottle receiving spaces at points substantially 90 degrees from each other, leaving practically a quadrant of the star wheel as a spacing means. In order to position one bottle in a tray designed to accommodate two bottles each star wheel 72 may be formed with

a single bottle receiving space and other portions of the bottle positioning mechanism may be proportioned to accommodate. Such an arrangement would not require changes in the present structure other than in the timing of cams and spacing of guides, since the bottle gripping means will operate whether a bottle is presented there-to or not, and star wheel 72 may be so formed as to present a single bottle to any one of the set of three gripping means. In another aspect, a greater number of bottles than three may be positioned in longer trays designed to accommodate eight, ten or any number of bottles. Such an arrangement merely requires the altering of star wheel 72 to have a greater number of bottle receiving spaces, and the rearrangement of other parts of the mechanism to accommodate a greater number of bottles than that shown. The disclosed form is designed to pack bottles in standard trays accommodating six bottles, for the reason that six bottles is a universal unit in the beverage industry, and practically all aspects of the industry are designed to accommodate units of six bottles. For example, the standard bottle carton is of a length to accommodate a row of six bottles, and conveyors, trucks and all other mechanisms in the usual plant are designed for this unit. None of the functions, operations and essential parts of the component parts of the bottle packing machine need be changed to accommodate other units of bottles or other articles.

Tray feeding mechanism

As previously described, the pulp trays are fed into the machine over the table 52 extending forward between bottle receiving tables 50 and 51. For this purpose the table is formed with suitable side guides and has a chain 100 (Fig. 7) extending over its length, driven by suitable gearing 101 which is rotated in a manner to be described later. Chain 100 carries suitably spaced lugs 102 which are pivoted at 103 and are arcuately slotted at 104, a pin 105 fitting in the slot. As the lower point of the lug 102 contacts a guide 106 at the forward end of table 52, the lug pivots around 103 and assumes an upright position to bring the tray forward, and as the lug rides off of guide 106 it will drop to a horizontal position beneath the bottom of the tray which is thereupon picked up by lugs on a chain to be fed through between the bottle gripping conveyors, as will be later described. It will sometimes happen that for some reason the supply of pulp trays becomes exhausted, and for this reason it is desirable that the operator who is placing the pulp trays should be able to stop the bottle gripping mechanism until he is again able to feed trays forward. However, it is also desirable that an empty tray should not be fed through the machine, and for this reason he should be able to allow the bottle gripping mechanism to fill the last tray which has been fed forward. It is also obvious that the star wheels should not be stopped except when a tray has been completely filled. Mechanism which will accomplish this purpose is herein described. An arm 110 (Fig. 6) is pivoted beneath the table 52 and is biased to inoperative position by a spring 111. The arm carries a handle or foot engaging member 112 convenient to the operator's foot so that as he places the last available tray on the machine to be fed forward by chain 100 he can thereupon push the arm 110 forward, transmitting the thrust through linkage 113 and 114 to a clutch dog member 115, which is

thereupon placed in the path of a clutch dog 116 (Fig. 10) which is normally biased in operative position by a spring 117. This clutch dog member carries a clutch pawl 118 (Fig. 14) mounted in the clutch member 119 which is fixed to shaft 61 and is normally held by spring 117 in engagement with a depression in the driven clutch member 120. Member 120 is fixed to sprocket 62 and continuously rotates. The relationship of the clutch pawl is such that the star wheel 72 will continue to revolve until the blank space is opposite the bottle gripping mechanism. At this point the member 115 which has been lifted into the path of dog 116 disengages the clutch and the star wheel 72 remains stationary until another tray is in position and ready to receive bottles. During this time the bottle gripping mechanism will have placed the last of a set of bottles within the last tray and the remainder of the machine will thereafter continue to operate until stopped, as will be later described. When the member 110 is released to again engage the clutch the last set of bottles to be gripped will be in readiness to be placed within the first of the new group of trays.

Bottle placing mechanism

The bottle placing mechanism comprises three cooperating units comprising the bottle gripping mechanism to receive each row of bottles from the feeding tables 50 and 51 and the tray conveying mechanism extending between the two gripping mechanisms to receive the bottles as they are released from the gripping mechanism. The gripping mechanism comprises the bottle grippers which are mounted on and driven by chains and sprockets operated at the same speed as the tray conveying mechanism. It is obvious that the bottle gripping units are exactly similar but in reversed relationship so that the operation of one unit in relation to the tray conveyor will suffice for the entire mechanism.

Both the bottle gripping mechanism and the tray conveyor are driven through the same set of gearing including the gearing previously described to drive shaft 59. Located on shaft 59 is a sprocket 140 which drives a sprocket 141 through a chain 142 (Fig. 6). The sprocket 141 is fixed to a shaft 143 at one end of the tray conveyor table and a similar sprocket 144 fixed to a shaft 145 is located at the opposite or tray receiving end of the tray conveying table. Both sprockets 141 and 144 in reality comprise two sprockets each of which may be joined to a central hub or to the shaft 59 and a double sprocket chain 146 passes around the sprockets and carries slats or bars 147 upon which the trays are adapted to rest. Pushers 148 are attached to suitable ones of the bars 147 and engage the rear ends of the trays as they are fed forward by the chain 100 and lugs 102. Pushers 148 are so located with respect to the bottle gripping mechanism that each of the tray pockets designed to receive a bottle will be in line with the bottle as it is deposited in the tray. In Fig. 6 it is seen that gearing 101 which drives sprocket chain 100 is driven by a gear 149 attached to shaft 145 so that the chain 100 and the tray conveyor are driven in proper synchronism.

Also mounted upon shaft 59 are two opposed bevel gears 200 (Fig. 15) each of which drives one of the bottle gripping conveyor chains. Being opposed, they will drive the conveyor chains in opposite direction so as to bring the bottles in the same direction of movement over the central tray conveying table. Gear 200 meshes with

a bevel gear 201 fixed to an upright shaft 202 which extends upward at one end of a standard or support for the bottle gripping chain. Fixed to shaft 202 are two sprockets 203 each of which drives a sprocket chain 204 in vertically spaced relationship about the gripper support. Suitable ones of the links of the sprocket chain 204 are adapted to hold lugs on the main body 205 of the bottle gripping members. The bottle grippers comprise a main body portion 205 which has a vertical rear face terminating in horizontal flanges or guides 206 which are adapted to be retained in grooves 207, having covering face plates 208, on the support to guide the bottle grippers in their longitudinal travel on both sides of the support. These grooves and plates maintain the grippers in accurate alignment and vertical position. Spaced arms 210 extend forward and downward from the lower end of the body portion 205 and are formed to receive a main pivot through holes in the ends of arms 210 and which passes through adjacent holes in the lower end of the pivoted gripper support 211. The gripper support is formed with a shelf 212 and an upright portion having openings 213 and 214 in its uppermost part. The support 211 carries a roller 216 at its lower end and has ears 217 near its lower end adapted to support a pivot 218 about which a bell crank carrying a second roller 219 pivots (Fig. 12). The opposite end of bell crank is attached by a linkage 220 to an arm 221 supported on a central portion of the main pivot 222 extending through members 205 and 211. A rod 223 is pivoted to the free end of arm 221 and extends upward through opening 214 in member 211. A spring 224 bearing against the top of member 211 and a pin 225 through rod 223 tends to force rod 223 and arm 221 downward and roller 219 outward away from the vertical as seen in Fig. 15. Attached to the free end of rod 223 is a bottle top gripping member 230 so formed as to receive and seat the capped end of a bottle. Member 230 also carries a short downwardly extending guide rod 231 (Fig. 10) which passes through opening 213 in member 211 to maintain the alignment of member 230. A bottle guide 232 is attached to member 211 slightly above the shelf 212 to align and guide the bottom of the bottle.

