

Aug. 11, 1959

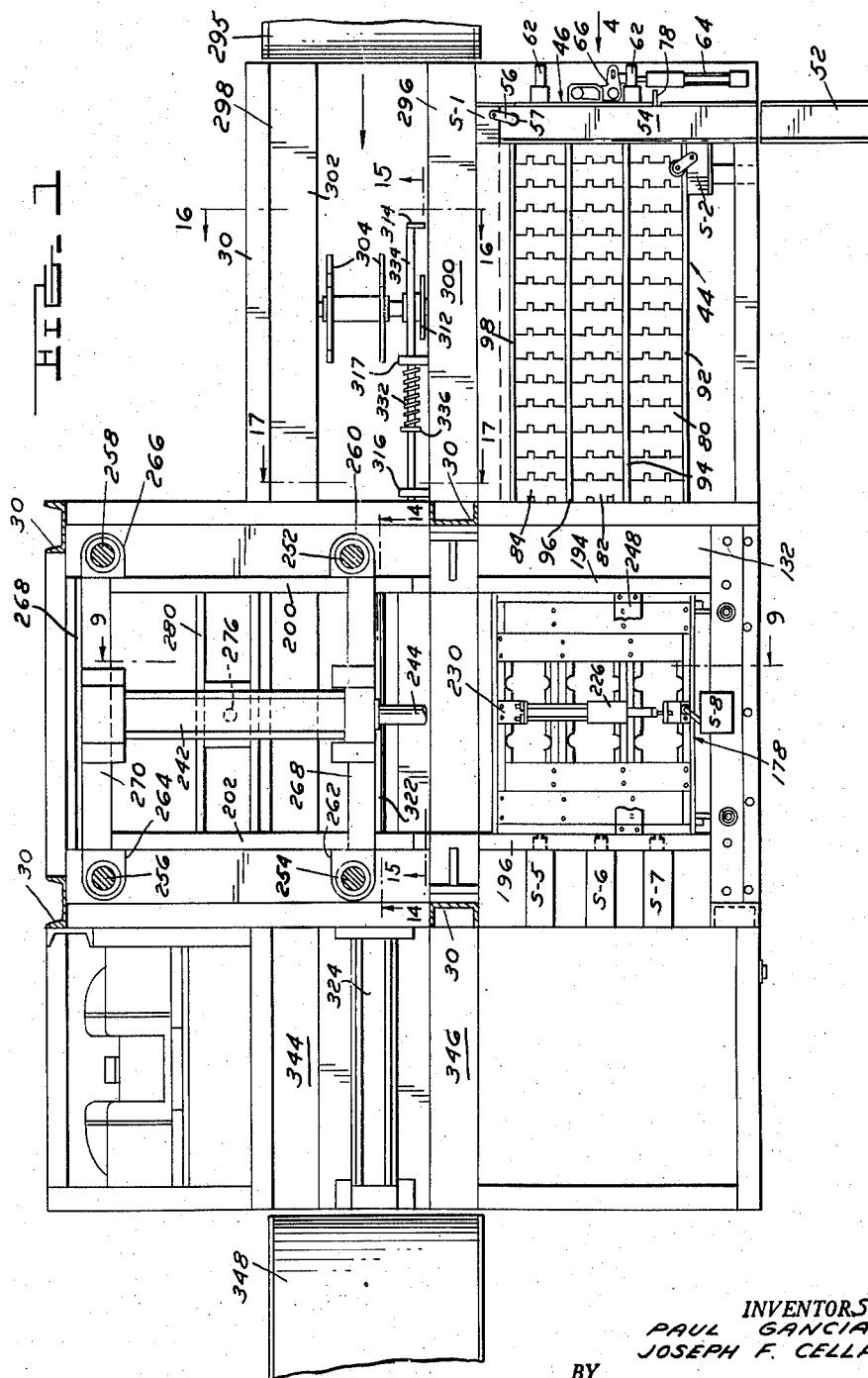
J. F. CELLA ET AL

2,898,716

BOTTLE PACKAGING MACHINE

Filed May 14, 1958

31 Sheets-Sheet 1



INVENTORS
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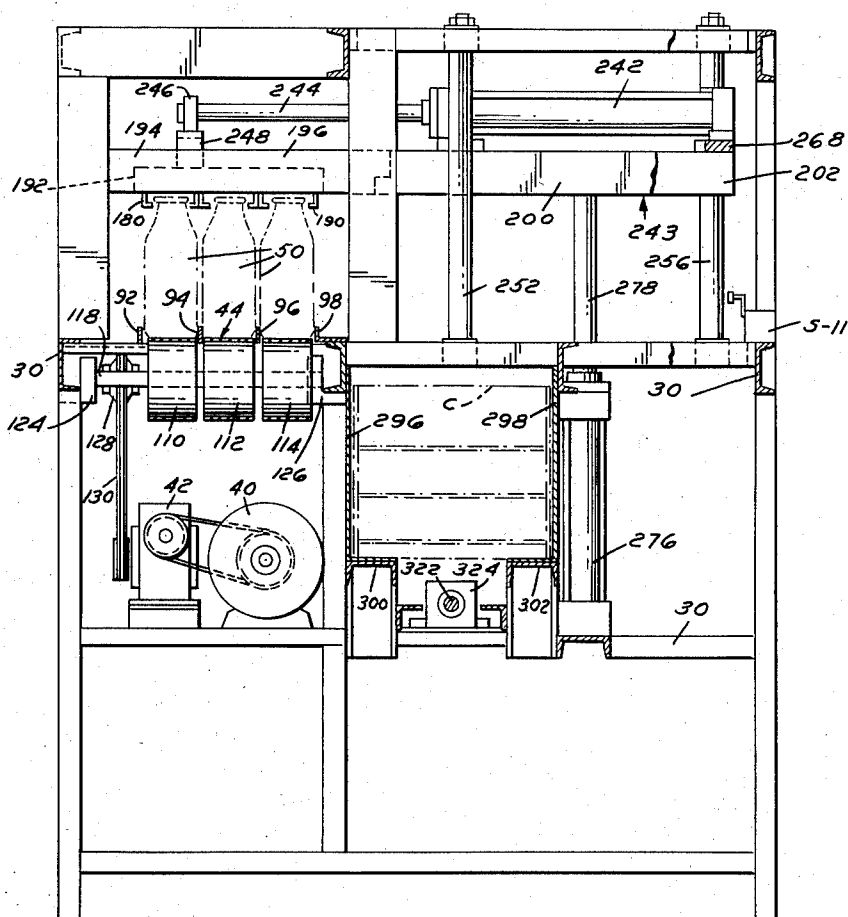
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FIG. 2



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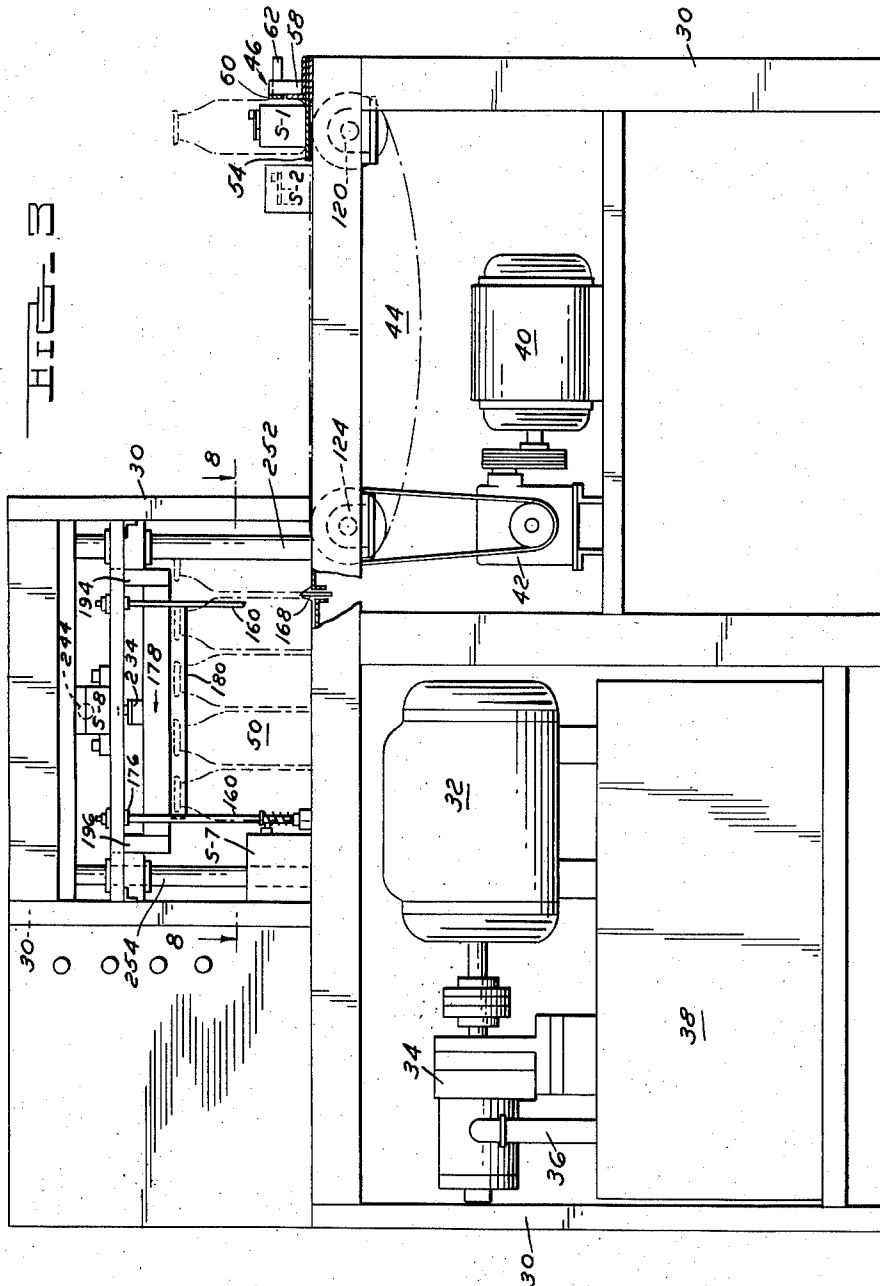
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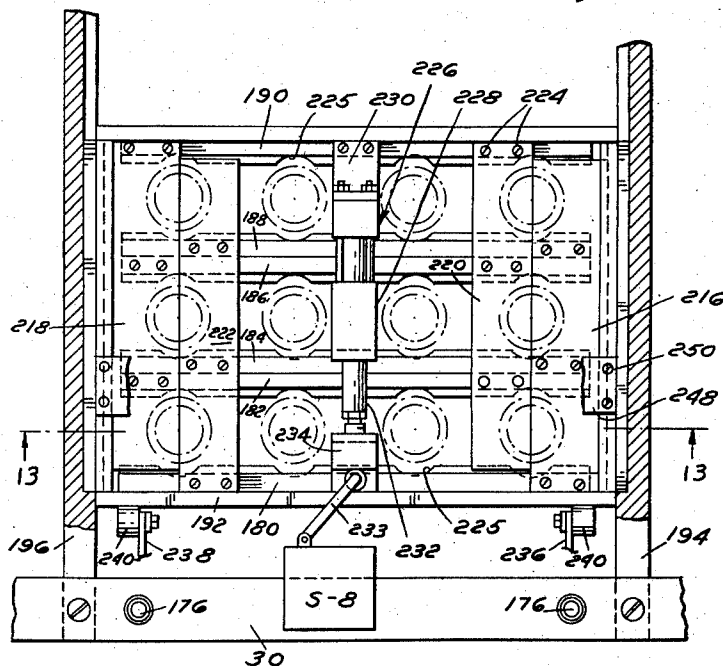
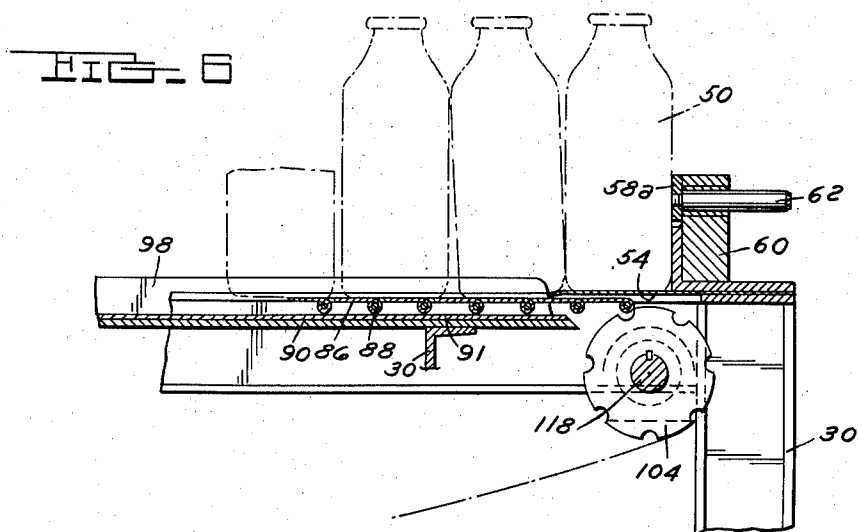