In order to cause the member 230 to be raised to receive a bottle from the star wheel 72 and to be lowered to grip the bottle, then to be again raised to release the bottle as it assumes a horizontal position in the tray, the following system of cams or tracks is utilized: Along the outside edge of the gripping mechanism support is a straight track 250 (Fig. 11) which engages the roller 216 to maintain member 211 in a vertical plane and against an adjustable stop 251 in the forward face of member 205. The cam 250 abuts a circular half-moon cam or track 252 at each end of the support, and as rollers 216 travel around the end of the support the bottle grippers will still be maintained in vertical position thereby. However, along the inner face of the support the bottle grippers must be tipped to assume a substantially horizontal position, and to accomplish this the rollers 216 are guided between curved guides or cams 253 and 254 which are so shaped that the bottles are caused to assume a horizontal position at the center of the gripper support and thereupon will be released, after which the gripper again assumes a vertical position and continues around to receive another bottle. Adjacent the star wheel 72 is a small cam

plate 260 which is so positioned that it will force the rollers 219 inward (Fig. 12) and consequently the gripping member 230 upward, while the bottle gripper is opposite the star wheel. During this time a bottle will be brought into position by the star wheel and placed on shelf 212 of the gripper and against the guide on member 230 and the guide 232 by the spring pressed pivoted arm 79. As roller 219 passes the end of cam plate 260 the spring 224 will again lower the gripper 230, and the bottle will be securely held in position on shelf 212. As the gripping mechanism assumes a horizontal position roller 219 is again forced in the same direction by a small cam plate 261 attached to the cam track 253 and in the manner previously described will raise member 230 to release the bottle. It has been found that various conditions contribute to a lack of uniformity in the size of pulp trays or to their exact positioning on the conveyor chain and also that slight variations in the bottles themselves occur. As a result, although cam 260 may be so proportioned as to raise member 230 a substantial distance, cam 261 is preferably positioned so that it will raise member 230 to give a slight clearance of the bottles in order not to break the walls of the pulp tray. Due to the variance in size of the bottles it might happen that one would not be released, but would again be picked up and carried through the machine which might result disastrously were it not for the ball connection 77 between shaft 75 and star wheel 72. However, in order to avoid the resultant delay and possible danger, stripper fingers 262 (Fig. 6) are so positioned above the line of travel of the trays as to positively strip the bottles from the bottle gripping mechanism before cam 261 releases roller 219, and in this way none of the bottles are allowed to leave the trays once they have been placed therein.

Member 230 is adjustably attached to rod 223 so that it may be raised or lowered in order to accommodate various sizes of bottles. An important feature of my device is that the grippers are able to accommodate variations in a single size of bottle without adjustment. It is practically impossible to manufacture bottles in uniform standard dimensions and as a result the capped bottles vary as much as three-eighths of an inch in height. The spring 224 allows member 230 to be raised above the top of the highest possible bottle of a certain capacity, and is thus compensatory to grip and hold each bottle that comes within the variable limits of height set for bottles of each capacity.

Tray stacking mechanism

As the filled trays leave the forward end of the machine they are received in a stacking mechanism which is so operated as to stack the trays one above the other if it is so desired. The preferred manner of packing pulp trays and bottles is to place four in a carton, and for the present mechanism will be described for stacking four trays. However, it is to be appreciated that the trays may be placed in cartons singly or in any other plural number.

Referring to Figs. 8, 15 and 20, a sprocket chain 260 is positioned on each side of the rear end of the conveyor 146 and carries lugs 301 which are pivoted to the chain and have arms which are adapted to engage stops 302 on the chain. These lugs will be forced into operative position while above a bar 303. The chains 300 are driven at a greater speed, preferably twice the speed of the chain 146, and are so timed that a lug 301 will

engage a filled tray and remove it from engagement with the pusher 148 as soon as the tray has passed beyond the stripper fingers 262. Traveling twice as fast as chain 146, chain 300 will take a filled tray to its farther end and still allow time for the stacking mechanism to operate before the next tray is brought to this position. As the tray reaches its foremost position it is above a vertically reciprocating stacking member 305 which supports the full length of the tray. Chains 300 extend alongside of stacking member 305 but the lugs 301 drop to a horizontal position upon passing the end of bar 303. Guide plates 306 having curved ends are placed on either side of the stacking member 305 to align the trays in lengthwise relationship to the chains 300 so that as each tray is brought into position over member 305 it will have been pushed forward in exact alignment against a back plate 307. The tray is thus practically boxed in on three sides, assuring vertical alignment of the sides of the stack. Sprocket chains 300 are driven from suitable gearing to be described.

The sprocket chains 300 are driven by sprockets mounted on a shaft 315 which is driven by sprocket chain 316 (Figs. 1, 8 and 20). This sprocket chain is driven by a sprocket on a shaft 317 which is driven from the main driving shaft 59 through a mechanism hereafter described. Mounted on shaft 59 is a sprocket 318 (Fig. 15) driving a sprocket chain 319 and a sprocket 320 (Fig. 30) loosely mounted on shaft 317. A clutch is positioned adjacent sprocket 320 and is so designed as to be engaged at all times that filled trays are being fed forward by chain 300. However, if an empty tray should be fed forward by chain 300, the clutch will be disengaged in order that this may be rectified and to prevent the later stacking of empty trays. The clutch is so fashioned that a filled tray which has been fed forward into position above stacking member 305 will be stacked before the entire stacking mechanism comes to rest as will be hereafter described. This coordination is accomplished by a feeler 321 which is positioned above the end of the tray conveyor 146 of the tray filling machine and is fixed to a rod 322 carrying an arm 323. Links 324 and 325 and a bell crank 326 operate a pawl 327 which cooperates with other members to engage or disengage the clutch. Pawl 327 is pivoted to a clutch lever 333 pivoted to the machine frame, the clutch lever carrying a shoe 334 (Figs. 30-35). As the filled trays pass under the feeler 321 the bottles will hold the feeler upward, thus continuously raising the pawl 327. However, should there be no tray presented to the feeler or if the tray should be entirely empty the feeler 321 will drop far enough to allow pawl 327 to come into engagement with a notch 328 in a horizontal yoke or double arm 329 which at one end is supported by shaft 317 and at the other end is pivoted to a connecting link 330 pivoted to the frame. The free end of the arm 329 which is supported by shaft 317 carries a roller 331 in engagement with a cam 332 fast to shaft 317. It is obvious that as shaft 317 is continuously rotated by sprocket chain 319 the cam 332 will reciprocate arm 329 in a horizontal plane and that as long as pawl 327 is maintained upward the clutch will not be affected. Should pawl 327 be lowered as seen in Fig. 34, cam 332 will rock arm 329 and the clutch lever 333 toward the left to position the clutch shoe 334 in line with a clutch dog 335. Cam 322 is fixed to shaft 317 which operates the stacking mechanism once for every tray or

conversely once for every revolution of shaft 317. Therefore, the speed of rotation of cam 322 is once for every tray and arm 329 will be reciprocated once for every tray. This shows that the cam is so positioned on the shaft that pawl 327 will be engaged by notch 328 and moved forward at the time that the leading edge of a tray should lift the feeler 321. As a result if a tray is present the pawl will be lifted clear of the notch and the clutch will not be affected but if there is no tray the clutch will be disengaged. Cam 322 is so proportioned that roller 331 is in engagement with the low portion of the cam during the time that the normal space between trays passes beneath feeler 321 and roller 331 will be riding upward on the high point of cam 322 to rock arm 329 at the time that the leading edge of the next tray passes below the feeler.

The clutch dog 335 is fixed to the driving member 336 (Fig. 35) of the clutch and carries a clutch lug 338 adapted to engage a depression in the driven member 337 of the clutch. Clutch dog 335 is spring biased to normally remain in its outermost engaged position, but when forced inward by clutch shoe 334 it will cause the clutch to disengage and remain disengaged as long as the feeler 321 is down. Clutch lever 333 is normally biased to inoperative position against a suitable abutment by a spring 339 so that the clutch will normally remain engaged.