FIG. 12

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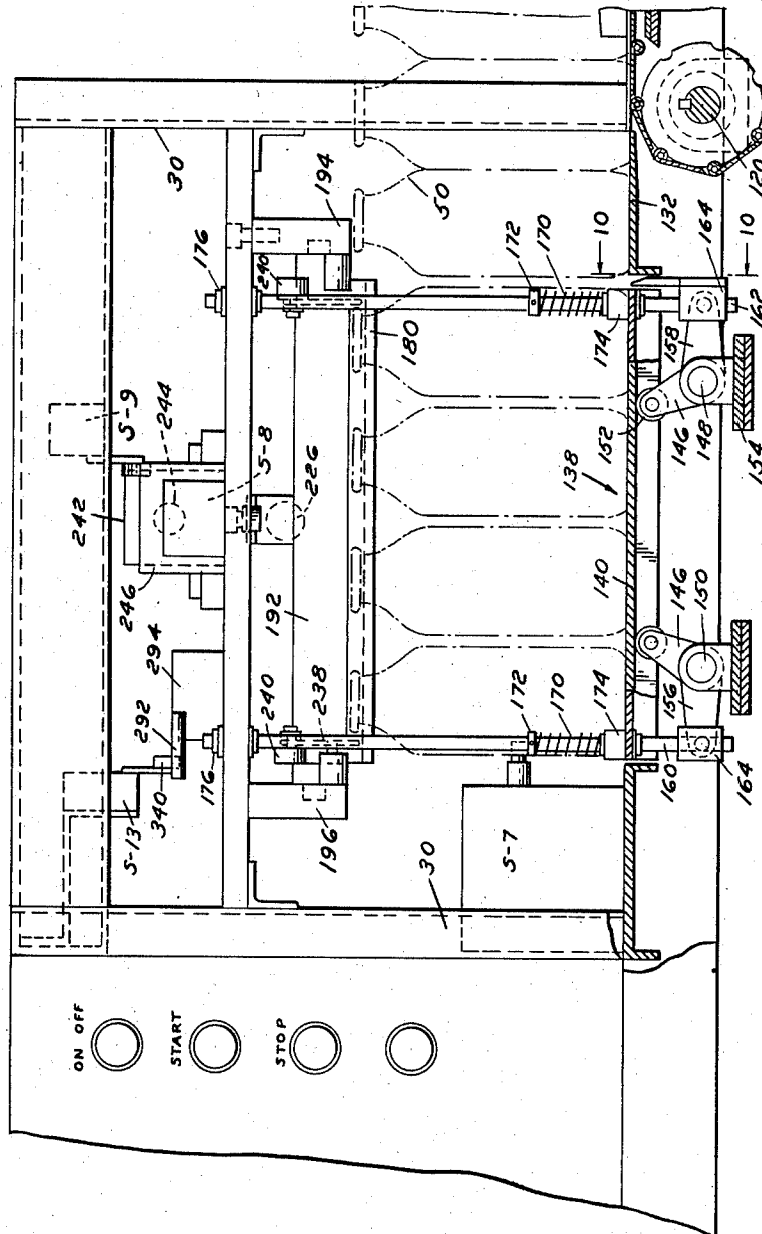
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FIG. 7



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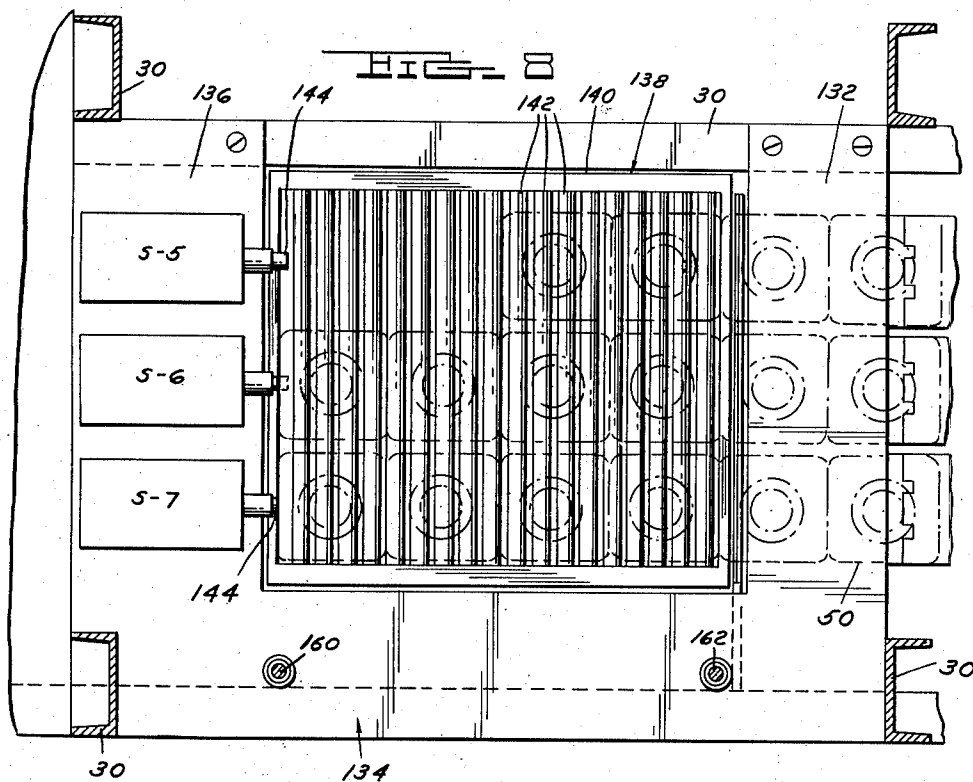


FIG. 11

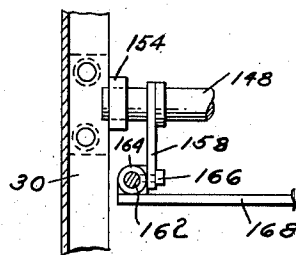
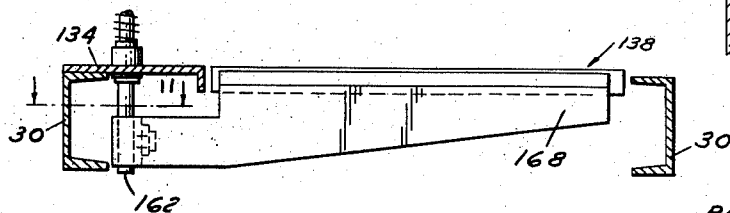


FIG. 10



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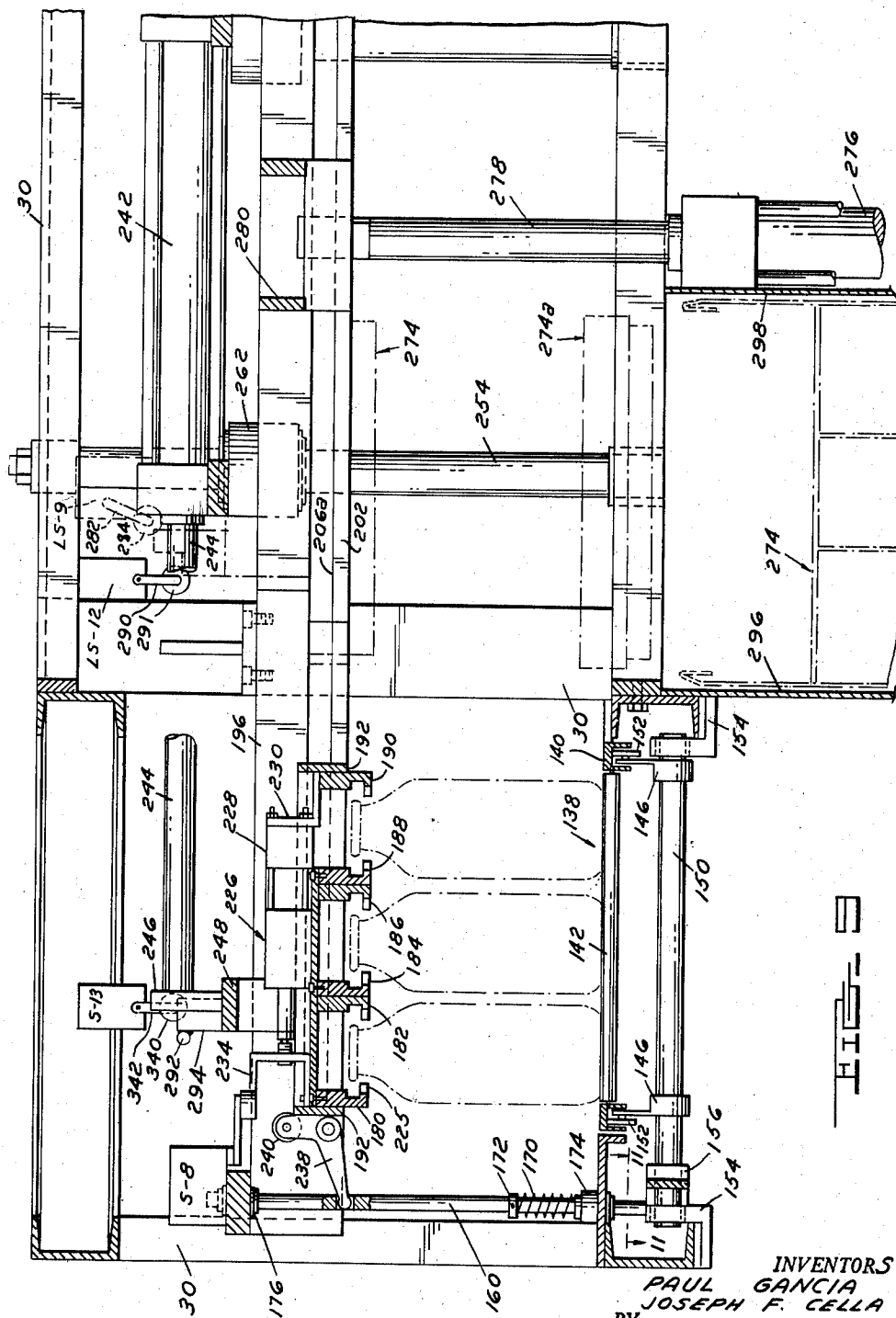
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BOTTLE PACKAGING MACHINE

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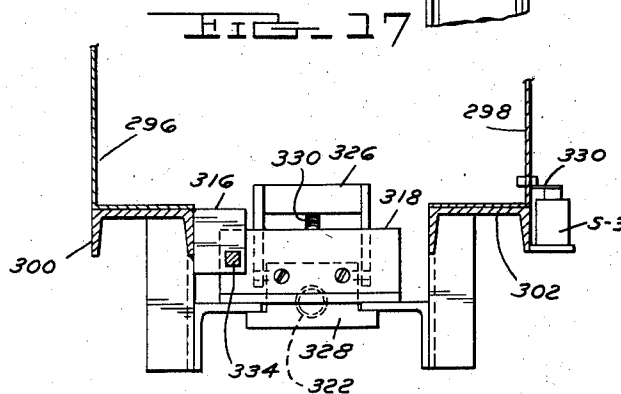
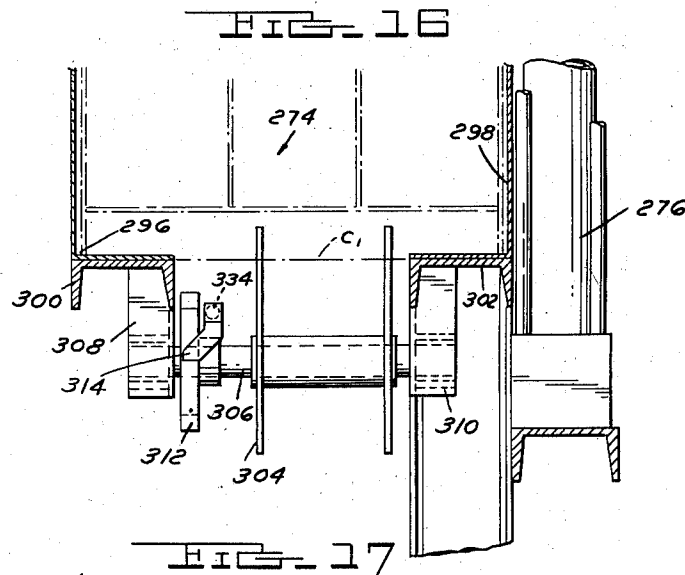
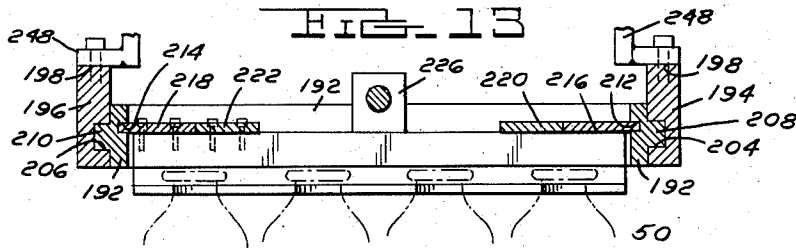
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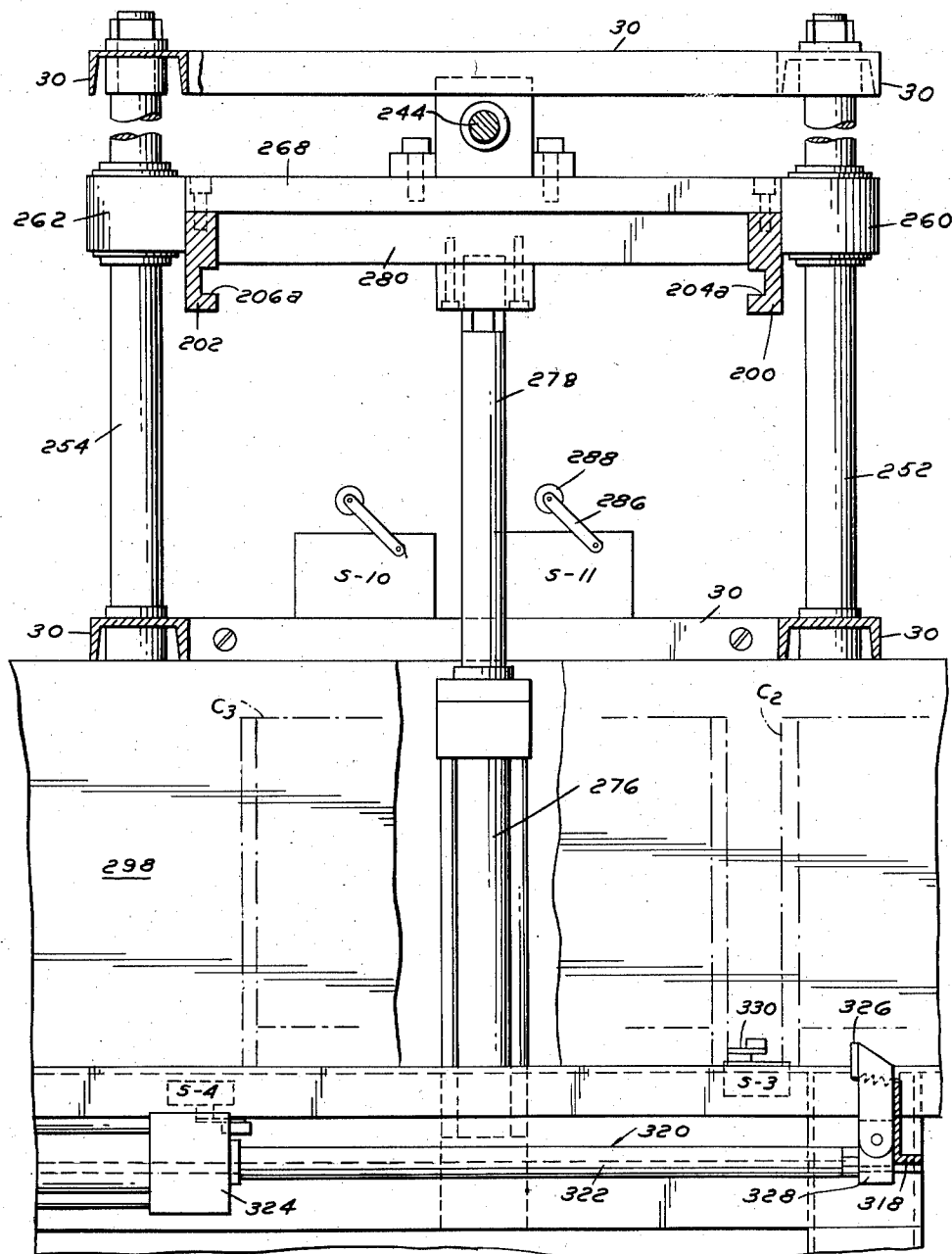