The disengagement of the clutch will only occur after the tray which has previously passed the feeler has been fed into position over the stacker 305. Shaft 317 drives the stacking mechanism and the packaging mechanism, and it is obvious that this end of the machine will cease to operate at any time that the feeler 321 drops. This, however, does not stop the forward end of the machine and its only effect is to prevent the packing of less than the desired number of trays. As soon as filled trays are again presented beneath the feeler 321, the operator at the forward end of the machine having adjusted whatever difficulty may have arisen there, the feeler will be lifted out of the way and the stacking mechanism will again operate at the point where it left off.

The feeler 321 comprises in reality a sensing device to sense the presence or absence of filled holding trays. In Fig. 30 it is seen that feeler 321 may drop to a position slightly lower than its highest position when the point of the feeler is above the neck of a bottle. However, the feeler is so shaped that this is not sufficient drop to allow the pawl 327 to engage in notch 328, and in order to have engagement take place the feeler must drop to the position it would assume should a holder be completely empty. Cam 322 is so positioned with respect to the advance of holders that it will not advance arm 329 during the time that the feeler 321 drops into the space between holders. The feeler is so fashioned that it will ride up on the leading edge of the next holder and raise the pawl 327 before cam 322 operates. The mechanical feeler or sensing means 321 and associated parts is the most practical and satisfactory form of sensing device. However, electrical or magnetical means may be substituted therefor by the exercise of mechanical skill.

In Figs. 1, 2, 8 and 20-29, inclusive, various details of the stacking mechanism are illustrated. The stacking member 305 is fixed to the end of a vertically reciprocating support 375 which is maintained in vertical alignment by links 376 and 378, pivoted to the frame. Link 378 has an

extension 379 to which is fixed a spring 380 so adjustable as to relieve a lifting cam from most of the work of raising the stacker and a filled tray supported upon it. Link 376 carries a roller 381 engaging with a cam 382 and which is adjustably mounted on arm 376 so as to provide for adjustment in the lift of member 305. Cam 382 is continuously rotated by shaft 317 and has a sharp operating period so that a tray will be quickly raised and the stacker immediately lowered to receive the next oncoming tray. Also fixed to shaft 317 are two cams 390 which operate similar stack-holding shelves, one of which will be described. Lever 391 pivoted at its center to the machine frame, carries a roller 392 in engagement with the cam 390. The opposite end of the lever carries a vertical link 393 which is pivoted to one end of a member 394 pivoted to the frame of the machine. A vertical support 395 rises from an intermediate portion of member 394 and carries a shelf or tray support 396 at its upper end. A plunger 397 guided in the frame and biased inwardly against member 395 by a spring 398 bears against the member 395 and forces it inwardly at all times except when roller 392 is engaged by the operating point of cam 390, this engagement occurring slightly in advance of the maximum lifting point of cam 382. As a result the members 395 and the opposed shelves 396 will be forced outward at the moment when the bottles in a tray on stacking member 305 engage the bottom of the previously stacked tray, but before the tray being lifted jams against the bottom of shelves 396. However, should the oncoming tray for any reason have a bottle tilted or misplaced, it is obvious that member 395 can pivot outward against the thrust of springs 398 before roller 392 is engaged so that serious trouble will be avoided should any accident of this nature occur. Shelves 396 are pivoted to supports 395 in such manner that if a bottle should become misplaced it will merely pivot outward while the bottle is in engagement therewith. A spring (not shown) may assist in returning the shelf to its proper position as member 305 reaches its highest point.

The timing of cams 382 and 390 is such that the cam 390 completely operates before cam 382 is at its maximum high point and springs 398 will snap the shelves 396 into supporting position below the tray before the stacking member 305 begins to recede. In the present instance four trays will be stacked and supported on shelves 396 before the stack is moved out of the stacking mechanism as will be described, but obviously a single tray or any other number of trays may be stacked if the proper gear and cam relationship of later described parts is followed.

Carton packing mechanism

The trays are now stacked and means are provided to remove the stack from the stacking mechanism, compress it into a minimum vertical height and place the stack in a carton. Figs. 1, 2, 8 and 20-28, inclusive, illustrate the means for removing the stack from the stacking mechanism. Fixed to shaft 317 is a gear 400 meshing with and driving a gear 401 fixed to a shaft 402 extending through the machine to the front of the machine. A large pusher operating cam 403 is attached to this end of shaft 402 and a rod 404, guided by a yoke about shaft 402, carries a roller 405 which engages the surface of cam 403. Rod 404 is connected to a bell crank 407 which rocks a rod 408 as the large operat-

ing end of the cam 403 engages roller 405. In the present instance the ratio of gears 400 and 401 is in four to one ratio so that shaft 317 makes four revolutions to one revolution of shaft 402 and rod 408 will consequently be rocked only once to every four reciprocations of stacker 305. Rod 408 has an arm 410 attached thereto which is connected by a slot connection to a pusher rod 411 which is adjustably attached to the end of a yoke or double armed member 412, the free ends of which are pivoted to a stack pusher carriage at 413. The carriage consists of four wheels and a vertical pusher plate 420 positioned in front of the forward set of wheels. The rear set of wheels are not connected except through the yoke member 412 and the remainder of the carriage while the front set of wheels are connected through an axle 421. Rods 422 (Figs. 1 and 3) extend forward from the axles of the rear set of wheels and the pusher plate 420 is mounted upon curved or angularly bent bars 423 which are clamped to the rods 422, providing for adjustment of the length of the carriage. The axle 421 of the forward set of wheels is journaled in members 423 so that the longitudinal distance between the forward and rear set of wheels may be adjusted.

As seen in Fig. 8 the carriage is at its rearmost position and pusher plate 420 is slightly to the rear of the rear edge of the stack of trays. In Fig. 22 the pusher is traveling forward under the influence of cam 403 while Figs. 23-27 show other positions of the carriage, as will be explained. The carriage wheels are flanged on their inner edges and the threads of the wheels are supported on a track 430. The wheels are prevented from being derailed by tracks 431 and 432. The rear set of wheels never leaves the lower track 430 since there is no axle or other obstruction between the wheels, and after pushing forward a stack of trays there is no necessity for raising the rear wheels above the level of the next tray which is rising or has risen as the carriage returns. However, the pusher plate 420 and the front axle 421 must be raised to clear this tray, and for this reason track 432 is supplied with a pivoted auxiliary track 433 at its forward end. As seen in Fig. 24 the forward wheels raise this pivoted track 433 and travel beneath it on track 430 during the forward pushing stroke, but afterward as in Fig. 26, this track will drop to its inclined position and the forward wheels will ride upward on to track 432 so that the pusher plate clears the filled tray. In order to bring the pusher plate back down to engage the bottom of a stack a gap is provided between upper tracks 431 and 432, and a pivoted auxiliary track 434 (Fig. 27) partially bridges this gap. The auxiliary track 434 is provided with a lug 435 and a spring 436 keeps lug 435 engaged with a cooperating notch on track 432 to maintain the auxiliary track 434 normally in a horizontal position. However, when the forward pair of wheels rides back off of the end of track 432 the auxiliary track 434 will pivot to return the forward wheels to track 430, spring 436 preventing any undue shock. Under normal conditions the forward set of wheels will return to the track without rebounding or derailing. However, it may happen that the forward set of wheels will bounce under the shock of dropping, particularly if spring 436 should break. If this should happen and the forward set of wheels should become derailed, it would be impossible to stop the machine before serious damage had been done. For this reason a guide plate 440 is positioned at each side

of the space between tracks 431 and 432. These plates are curved outwardly and engage the outer ends of the axle 421 to align the wheels with the track before they drop on to track 430, and should a rebound occur, will prevent lateral displacement of the carriage. The pusher plate is adapted to push the stack on to a carton packaging table 450 and in engagement with a guide 451 on the table.

Fixed to the rod 408 is an arm 441 (Fig. 8) which has pivoted to it a rod 442 (Fig. 26) guided for vertical movement on the machine frame. A compression spring 443 surrounds rod 442 and tends to force arm 441 upward; hence forcing the roller 405 against cam 403 and returning the carriage to its rearward position. During the time that the forward set of wheels is climbing up on the inclined auxiliary track 433 an auxiliary spring 444 operates to assist spring 443. This spring 444 surrounds a rod 445 pivoted to a second arm 446 fast to the rock shaft 408. The length of the compression spring 444 is such that it will be compressed only during the last few inches of forward travel of the carriage, and hence will assist in returning the carriage only during the time that the spring 443 exerts the greatest force when the carriage is in its foremost position. After arm 410 passes the vertical it will tend to drag the carriage back of its own weight and spring 443 need not exert a great deal of force during this time.

The arrangement heretofore described is designed to stack four filled trays and then shove them forward into the carton packing mechanism. Figs. 47 and 48 show the changes necessary to allow the packing of two trays in Fig. 47, and one tray in Fig. 48. In Fig. 47 the outline of cam 403 has been modified and the ratio of gear 400 to 401 has been changed to a two to one ratio, while in Fig. 48 the outline of cam 403 has again been changed and the ratio of gear 400 to 401 is a one to one ratio. Obviously, changing the gear ratio changes the number of times that shaft 317 revolves before the pusher plate 420 is reciprocated and changing the outline of cam 403 alters the speed of travel of the pusher plate to correspond to the change in timing of other parts.

As pusher plate 420 shoves a stack of trays forward it is received and aligned on the table 450 and against the back plate 451. A second pusher plate 452 is located to one side of and parallel to the direction of movement of the stack and is adapted to be reciprocated to shove the stack into a carton which will have been located in readiness therefor, as will be described. It sometimes happens that the bottles have not been fully seated in the trays, and as a result the stack will have a greater height than the inside dimension of the carton, and for this reason the stack is now compressed to the proper height. Means for operating the pusher plate 452 and the stack compression means will now be described.

In Fig. 20 it is seen that shaft 317 carries a second gear 460 meshing with a gear 461 mounted upon a collar or hub loosely rotatable about shaft 402. Gear 461 is fixed to a beveled gear 462 which meshes with a bevel gear 463 driving a shaft 464 extending longitudinally of the machine (Fig. 8). Shaft 464 carries a number of cams, certain of which operate the stack pusher and the stack compressor.

The stack compressor (Figs. 36 and 37) is operated by cams 470 and 471 mounted upon shaft 464. A bell crank member 472 is pivoted about a rod 473 and carries two oppositely located rollers 474 and 475. The crank 472 is located mid-

way of cams 470 and 471 and can, as a result, pass between the two cams at certain points in its oscillation. The inner arm 476 of the yoke is pivoted to a rod 477 which is connected at 478 to the joint of a toggle comprising toggle arms 479 and 480. Arm 479 is pivoted to the frame while arm 480 is pivoted to a cross bar 481 extending diagonally across the space directly beneath the table 450. Fixed to either end of the cross bar 481 is a rod 485 guided for vertical reciprocation in a bearing 486 at the bottom of the frame and similar bearing (not shown) at the top of the frame. Fig. 38 shows further details of the rods 485 and it is seen that they extend upward at diagonally opposite corners of the table 450 and support at their upper ends a rectangular compressing plate 487 carried by a cross bar 488 and braced by reinforcing members 489. Rods 485 are threaded so that plate 487 may be raised and lowered with respect to table 450. It is seen from Figs. 36 and 37 that when cam 470 is in engagement with roller 475 in its operative phase the toggles 479 and 480 will be broken and cross bar 481 will be raised to raise the compressor plate 487 above the top of the stack which at this time is being thrust on to table 450. Immediately after cam 470 leaves roller 475 the cam 471 contacts roller 474 to rock bell crank 472 in the opposite direction to straighten the toggle and force the compressor plate down on to the top of the stack. The compressor plate bears directly against the upper layer of bottles and for this reason it is formed with a surface of rubber, cork or similar material 490 to prevent it from breaking the bottles.

In Figs. 36, 38 and 40 details of the mechanism for operating the pusher plate 452 are shown. This mechanism comprises a cam 500 fast to shaft 464 and bearing against roller 501 carried on a forked member 502 pivoted about rod 473. The opposite arm of member 502 extends upward to a point above the table 450 and is connected through a pin and slot connection to the arms of a double connecting rod 503. Rods 503 are connected to the pusher plate 452 through the medium of small plates 505 fastened to the back of the pusher plate. The member 502 operates through an opening in table 450 so as to allow the pusher plate 452 to be advanced to the extreme left edge of the table and force the stack into a carton which has been positioned at the left of the table. Fastened to plates 505 are guide rods 506 extending some distance to the rear of plate 452 and braced by a cross rod 507 beyond the member 502. Guide rods 506 are guided in channels 508 supported on the table and assist the pusher plate in maintaining a direct alignment in its reciprocation. Also mounted on plates 505 are rollers 509 which ride on the surface of table 450 and support the weight of pusher plate 452. Cam 500 is so positioned with respect to cams 470 and 471 that the pusher plate will be reciprocated during the time that the compressor plate 487 is fully raised, and it is so positioned with respect to shaft 317 that pusher plate 452 will be reciprocated and back in its initial position before carriage plate 420 can begin to position another stack on table 450. To return the pusher plate 452 and maintain roller 501 against the cam 500 a strong tension spring 510 is connected to a portion of the frame and to a link 511 pivoted to an extension of member 502 below its pivotal point at 473. The spring is adjustable and strong enough to positively insure return movement of the pusher plate.

Referring to Figs. 1, 36, 38 and 39, it is seen that an auxiliary conveyor table 525 is placed at the side of the machine and substantially on a level with table 450. The conveyor table 525 is of a width sufficient to support a carton which is laid on its side with its open end facing pusher plate 452. The flaps of the carton must be maintained spread in order to allow the stack to be slid into the carton and a guide 526 performs this function. The guide 526 comprises a rectangular frame of which the sides and top walls slope inwardly toward the carton so that if the carton should be misaligned with the stack, the guide 526 will cause it to be properly aligned. In Figs. 38 and 39 it is seen that on the vertical sides of the guide 526 there are positioned angles 527 which assist in maintaining the end flaps of the carton top substantially parallel to the longitudinal axis of the machine. This is indicated by flap a bearing against angle 527 in Fig. 39. The lower flap of the carton b is inserted in a space provided for that purpose between table 450 and a curved guide plate 528 (Fig. 36). The upper flap c is merely supported on the top wall of guide 526. The guide plate 528 is an extension of an auxiliary table top 530 which extends past the carton packing mechanism and allows flap b to be slid lengthwise from under table 450 without meeting any obstruction.