FIG. 14

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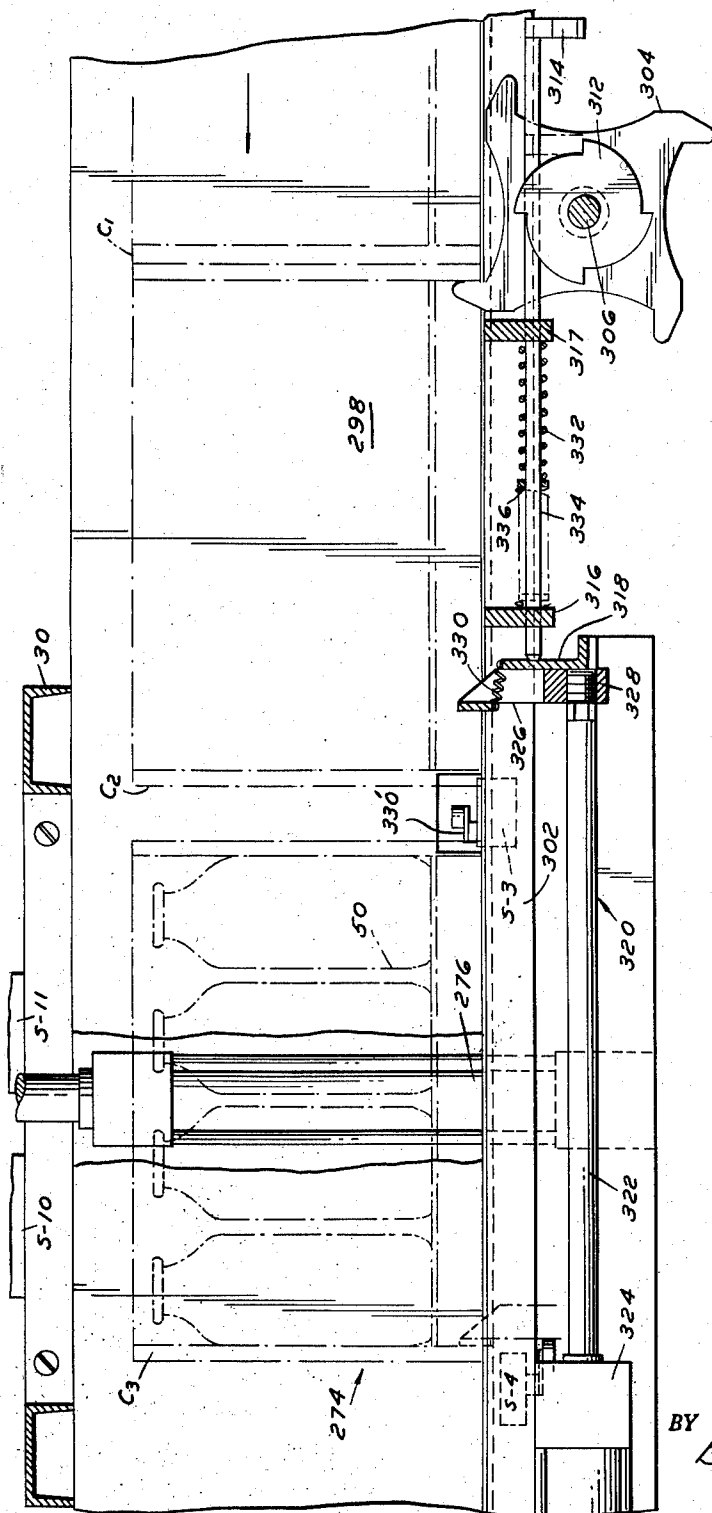


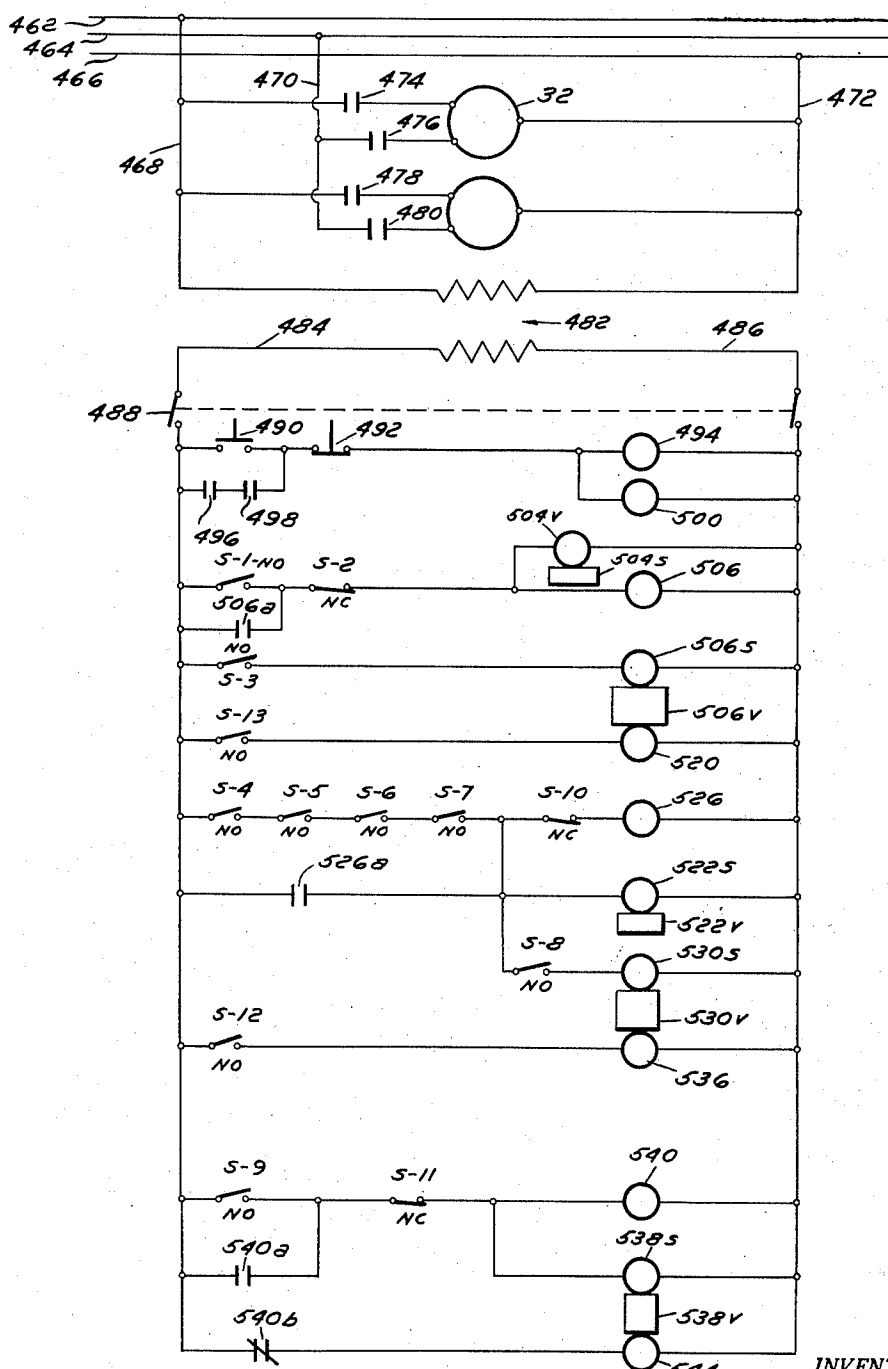
FIG. 11

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Fig. 18

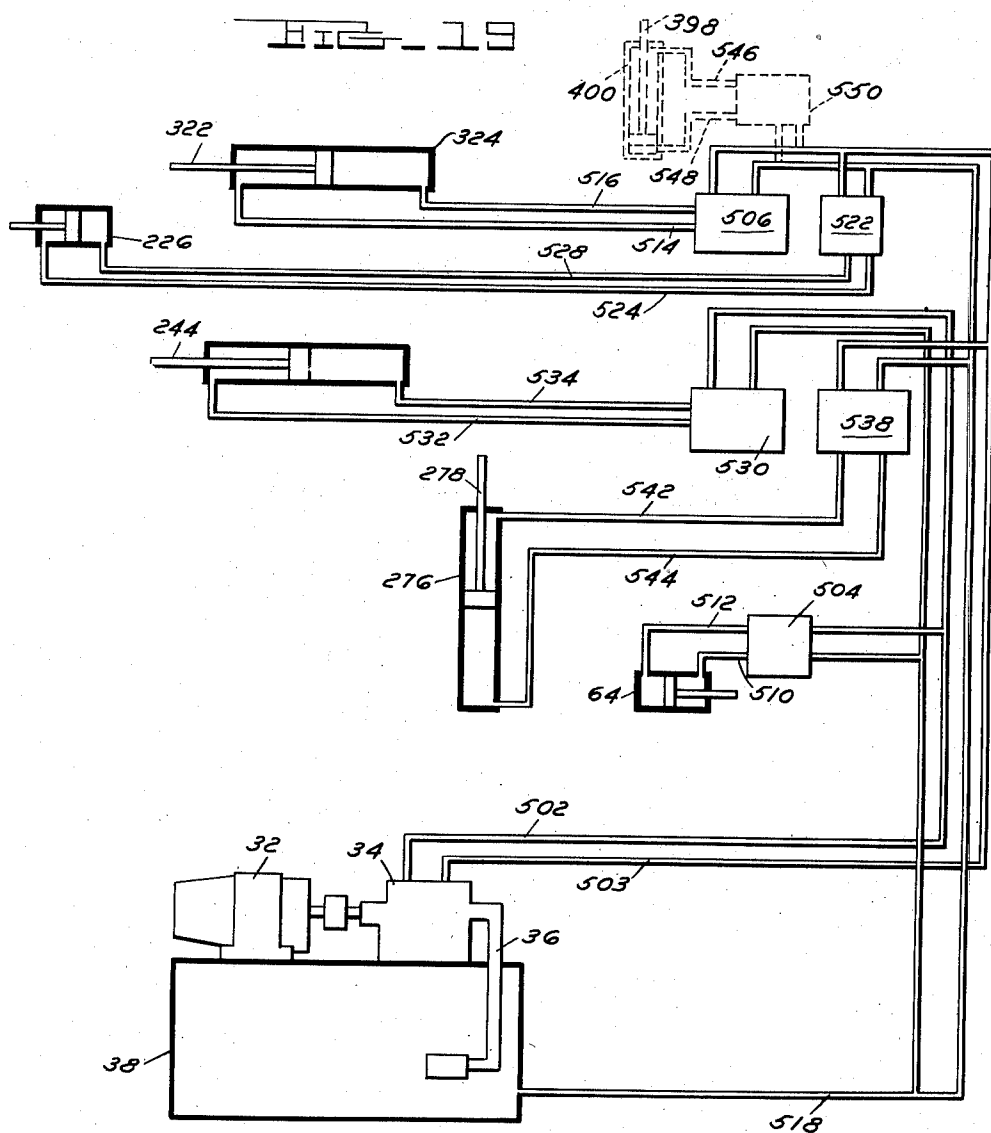
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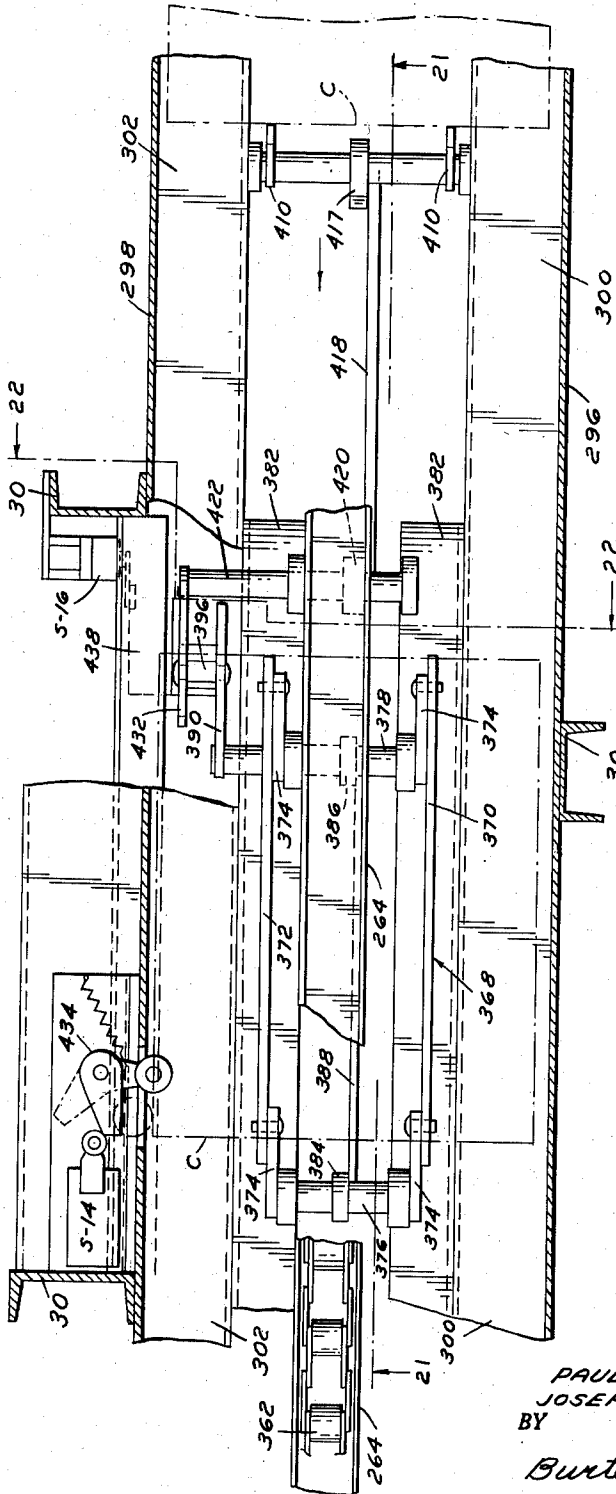