It is apparent from the foregoing that a carton may be positioned to receive a stack and that this positioning is manually accomplished. However, at the standard speed of the machine, 120 bottles per minute, or 20 filled trays, the output of the machine will be five cartons per minute, and for this reason means must be provided as a safety device to prevent further operation of the machine in case the supply of cartons become exhausted or in case the operator who is positioning cartons does not place a carton in time. This mechanism is illustrated in Figs. 2, 36 and 38 and comprises in part an electrical circuit which will be described later. The mechanical features of the device comprise a back plate 550 mounted on arms 551 fixed to a shaft 552. At one end of shaft 552 and fixed thereto for movement in unison with plate 550 is a member 553 which has two notches 554 and 555 in its outer edge. A pawl or dog 556 is pivoted on a rod 557 mounted below shaft 552 and is rocked about rod 557 by movement of a connecting rod 558. When the dog 556 is in engagement with notch 555 the plate 550 will be held vertically to act as a backing for the carton to prevent the carton from shifting due to the frictional force exerted by the stack being inserted therein. However, it is impossible to insert a carton when plate 550 is in its vertical position, and for this reason dog 556 is rocked out of notch 555 and will be held in position to engage notch 554 to maintain plate 550 in the position shown in dotted outline (Fig. 38). The plate 550 is slightly off balance so that it will tend to drop to its outer position, and a spring 559 (Fig. 2) prevents it from dropping with undue force. The operator returns the plate after inserting a carton, this being easily accomplished with one hand as he reaches for another carton. Rod 558 is operated by a cam 560 attached to shaft 464 and rocking a member 561 pivoted on rod 473 and carrying a roller 562. A tension spring 563 connected to member 561 and to the frame maintains roller 562 against the cam and tends to keep the dog 556 in its full line position (Fig. 38) at all times except when the high point of cam 560 bears

against the roller. Cam 560 is so positioned with respect to cam 500 that it will move dog 556 to its dotted position, allowing back plate 550 to drop, at the time that the pusher plate 452 has reached its outermost position and is returning to the right. Due to the fact that roller 562 is biased against cam 560 by a spring it is obvious that the plate 550 may remain in its dotted position at all times without damaging any of the parts of the machine. This will occur at any time that the operator has not placed a carton and closed the back plate, the back plate remaining lowered with dog 556 in engagement with notch 554. As will be explained in connection with the wiring diagram, whenever dog 556 is held in its outer position the machine will stop before a stack is shoved forward by the pusher 452.

A gauge or guide 565 mounted on table 525 at the forward end of the table may be placed so as to assist the operator in aligning the carton with respect to the stack. However, this gauge may be removed in which case it has been found that the operator may position an empty box to receive a stack, and while that box is being filled position the next box with the adjacent flaps of the boxes in overlapped relation, so that as the filled box is subsequently conveyed away he may simply shove the empty box forward in the line of travel of the filled box and stop it at the position to receive the next stack.

After the carton has been filled in the above described manner it is removed from its filling position so that it may be ejected from the machine. This is accomplished by the following mechanism illustrated in Figs. 1, 2, 20, 36, 38, 41 and 42. As seen in Fig. 20 there is a sprocket 600 adjacent gear 460 on shaft 317 which drives a sprocket 601 (Fig. 38) through a sprocket chain 602. Sprocket 601 is mounted on shaft 603 which extends beneath table 450 and table 525 and carries a sprocket 604 (Fig. 36) which drives the carton removing conveyor chain 605 (Fig. 1). A pusher 606 attached to conveyor chain 605 contacts with the carton at the instant or slightly after the pusher 452 begins to recede and slides the carton forward along table 525 to a point adjacent the end of the table 530. Conveyor chain 605 extends from sprocket 604 to a second sprocket 607 (Fig. 2) at this point and pusher 606 will merely be returned beneath table 525 after the carton has reached the desired position. A guide or guard 608 prevents the carton from being shoved off of the table after it leaves the vicinity of back plate 550 and guides 609 (Fig. 41) may be placed along the opposite side. The table 525 comprises opposed angle bars between which a space is left. At the far end of the table 525 and flush with the surface thereof is a plate 610 (Figs. 1 and 41) mounted in the space in table 525. This plate is mounted at the end of a set of angular arms 611 which are braced by rods 612 extending between the first and second arm and the third and fourth arms, leaving a space between the second and third arms, and a continuous rod 613 extending between the first and fourth arms. Arms 611 are fixed to a shaft 615 mounted beneath the outer edge of table 525. Fixed to shaft 615, and in the space between the second and third arms, is a segmental sprocket 616. Attached to the upper edge of sprocket 616 is a sprocket chain 617 which extends around the sprocket and is in mesh with all of its teeth when plate 610 is flush with the surface of table 525, as seen in full outline in Fig. 41. Extended upward as extensions of the

arms 611 are arms 618. Upon chain 617 being pulled to the right of Fig. 41, plate 610 will tip the carton outward off of table 525 and into contact with arms 618 which are moving with plate 610, and the carton will be deposited thereby upon a roller conveyor 620, or other conveying means, which will remove the carton from the machine and carry it to a carton sealing station or storage place. The upper rollers of the conveyor 620 are mounted on vertical bars 621 suitably supported adjacent table 530, leaving spaces between the rollers to receive arms 618 when the carton is being deposited on the conveyor. A guard 622 at the outer edge of the conveyor 620 prevents the carton from being slid off of the conveyor. The conveyor is set at a slant which will allow rapid removal of the carton by gravity. As soon as the weight of the carton has been removed from arms 618 they will tend to rise and re-wind sprocket chain 617 about sprocket 616 due to the influence of a tension spring 623 fixed to plate 610 and the frame. Sprocket chain 617 is pulled to the right by an arm 625 pivoted on rod 473 and carrying a roller 626 in engagement with a cam 627 fixed to shaft 464. The relationship of cam 627 to cams 470, 471, 500 and 560 is such that the plate 610 will be pivoted about shaft 615 at the time that conveyor chain 605 brings a filled carton to the end of the machine, and plate 610 will return before another box can be brought forward.

From the foregoing it is obvious that the carton is ejected from the machine in an upright position, unsealed, and containing twenty-four bottles stood upright and protected within the trays. In this form of the machine the result is a package of which the entire contents may be inspected from the top, that is, each of the bottles may be seen without removing any of the trays.

Wiring diagram

Certain features of the machine are best described in connection with the wiring diagram (Fig. 43). It has been explained in connection with the mechanical features that there are two operators, one standing adjacent table 52 and inserting trays and one standing adjacent back plate 550 and inserting cartons. At these two stations there are manual start and stop switches, 650 on table 52 (Fig. 1) and 651 on table 525 (Fig. 1). These switches are connected in series to a conventional starter box 652 (Fig. 3) so that either switch may start or stop the entire machine which is driven by motor M (Fig. 43) and pulley 53. The details of this starter box are not a part of the present invention and are entirely conventional, as illustrated in Fig. 43. It is obvious that both switches must be set at "start" in order that the machine may operate, while only one of the switches need be set at "stop" to stop the machine. This insures that both operators must be in readiness before the machine will start, but that either one may stop if difficulty should arise at his end of the machine. Mounted on guards 69 of table 50 is a mercury switch 653 (Figs. 1 and 9), and mounted on guards 69 of table 51 is a mercury switch 654. These mercury switches are conventionally operated through gears (not shown) to tip and break the circuit if a feeler 655 (Fig. 9) should pivot about its axis. This feeler is maintained in circuit closing position at all times that the supply of bottles is continuous. However, it will break the circuit if a gap in the lines of bottles should

occur. Switches 653 and 654 are in series with the starter box 652 and both must be closed in order that the machine will operate, but if either line of bottles should cease, the machine will stop.

5 In the circuit with switches 653 and 654 and the start and stop switches are two mercury switches 656 and 657. In Fig. 43 it is seen that switches 656 and 657 are connected in parallel so that both switches must be open in order to
10 break the circuit and that either one of these switches may be open without affecting the circuit. Switch 657 is mounted on dog 556 (Fig. 38) and it is obvious that if dog 556 is periodically
15 rocked by connecting rod 558 the mercury switch 657 will periodically make and break contact, the breaking of the contact occurring when dog 556 is in notch 554 and back plate 550 is in its dotted
20 outline position. It is obvious that if plate 550 is not raised by the operator as previously explained, switch 657 will remain broken. However, this will have no effect on the machine
25 unless switch 656 is broken at the same time, whereupon the machine will stop. Switch 656 is mounted on a pivoted arm 660 carried by the
30 frame of the machine (Fig. 38). The arm 660 carries a roller 661 which is biased by a spring against a cam 662 fixed to shaft 464. When the
35 roller 661 drops into the cut away portion of cam 662 switch 656 will be broken. As seen in Fig. 38, this occurs before dog 556 is rocked to allow plate 550 to drop, and at the time that dog
40 556 is rocked roller 661 will be out of the depression and switch 656 will have again made contact to maintain the flow of current. Should
45 it happen that for any reason plate 550 is not raised and thereby holds dog 556 in its dotted position, it is obvious that roller 661 drops into the depression of cam 662 to break switch 656, and the machine will immediately stop.