FIG. 20

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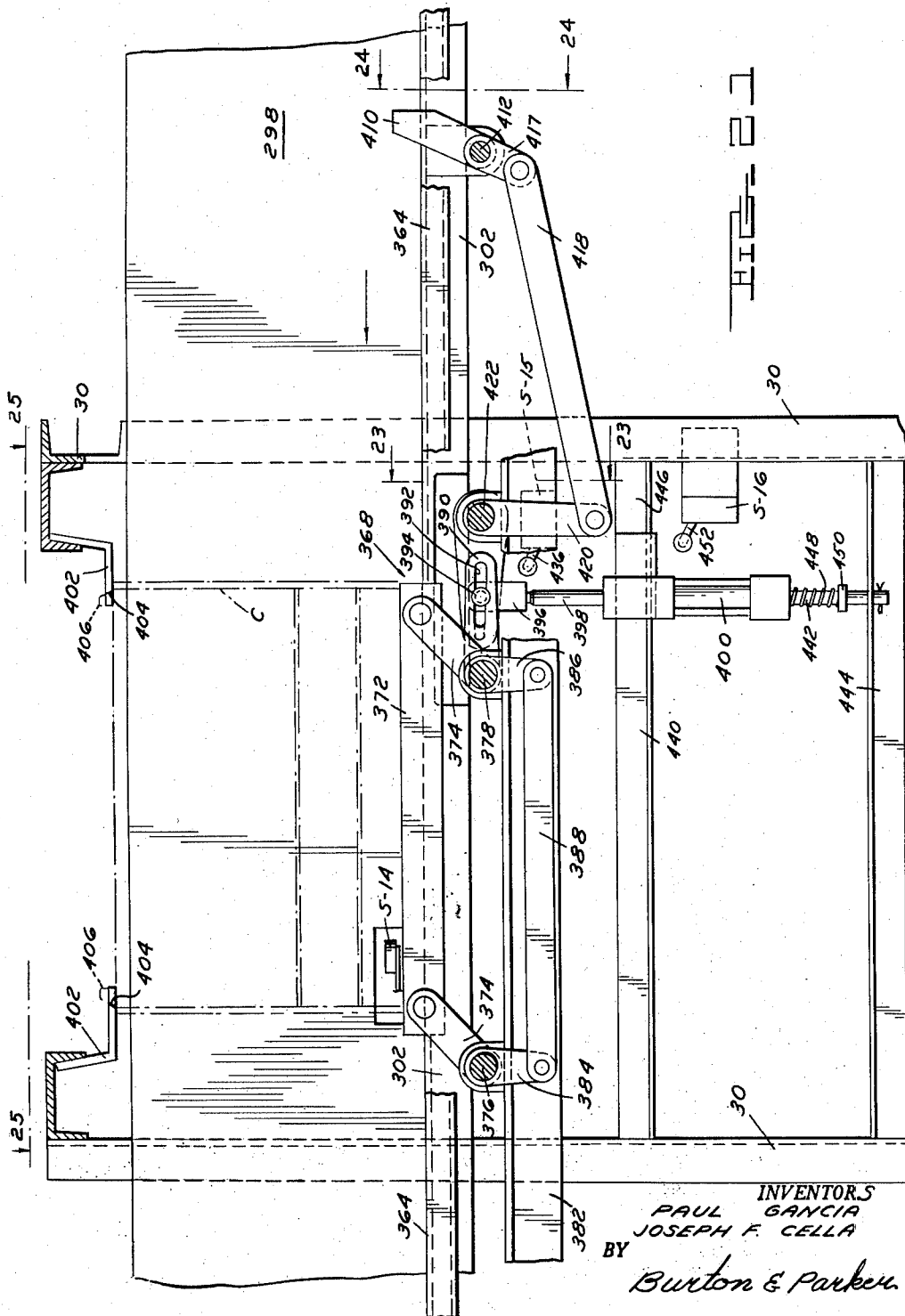
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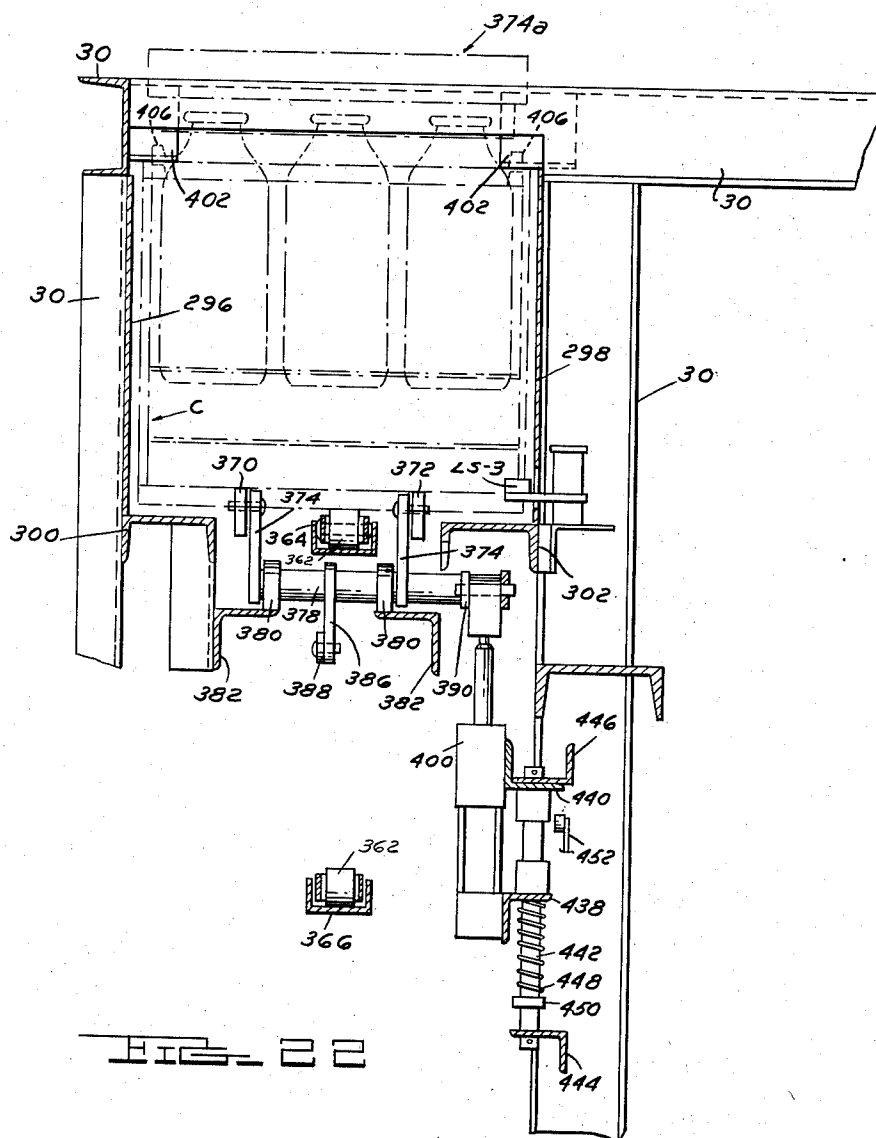
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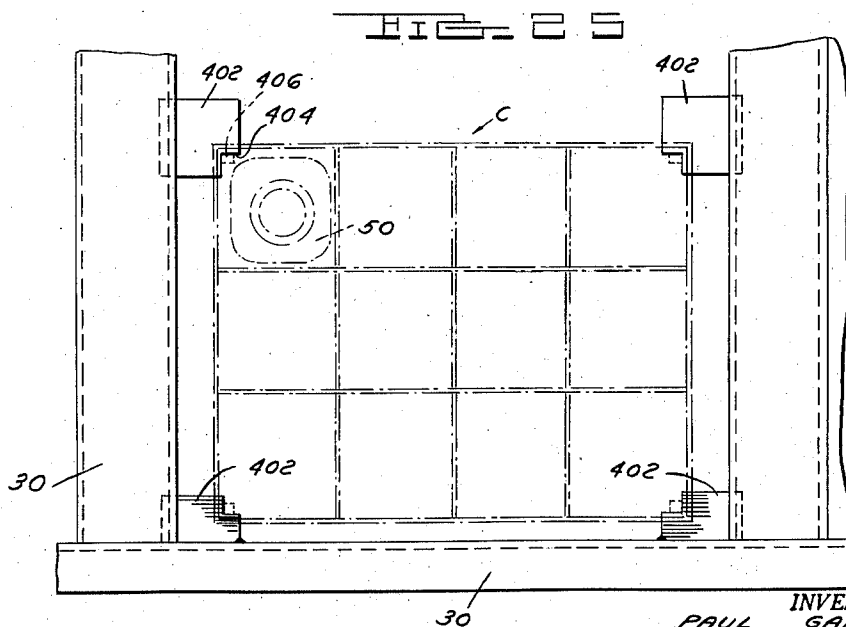
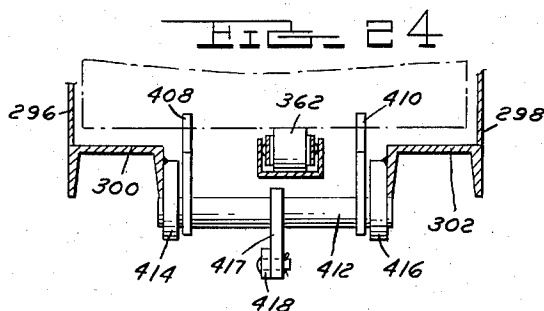
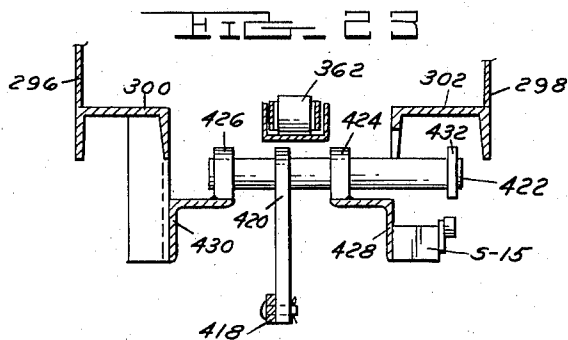