40 This wiring diagram, taken in connection with the mechanical features, obviously provides the machine with every possible degree of safety. It is impossible for the machine to eject improperly
45 filled cartons or improperly filled trays or to fully operate when any of the sources of supply fail, these sources of supply being the source of filled bottles, the source of pulp trays and the source of cartons.

Modified carton filling mechanism

50 Figs. 44-46, inclusive, are devoted to a modified form of carton filling mechanism which may take the place of the previously described form, all other aspects of the machine being identical.
55 Thus it is seen in Figs. 44 and 45 that the filled tray is received on the stacking means 305 which is vertically reciprocated by member 375 and that the tray is lifted to horizontally oscillated
60 shelves 396 which are supported on arms 395 in the manner described. The stack when formed is pushed forward by pusher plate 420 reciprocated by cam 403. Cam 403 is fixed to shaft 402 which is rotated in a four to one ratio by shaft
65 317 which operates members 305 and 396. Obviously, cam 403 and gears 400 and 401 may be changed as explained in connection with Figs. 47 and 48 to package other numbers of trays than four.

70 In this modified form the stack is shoved forward across a short intermediate table 700 and is deposited on pivoted opposed shelves 701 which support the side edges of the stack. The stack is received within the walls of a guard or guide
75 702 extending preferably around three sides of the stack to positively locate it with respect to

the carton which in this instance is placed immediately below shelves 701. A cam 705 is mounted on shaft 402 at the opposite side of the machine from cam 403 and operates but once for every
5 four trays. An arm 706 pivoted to the frame carries a roller 707 which is biased against cam 705 by a spring 708. Link 709 connects arm 707 to a crank 710 fixed to a shaft 711 extending
10 across the machine beneath table 700. This shaft carries segmental worm gears 712 in mesh with gears 713 fixed to shafts 714 to which the shelves
15 701 are fastened. From the foregoing it is clear that shelves 701 will be rocked from a horizontal to a vertical position whenever roller 703 reaches the low point of cam 705, which rocking occurs
20 at a time immediately after pusher plate 420 deposits the stack upon shelves 701. In this manner vertical support is removed from the stack and it will drop into the carton, being guided for the
25 first portion of its movement by the guide 702 and the shelves 701 which are now vertical, and then by the walls of the carton. Regardless of the number of trays in a stack it will be gently deposited within the carton due to the cushioning
30 effect of the substantially trapped air. The carton is supported on a table 720 in which table is a slot through which projects a pusher 721 on a sprocket chain 722. This sprocket chain passes
35 about sprockets 723 on a shaft at one end of the table and sprocket 724 on a shaft 725 at the end of the table adjacent the stacking mechanism. Shaft 725 extends to the side of the machine and a sprocket 726 at its end is driven by a sprocket
40 chain 727 from a sprocket 728 fixed to shaft 317. The timing of this device is such that pusher 721 contacts the rear edge of the carton immediately after the trays have been placed therein and carries it forward to some removing means (not
45 shown), whereupon the operator may place another carton in position to receive the next stack. Suitable guides 730 may be placed on table 720 to position the carton.

In this form of the invention the switch 657 is preferably mounted on a pivoted arm or feeler 731 at some point on the guide 730 so that it will
50 make contact when a carton is properly seated in the guide, and switch 651 is situated on the frame of the machine, at a position convenient to the operator's reach. Switch 656 obviously may be driven from shaft 317 in the manner
55 previously described or through similar mechanical connections, thus supplying the same features of safety in this form of the device.

Résumé

55 In the foregoing specification there has been described a machine capable of automatically placing bottles in trays, having means to assure the placing of the desired number of bottles in the trays, and capable of placing the trays in
60 cartons, having means to prevent the placing of less than the desired number of trays. With the safety devices described it is obvious that nothing but a carton having the full desired number of bottles properly placed in trays may be ejected
65 from the machine. It is also apparent that the machine is entirely automatic in bringing the bottles, trays and cartons together, and that at no point do human hands touch the bottles.

To summarize in a general manner the operation of the machine the following will suffice:

A continuous line of bottles is supplied to either side of the machine and these bottles are gripped singly and carried to a position adjacent the center line of the machine. Trays or holders are
75

fed longitudinally of the center line of the machine and at the same speed as the bottle gripping means, which gripping means deposit the bottles in the holders alternately from opposite sides of the machine. The filled holders are thereupon brought above the stacking plate which stacks a plurality of the filled trays, the stacking being done by raising the previously stacked trays and adding to the bottom of the stack. The stack is now deposited on a table where it is compressed into correct height, the compressing action occurring while the first of the succeeding trays are being stacked. After compressing the stack it is placed within a carton which is positioned to receive it, this action occurring as a succeeding stack is nearing completion. The filled carton is now removed from the filling station and carried to the ejecting means during which time a succeeding carton is placed in the machine and the now completed succeeding stack is brought forward beneath the compressing plate.

The safety features of the machine include automatic means to stop the machine should either line of bottles be broken, and to stop the machine if a carton has not been properly positioned to receive the stack. These automatic safety devices are so interrelated that if any one of the sources of supply should fail the machine will stop; that is, if a bottle is not supplied, or if a carton is not supplied, the motor will be shut off and the machine will stop. The machine also includes means to stop the carton filling and stacking mechanism should the supply of trays cease, and thereby insure that the proper number of trays are packed within each carton. Related to the automatic means are the manual means whereby either operator may stop the machine for any reason.

I have described this machine in connection with bottles and bottle trays. However, as previously mentioned, other articles may be packed by my invention, upon adapting the parts of the machine to accommodate such articles, and other holders than trays or other forms of trays may be used to receive articles for which they are adapted. It is equally apparent that my invention is not limited to a machine for packing cartons, since other receptacles such as wooden boxes, metal cases and others may be filled thereby. By the term "carton" I mean receptacles adapted to receive the filled holders. I do not intend that my invention should be limited to a machine for placing bottles in trays since it would be but a matter of mechanical skill to adapt my machine to varying situations.

Although I have illustrated and described the preferred embodiment of my invention, other forms of various component parts may be apparent to the skilled workman, and I do not intend to be limited to the specific details and arrangement illustrated. The scope of my invention is to be determined by the following claims which are to be construed in their broadest aspect.

What I claim is:

1. In a bottle packing machine, means to supply a plurality of lines of upright bottles to said machine, means to supply a holder to said machine, and means to remove bottles alternately from each of said lines and to position said bottles upon their sides within said holder.

2. In a bottle packing machine, means to feed a continuous line of upright bottles to said machine, means to remove a plurality of said bottles one at a time from said line and present

each of them to one of a series of spaced bottle gripping means, means to supply holders having spaced recesses each adapted to receive a bottle to said machine, and means to cause said gripping means to position said bottles upon their sides in said recesses.

3. In a packing machine, means to place articles in holders, means to form a stack of a plurality of said holders, means to compress said stack, and means to place said stack within a carton.

4. In a bottle packing machine, means to supply similarly disposed bottles to said machine, means comprising a conveyor to convey holders each having a plurality of recesses each adapted to receive one of said bottles through said machine, and means to position said bottles in alternately reversed relationship in the recesses of said holders as the same are being conveyed through said machine.