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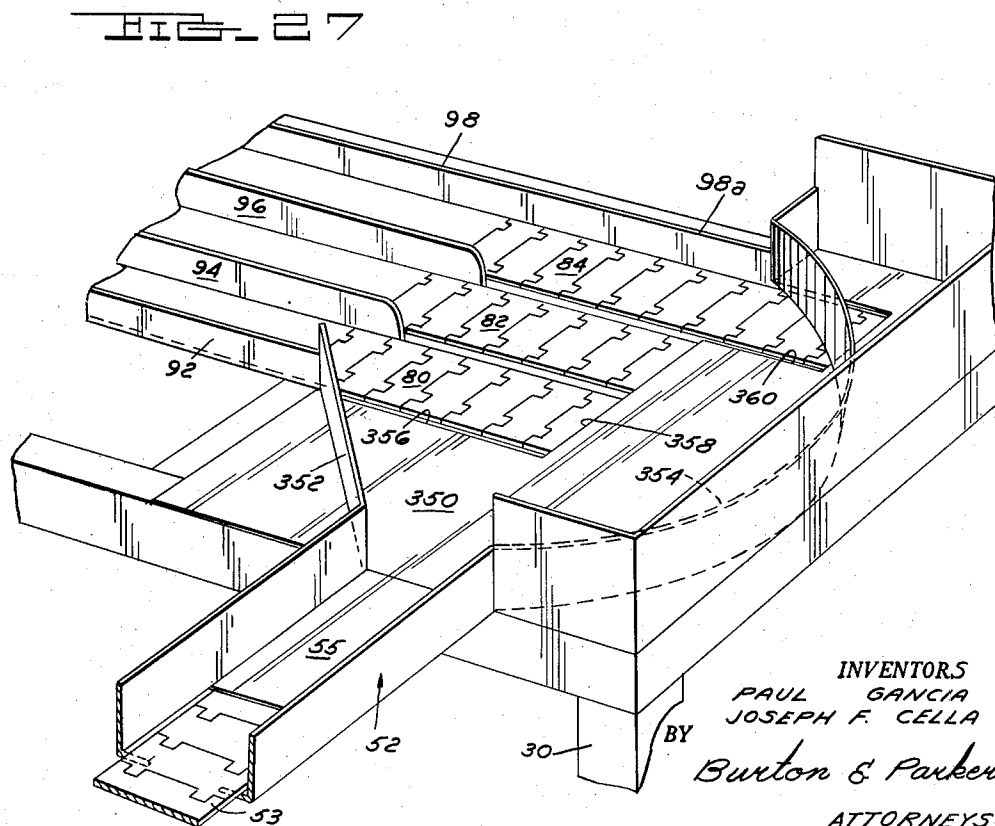
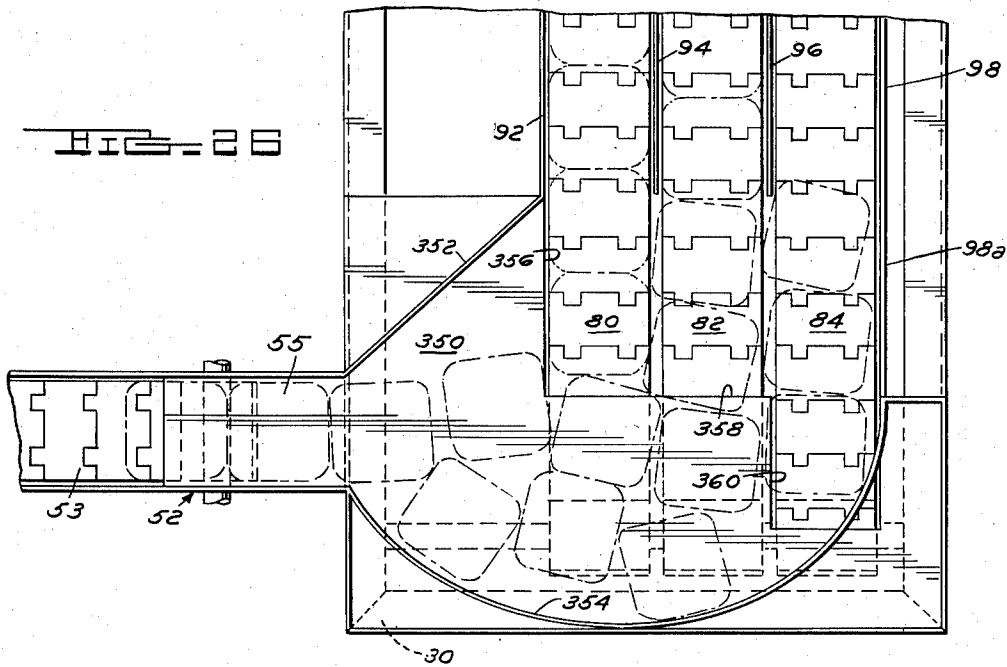
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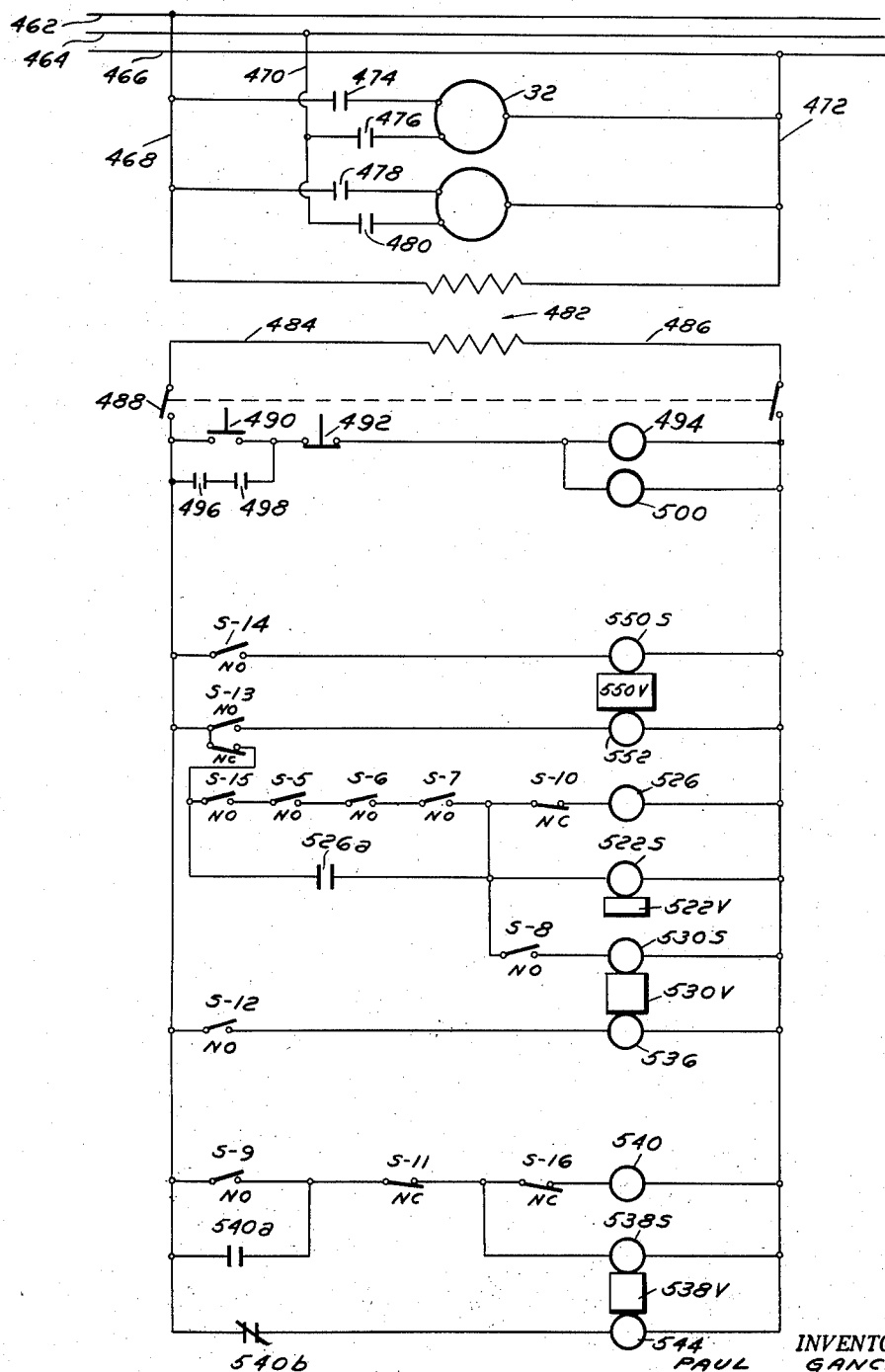
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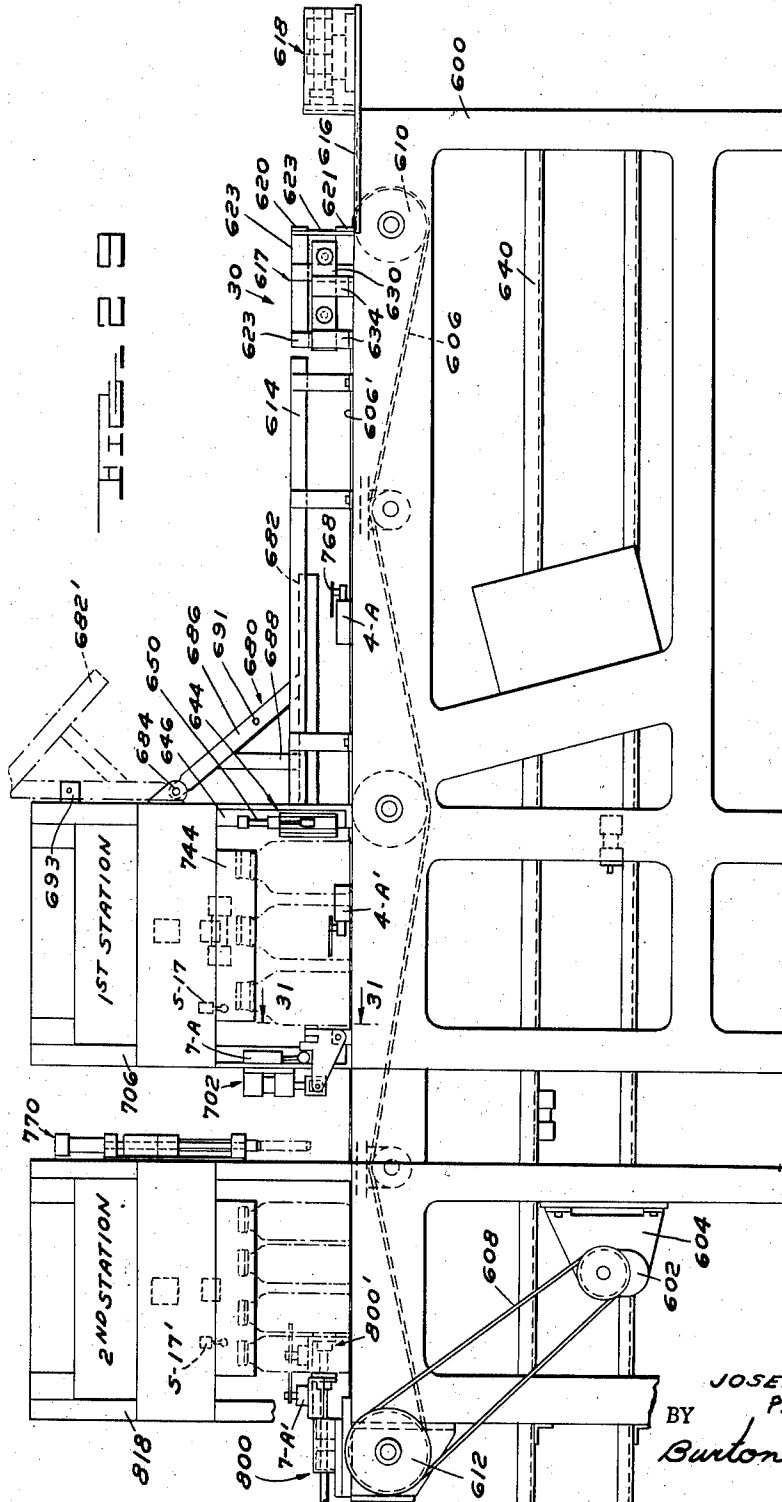
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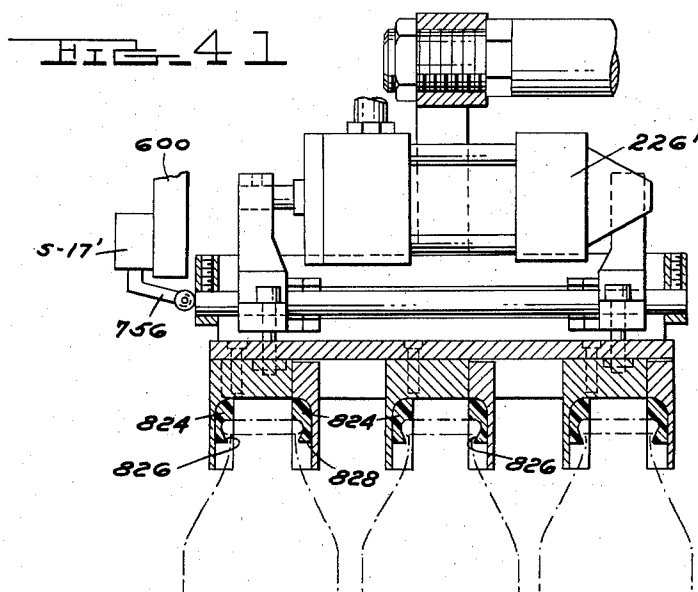


FIG. 37

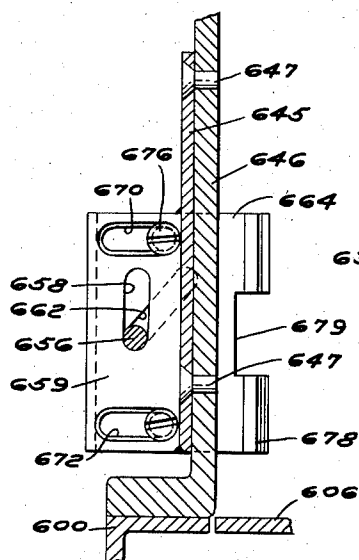
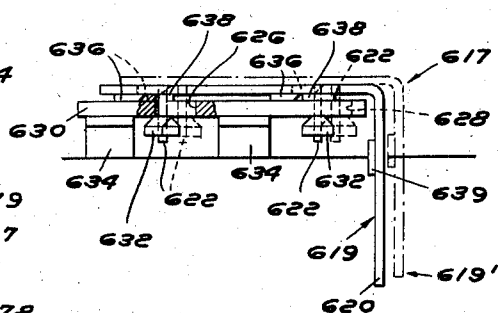


FIG. 30



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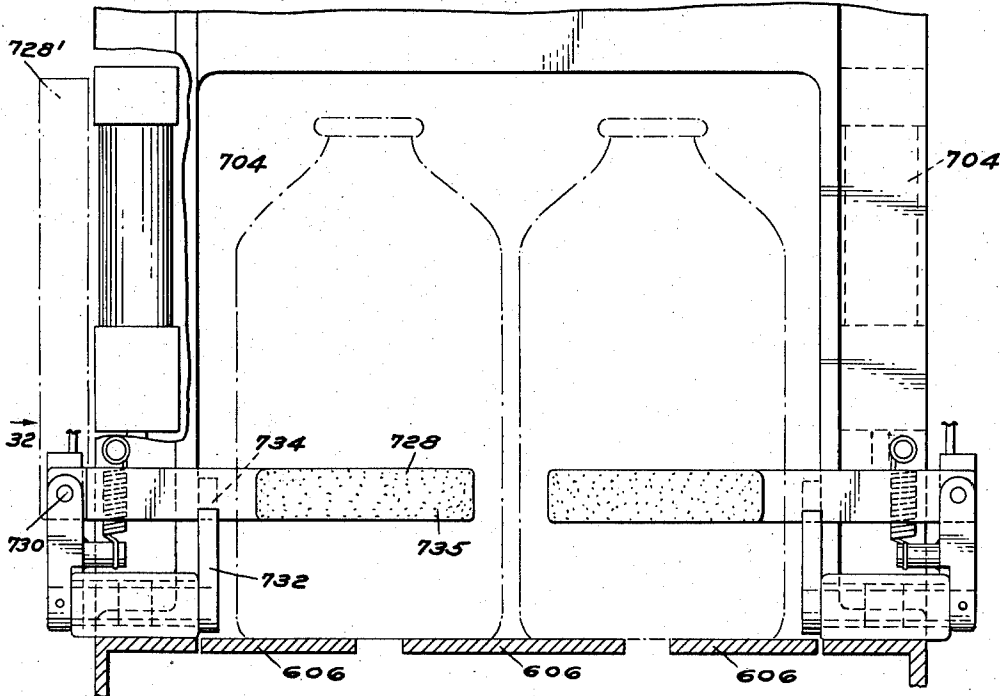


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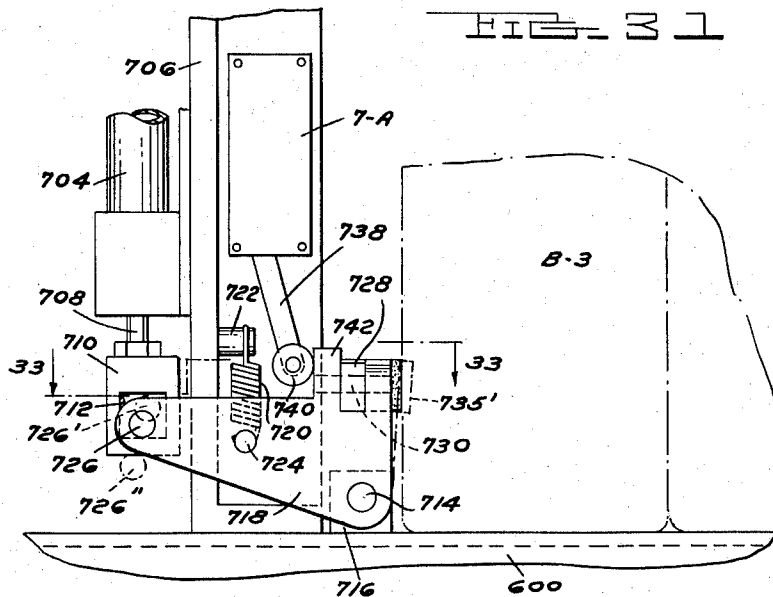


FIG. 32

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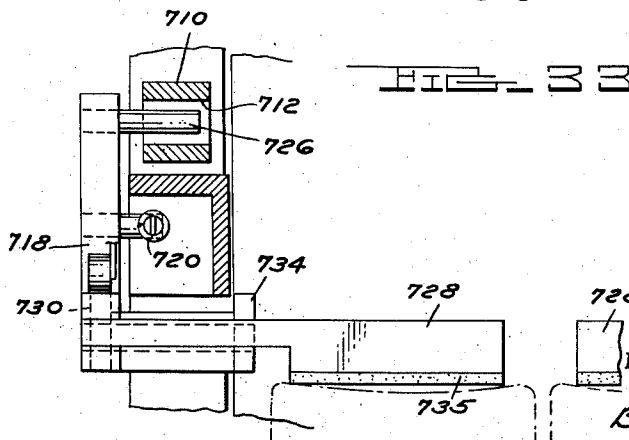
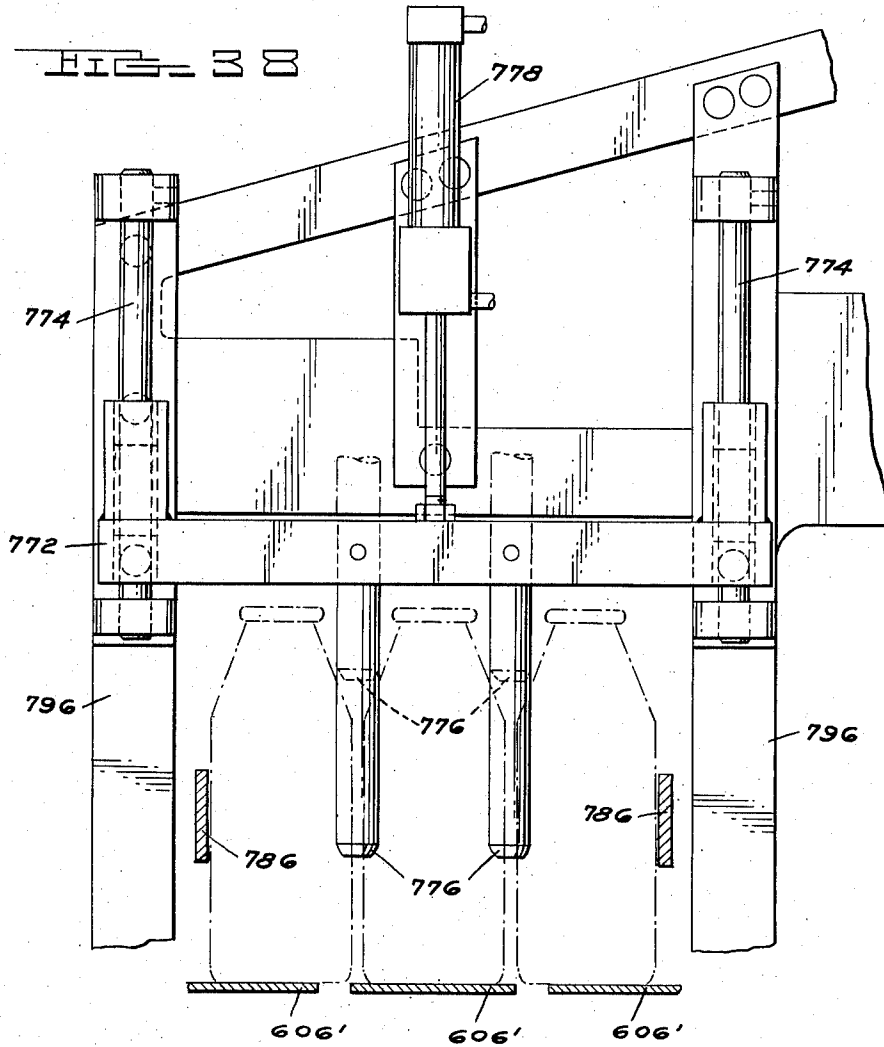
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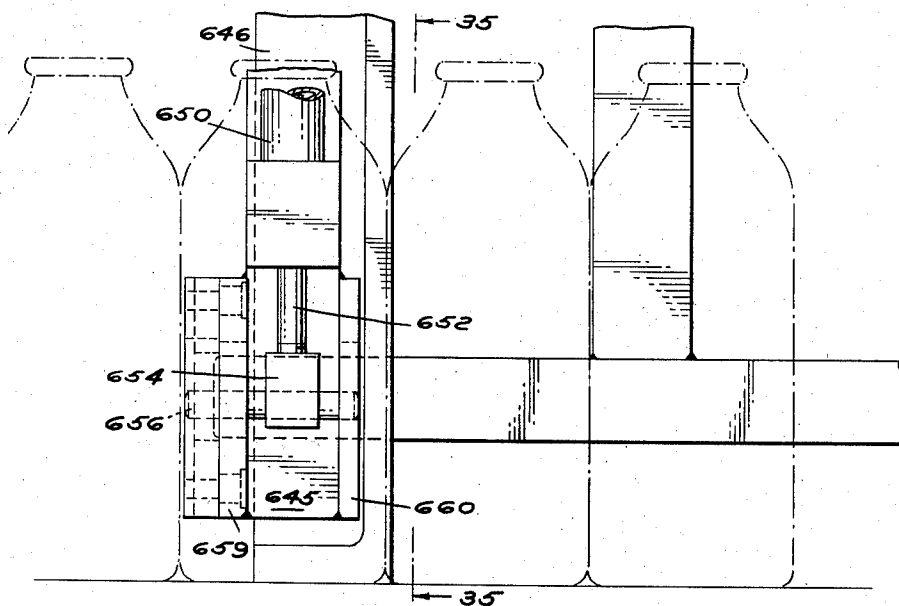