5. In a bottle packing machine, means to supply a continuous line of similarly disposed bottles to each side of said machine, means comprising a conveyor to supply holders centrally of said machine, and means to remove a bottle alternately from each side of the machine and to position said bottles in alternately reversed relationship in said holders.

6. In a bottle packing machine, means to supply a continuous line of similarly disposed bottles to each side of said machine, means comprising a conveyor to supply holders centrally of said machine, means to remove a bottle alternately from each side of the machine and to position said bottles in alternately reversed relationship in said holders, and means comprising a pivoted, resiliently projected arm positioned adjacent the path of each line of bottles, and a switch associated with each arm and adapted to be opened in case the continuity of the line of bottles is broken, said switches being connected in series whereby to stop the machine if the continuity of either line of bottles is broken.

7. In a packing machine, means at each side of said machine adapted to grip and convey articles in upright position, means to convey holders centrally of said machine, and means to cause said gripping means to deposit said articles seriatim in reclined alternately reversed relationship in said holders.

8. In a packing machine, means to grip and convey a group of upright articles adjacent each side of the machine, means to convey a holder centrally of the machine, and means to cause said gripping means to deposit said groups of articles in reversed relationship in said holder.

9. In a packing machine, means adjacent one side of the machine to convey a group of spaced upright articles, means adjacent the opposite side of the machine to convey a second group of spaced upright articles, the articles of one group being adjacent the spaces between the articles of the first group, and means to cause said article conveying means to release said articles centrally of the machine in reclined alternately reversed relationship.

10. In a packing machine, means to convey a group of spaced articles, means to convey a second group of spaced articles, the articles of one group being adjacent the spaces between the articles of the first group, means to convey an article receiving holder at the same speed of travel as said foregoing means, and means to cause said article conveying means to position said articles in a single layer and in the same relative order in

said holder as the same is being conveyed through said machine.

11. In a packing machine, means adjacent one side of the machine to convey groups of spaced articles, means adjacent the opposite side of the machine to convey other groups of spaced articles, the articles of the groups at one side of the machine being adjacent the spaces between the articles of the groups at the opposite side of the machine, means intermediate of the foregoing means to convey article receiving holders in spaced relationship at the same speed of travel as said foregoing means, and means to cause said article conveying means to position said articles in a single layer in said holders.

12. In a packing machine, means adjacent one side of the machine to convey spaced groups of spaced upright articles, means adjacent the opposite side of the machine to convey other spaced groups of spaced upright articles, means intermediate of the foregoing means to convey article receiving holders in spaced relationship at the same speed of travel as said foregoing means, the articles of the groups at one side of the machine being adjacent the spaces between the articles of the groups at the opposite side of the machine and the spaces between the groups of articles being adjacent the spaces between said holders, and means to cause said article conveying means to position said articles on their sides in said holders.

13. In a packing machine, means adjacent one side of the machine to convey spaced groups of spaced upright articles, means adjacent the opposite side of the machine to convey other spaced groups of spaced upright articles, means intermediate of the foregoing means to convey article receiving holders in timed relationship to said foregoing means, and means to cause said article conveying means to interdigitate the articles of opposed groups in alternately reversed relationship in said holders.

14. In a packing machine, a conveyor adapted to progress a series of holders through the machine, means to place articles in said holders while they are on said conveyor, stacking mechanism adapted to receive said holders singly and to form a stack of said holders, an intermediate conveyor between the first conveyor and said stacking mechanism, and means controlled by the absence of filled holders on said first conveyor to stop said stacking mechanism and said intermediate conveyor.

15. In a packing machine, conveying means adapted to deliver spaced holders, a vertically reciprocating plate to which said holders are delivered by said conveyor, means to reciprocate said plate above the path of travel of said conveyor during the time elapsing between the delivery of adjacent holders, means to receive each of said holders from said reciprocating plate and retain each of the holders above the path of said conveyor, said retaining means comprising opposed shelves adapted to support the edges of said holder, means whereby said shelves are caused to separate as said plate approaches its maximum height and caused to approach each other as said plate reaches its maximum height, and means to remove said holders from said shelves as said plate is being lowered.

16. In a packing machine, conveying means adapted to deliver spaced holders, a vertically reciprocating plate to which said holders are delivered by said conveyor, means to reciprocate said plate above the path of travel of said con-

veyor during the time elapsing between the delivery of adjacent holders, means to receive each of said holders from said reciprocating plate and retain each of said holders above the path of said conveyor, said retaining means comprising opposed shelves adapted to support the edges of said holder, means whereby said shelves are caused to separate as said plate approaches its maximum height and caused to approach each other as said plate reaches its maximum height, and a horizontally reciprocating pusher adapted to remove said holder from said shelves as said plate recedes toward the path of said conveyor.

17. In a packing machine, conveying means adapted to deliver spaced holders, a vertically reciprocating plate to which said holders are delivered by said conveyor, means to reciprocate said plate above the path of travel of said conveyor during the time elapsing between the delivery of adjacent holders, means to receive said holders from said reciprocating plate and retain a plurality of said holders in superimposed relationship above the path of said conveyor, said retaining means comprising opposed shelves adapted to support the edges of the lowermost holder, means whereby said shelves are caused to separate as said plate approaches its maximum height and caused to approach each other as said plate reaches its maximum height, a horizontally reciprocating pusher adapted to remove said holders from said shelves as said plate recedes toward the path of said conveyor after elevating said plurality of holders, and means controlled by the absence of holders on said conveying means to stop said plate and said pusher.

18. In a packing machine, a conveyor system adapted to convey a series of holders, means operating continuously to position a plurality of articles on each holder as it is moved forward by said conveyor system, means operable to raise each holder into an elevated position, and means to retain the holders in their elevated position until a predetermined number have been superimposed.

19. In a packing machine, a conveyor system adapted to convey a series of holders, means operating continuously to position a plurality of articles on each holder as it is moved forward by said conveyor system, means operable to raise each holder into an elevated position, means to retain the holders in their elevated position until a predetermined number of holders have been superimposed, and means operable to transfer the superimposed holders to an advanced position.

20. In a packing machine, a conveyor system adapted to convey a series of holders, means operating continuously to position a plurality of articles on each holder as it is moved forward by said conveyor system, means operable to raise each holder into an elevated position, means to retain the holders in their elevated position until a predetermined number have been superimposed, and means operable to transfer the superimposed holders to an advanced position, said last named means comprising a carriage and means to reciprocate said carriage in timed relationship to said elevating means.

21. In a packing machine, a conveyor system adapted to convey a series of holders, means operating continuously to position a plurality of articles on each holder as it is moved forward by said conveyor system, means operable to raise each holder into an elevated position, means to retain the holders in their elevated position until

a predetermined number have been superimposed, and means operable to transfer the superimposed holders to an advanced position, said last named means comprising a pusher plate mounted on a carriage, a horizontal track upon which said carriage is supported during its operative forward travel, and a second horizontal track adapted to elevate said pusher plate during its return movement.

22. In an article packing machine, a conveyor system adapted to position articles on a plurality of continuously moving holders, holder stacking means adapted to superimpose a plurality of filled holders, and means to position the superimposed holders in cartons, all of said means operating concurrently and co-extensively in timed relationship.

23. In a packing machine, a conveyor for transferring a plurality of articles in spaced relationship, clamping means secured to said conveyor for holding the moving articles, fixed means cooperating with said conveyor to actuate said clamping means to secure and release the articles at predetermined positions of said conveyor, said clamping means being operated to receive said articles in upright position and to release said articles in reclined position.

24. In a packing machine, a conveyor for transferring a plurality of articles in spaced relationship, clamping means secured to said conveyor for holding the moving articles, fixed means cooperating with said conveyor to actuate said clamping means to secure and release the articles at predetermined positions of said conveyor, said clamping means being operated to receive said articles in upright position and to release said articles in reclined position, said fixed means comprising a system of cams and said clamping means comprising a plurality of rollers cooperating with said cams, one of said rollers acting to guide said clamping means and the other of said rollers acting to operate said clamping means to clamp and release said articles.