FIG. 34

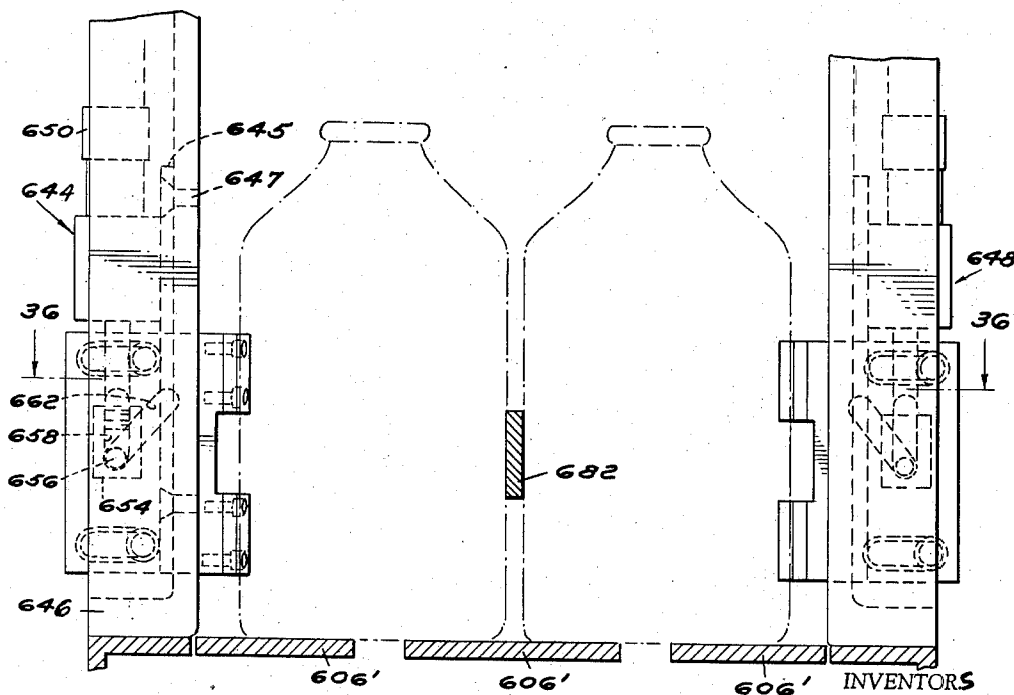


FIG. 35

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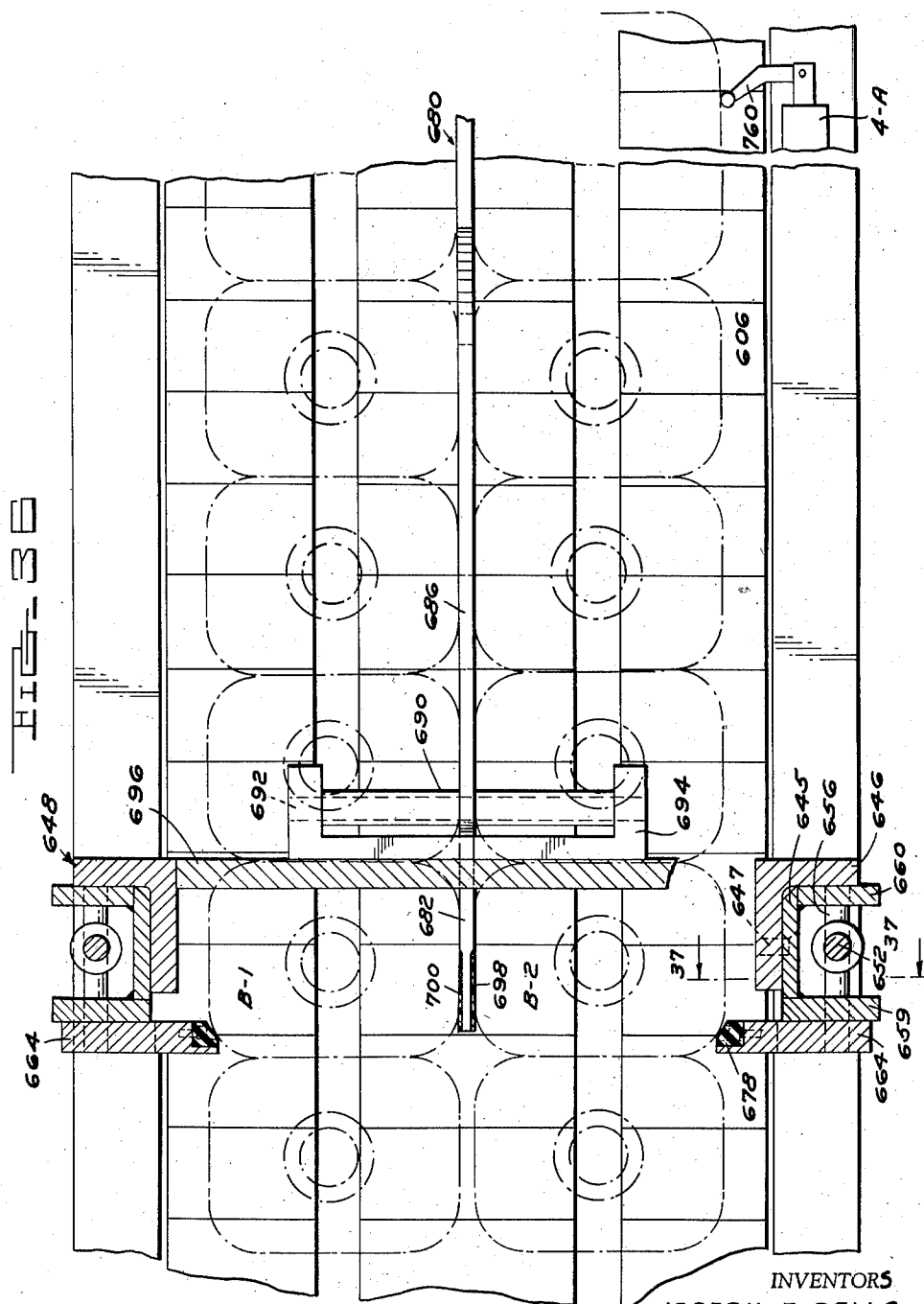
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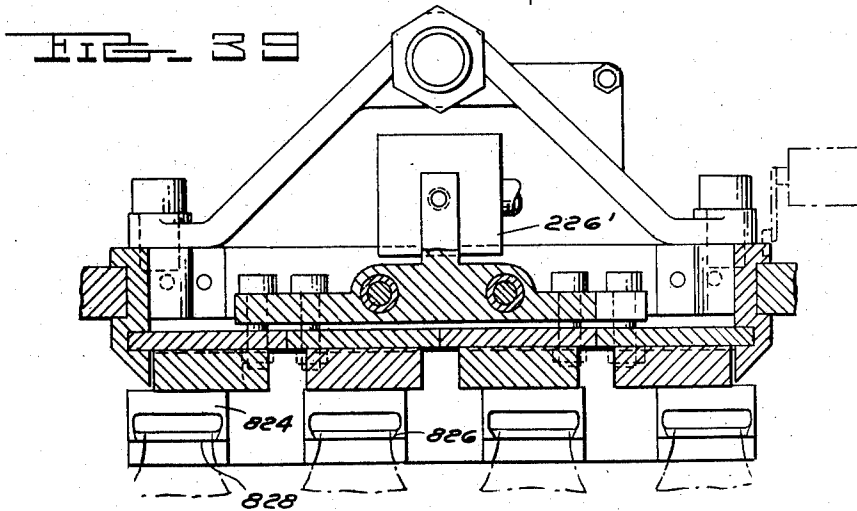
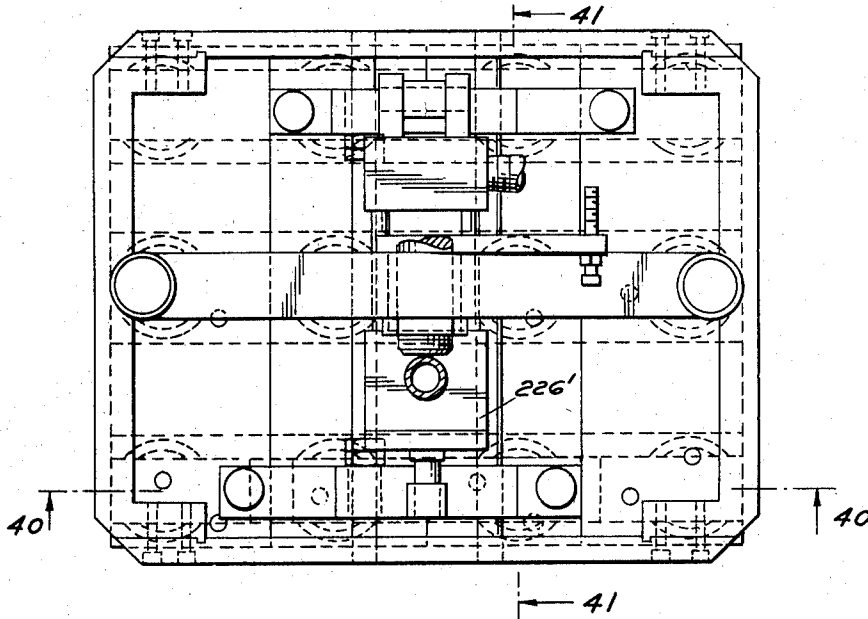


FIG. 4

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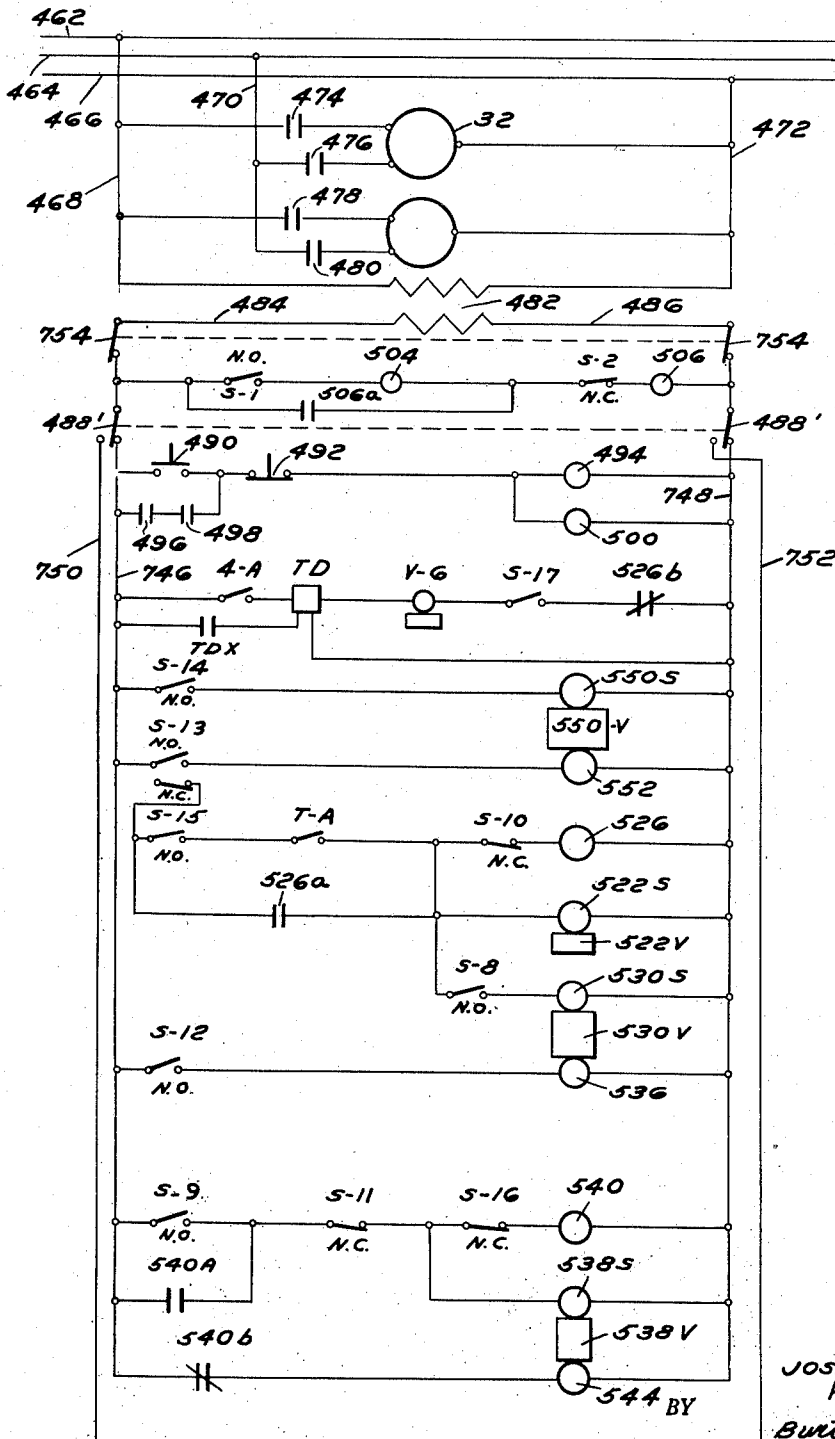