25. The method of packing bottles which comprises converging two lines of upright bottles toward a central point adjacent a series of holders traveling toward said central point, spacing said bottles as they converge, the bottles of one line being positioned adjacent the spaces of the opposite line, and depositing said bottles in reclined position in said holders as said central point is reached.

26. The method of packing elongate articles, which comprises advancing a plurality of continuous lines of upright articles, advancing in timed relationship thereto a series of article receiving means, segregating groups of articles from each line, and interdigitating the articles of a group in one line with those of a group in another line seriatim while placing the articles in reclined position in said holding means.

27. The method of packing elongate articles, which comprises advancing a plurality of lines of upright articles, advancing in timed relationship thereto a series of holders having recesses each adapted to receive an article, bringing said lines of articles into intersection with the path of said holders, and inserting said articles seriatim in reclined position into said recesses at the point of intersection.

28. The method of packing elongate articles, which comprises advancing a plurality of continuous lines of upright articles, advancing in timed relationship thereto a series of article receiving means, segregating groups of articles from

each line, interdigitating the articles of a group in one line with those of a group in another line seriatim while placing the articles in reclined position in said holding means, and placing a plurality of said filled holding means in superimposed relationship in a carton.

29. The method of packing articles, which comprises advancing a plurality of continuous lines of articles, advancing in timed relationship thereto a series of article receiving means, segregating groups of articles from each line, interdigitating the articles of a group in one line with those of a group in another line seriatim while placing the articles in said holding means, forming a stack of said filled holding means in superimposed relationship, compressing said stack, and depositing the compressed stack in a carton.

30. The method of packing elongate articles such as bottles, which comprises advancing a plurality of lines of upright articles, advancing in timed relationship thereto a series of holders having recesses each adapted to receive an article, bringing said lines of articles into intersection with the path of said holders, inserting said articles seriatim in reclined position into said recesses at the point of intersection, continuing the advance of said series of holders past the point of intersection, stacking a plurality of said holders in superimposed relationship, and positioning said stack in a carton.

31. The method of packing elongate, fragile articles such as bottles, which comprises advancing a plurality of continuous lines of upright articles, advanced in timed relationship thereto a series of article receiving means, segregating groups of articles from each line, interdigitating the articles of a group in one line with those of a group in another line seriatim while placing the articles in reclined position in said holding means, and thereafter placing said holding means in a receptacle.

32. In a packing machine, a conveyor for transferring a plurality of articles in spaced relationship, clamping means secured to said conveyor for holding the moving articles, fixed means cooperating with said conveyor to actuate said clamping means to secure the articles in upright relation and to release the articles in tilted relation at predetermined positions of said conveyor, said clamping means being compensatory to accommodate variations in said articles.

33. In a machine for packing bottles in holders, means for supplying bottles to the machine in upright position, means for supplying holders to the machine each designed to receive a plurality of bottles in reclined position, and means for transferring bottles from said supplying means to the holders comprising a series of traveling grippers each having a member to be positioned above the top of a bottle and a member to be positioned below the bottom of a bottle and means associated therewith to actuate said members to grasp a bottle therebetween.

34. In a machine for packing bottles in holders, means for supplying bottles to the machine in upright position, means for supplying holders to the machine each designed to receive a plurality of bottles in reclined position, means for transferring bottles from said supplying means to the holders comprising a series of traveling grippers each having a member to be positioned adjacent the top of a bottle and a member to be positioned adjacent the bottom of a bottle and means associated therewith to actuate said members to grasp a bottle therebetween, and means

associated with said series of grippers to cause tilting of said bottles from upright to reclined position.

35. In a machine for packing bottles in holders, means for supplying bottles to the machine in upright position, means for supplying holders to the machine each designed to receive a plurality of bottles in reclined position, means for transferring bottles from said supplying means to the holders comprising a series of traveling grippers each having a member to be positioned adjacent the top of a bottle and a member to be positioned adjacent the bottom of a bottle and means associated therewith to actuate said members to grasp a bottle therebetween, one of said members being resiliently mounted whereby bottles of various heights may be grasped therebetween.

36. In a machine for packing bottles in holders, means for supplying bottles to the machine in upright position, means for supplying holders to the machine each designed to receive a plurality of bottles in reclined position, means for transferring bottles from said supplying means to the holders comprising a series of traveling grippers each having a member to be positioned adjacent the top of a bottle and a member to be positioned adjacent the bottom of a bottle, and means associated therewith to actuate said members to grasp a bottle therebetween, said members being mounted on a tilting support having a roller cooperating with fixed cams adapted to control the tilting of the bottles.

37. In a machine for packing bottles in holders, means for supplying bottles to the machine in upright position, means for supplying holders to the machine each designed to receive a plurality of bottles in reclined position, means for transferring bottles from said supplying means to the holders comprising a series of traveling grippers each having a member to be positioned adjacent the top of a bottle and a member to be positioned adjacent the bottom of a bottle, and means associated therewith to actuate said members to grasp a bottle therebetween, said members being mounted on a tilting support having a roller cooperating with fixed cams adapted to control the tilting of the bottles, and one of said members having a linkage and a roller associated therewith cooperating with fixed cams to cause the actuation and release of said members at the proper instant.

38. In a machine for packing bottles in holders, means for supplying bottles to the machine in upright position, means for supplying holders to the machine each designed to receive a plurality of bottles in reclined position, means for transferring bottles from said supplying means to the holders comprising a series of traveling grippers each having a member to be positioned adjacent the top of a bottle and a member to be positioned adjacent the bottom of a bottle, and means associated therewith to actuate said members to grasp a bottle therebetween, said members being mounted on a tilting support having a roller

cooperating with fixed cams adapted to control the tilting of the bottles, the upper of said members having a linkage and roller associated therewith, said latter roller being adapted to contact with a cam to spread said members while a bottle is being positioned therebetween, and a spring associated with said linkage to cause gripping action of said members as said latter roller is relieved from contact with said cam.

39. In a machine for packing bottles in holders, means for supplying bottles to the machine in upright position, means for supplying holders to the machine each designed to receive a plurality of bottles in reclined position, means for transferring bottles from said supplying means to the holders comprising a series of traveling grippers each having a member to be positioned adjacent the top of a bottle and a member to be positioned adjacent the bottom of a bottle, and means associated therewith to actuate said members to grasp a bottle therebetween, said members being mounted on a tilting support having a roller cooperating with fixed cams adapted to control the tilting of the bottles, the upper of said members having a linkage and roller associated therewith, said latter roller being adapted to contact with a cam to spread said members while a bottle is being positioned therebetween, and a spring associated with said linkage to cause gripping action of said members as said latter roller is relieved from contact with said cam, a star wheel positioning bottles adjacent said grippers to be grasped by said members and a second cam with which said latter roller cooperates to again spread said members at the point where the bottle is to be released in reclined position in one of said holders.

40. In a machine for packing articles, means for elevating a holder containing articles positioned therein, means to retain said filled holder in elevated position comprising opposed arms and a shelf carried by each arm, and means to spread said arms as said elevating means approaches its highest point and to cause converging of said arms as said elevating means reaches its highest point, said shelves being pivotally mounted upon said arms so as to yield in case said holder should contact therewith in its upward travel.

41. In a machine for packing articles, means for elevating a holder containing articles positioned therein, means to retain said filled holder in elevated position comprising opposed arms and a shelf carried by each arm, and means to spread said arms as said elevating means approaches its highest point and to cause converging of said arms as said elevating means reaches its highest point, said shelves being pivotally mounted upon said arms so as to yield in case said holder should contact therewith in its upward travel, the weight of said shelves being so distributed as to cause them to fall back into proper position after said holder has been lifted thereabove by said elevating means.

ROBERT E. READ.