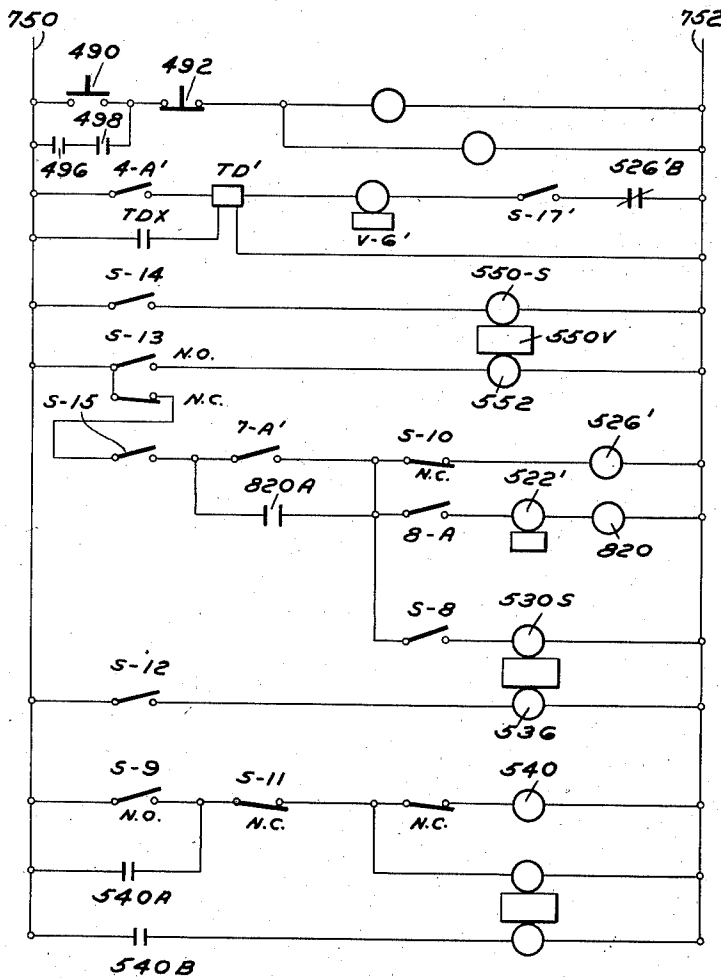
FIG. 4

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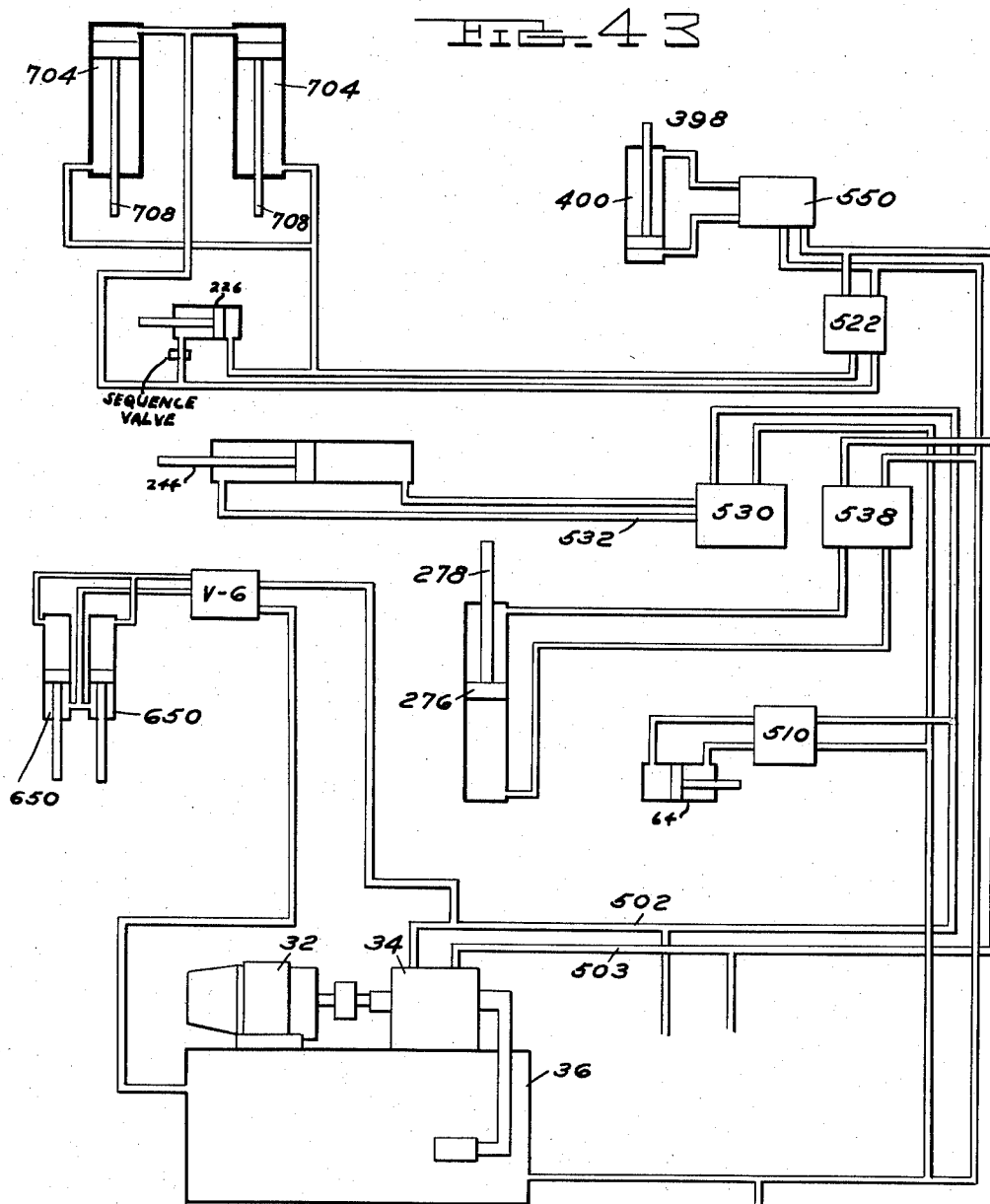
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BOTTLE PACKAGING MACHINE

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FIG. 43-A

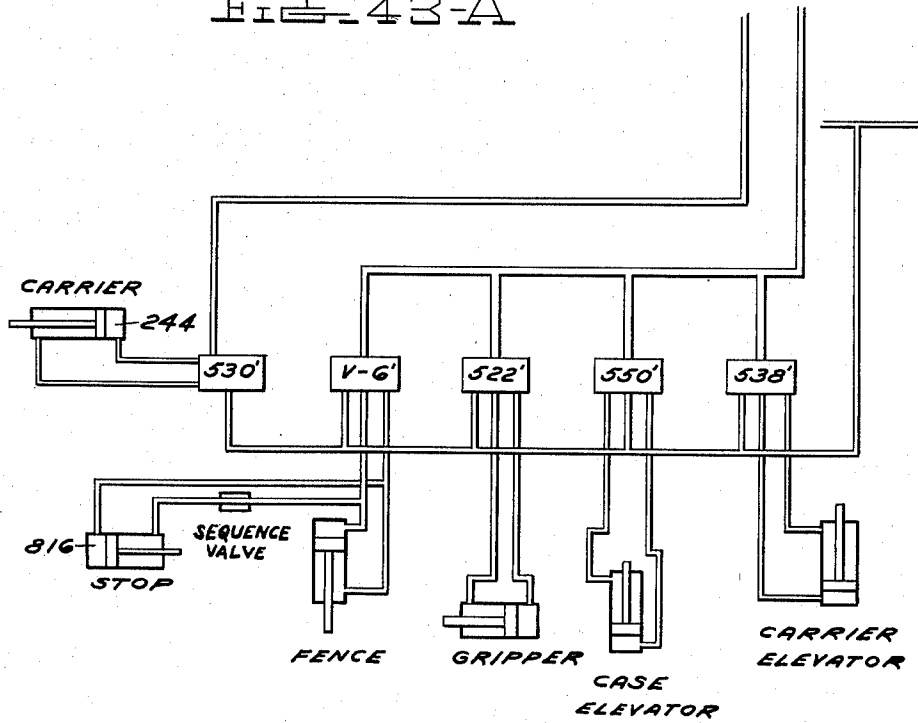
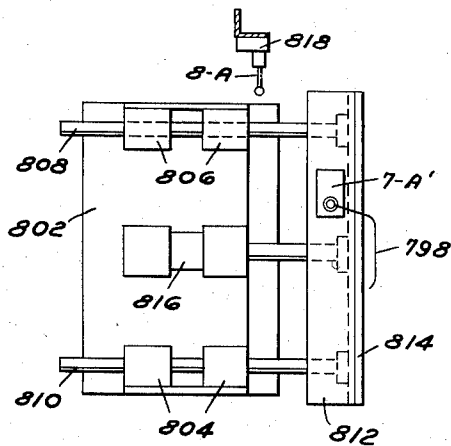


FIG. 43



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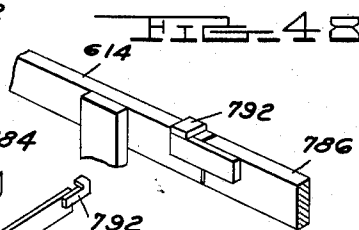
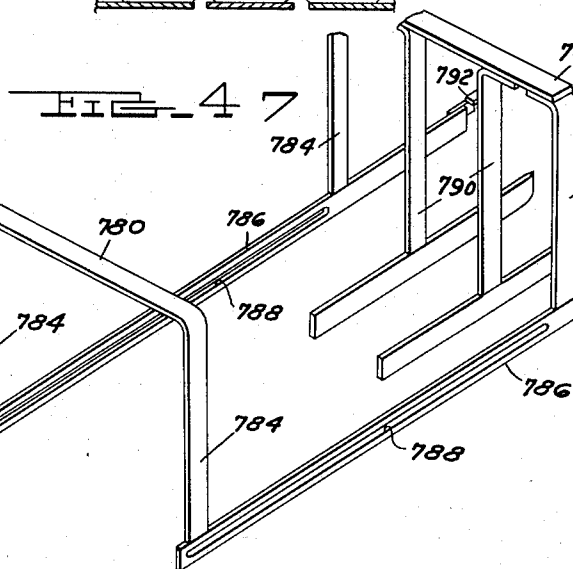
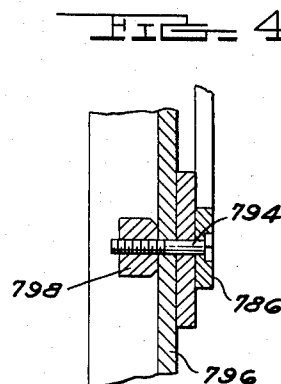
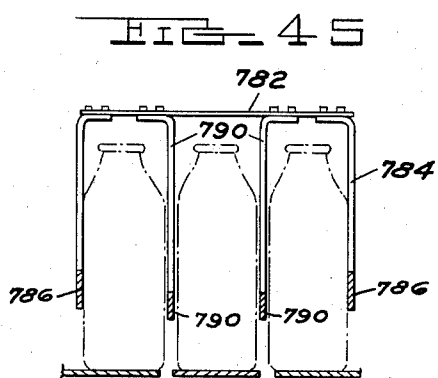
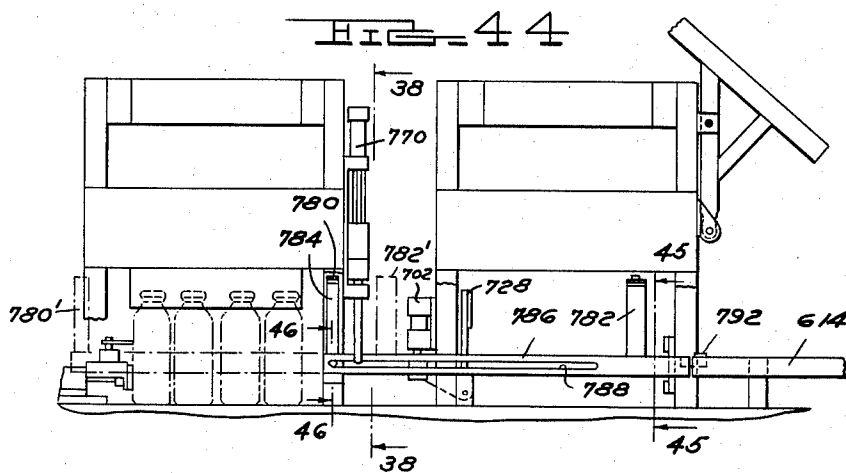
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2,898,716

BOTTLE PACKAGING MACHINE

Joseph F. Cella, Bronxville, N.Y., and Paul Gancia, Royal Oak, Mich., assignors, by direct and mesne assignments, to Cella Machinery, Inc., New York, N.Y., a corporation of New York

Application May 14, 1958, Serial No. 737,991

50 Claims. (Cl. 53—62)

This invention relates to bottle handling machines and particularly to machines for automatically filling bottle crates with bottles.

An object of this invention is the provision of a machine adapted to continuously receive a succession of bottles and a succession of bottle crates and automatically fill each crate with the required number of bottles.

Another object of the invention is the provision of a bottle crate filling, or bottle packaging, machine which does not require constant attention by an operator but is fully automatic in operation. A concomitant object is the provision in such a machine of means adapted to interrupt the operation thereof if for any reason the bottles are not properly received within a crate.

As is more specifically disclosed hereinafter, the machine is adapted to receive upon a conveyor in single or double file a succession of bottles from bottle filling and capping machines. Upon being received from such conveyor, the machine marshals the bottles into rows, the number of rows proportionally depending upon the number of rows of cells in the crates being filled. These rows of bottles are carried forward upon a conveyor to a bottle indexing station. At the same time a plurality of empty bottle cases are being fed to the machine on another conveyor. One by one these cases enter the machine and are automatically moved therein into a bottle receiving position. When a sufficient number of bottles have accumulated at the indexing station to fill a case in the bottle receiving position, a bottle carrier grips the accumulated bottles and carries them toward and into the case. The filled case then moves on its conveyor out of the machine and an empty case takes its place and the operation is repeated.

With reference to the above general description, another object of the invention is the provision of a machine having means for marshaling a single column of bottles into a plurality of rows of bottles, mechanism for feeding the rows to an indexing station, means adapted to position an empty crate in a bottle receiving position, mechanism for shifting a determined number of bottles accumulated at the indexing station to the crate to fill the crate, and control means synchronizing the movements of the above mentioned mechanisms.

Other objects of the invention include marshaling means adapted to continuously receive a single column of bottles and distribute the bottles into a plurality of rows of bottles, and guide each bottle designated for a particular row onto a conveying mechanism which carries the rows into the machine; a conveyor adapted to receive rows of bottles from a marshaling device and feed such rows to mechanism for shifting a determined number of bottles into an empty crate, such conveyor in one embodiment of the invention having a portion thereof which is movable relative to the bottle shifting mechanism to facilitate shifting of the bottles into the crate.

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Another object of this invention is the provision of a bottle crate positioning device adapted to receive empty crates from a conveyor feeding such crates to the machine, and support the crates in bottle receiving position to be filled with bottles delivered to it by a bottle carrier, and move the crate relative to the path of movement of the carrier so that the bottles are properly received by the crate.

Certain of the meritorious features of the invention are: control means adapted to prevent the carrier from moving the bottles into the crate if the crate is not properly aligned with the path of movement of the carrier and therefore not in position to properly receive the bottles; and control means adapted to interrupt the movement of the carrier toward the crate if the bottles would not properly seat in the crate, as, for example, if an obstruction were present which would prevent such proper seating, though the crate be properly aligned with the path of movement of the carrier.

Another object of the invention is the provision of a slidably mounted carrier having a plurality of spaced-apart clamping bars adapted to grip a plurality of bottles by their necks and shift them laterally off a conveyor to a bottle crate.

Still another object is a bottle crate supporting mechanism adapted to floatingly support a bottle crate in a position to receive bottles carried to the crate by a carrier, and adapted to yield to the pressure of the bottles and carriage if the bottles do not properly enter the crate, thereby actuating control mechanism which interrupts the movement of the carriage and returns it to its starting position.

Yet another object of the invention is the provision of a machine of the character described which is adapted to reject any defective bottle case because it is interiorly misshapen so that it will not properly receive bottles deposited therein, and in rejecting such case withhold the deposit of bottles thereinto until such case is automatically fed out of the machine and another case has automatically assumed the bottle receiving position and replaced the defective case.

Another object of the invention is the provision of a multiple indexing station bottle packaging machine which will handle bottles of different types or sizes without any reconstruction of the machine, so that one machine can handle, for example, at one time, one-quart milk bottles and at another time one-half gallon bottles. A concomitant object of the invention is the provision of a machine having a plurality of bottle indexing stations at spaced apart intervals along a common bottle feed conveyor, with each station adapted to index bottles of a determined size or kind for delivery to an awaiting case.

Another object of the invention is the provision of a bottle packaging machine having a bottle carrier which will remove bottles from a moving bottle conveyor and carry the bottles to and deposit them in an awaiting case.

Another object of the invention is the provision in a multiple indexing station bottle packaging machine, having a bottle conveyor passing through at least one indexing station to a succeeding station, of means for arresting and isolating a determined number of bottles at said one of the indexing stations for transfer by a carrier to an awaiting crate, with such means being shiftable to an inoperative position to permit bottles to pass completely through the station to a succeeding station for transfer at the latter to an awaiting crate.

Another object of the invention is the provision in a bottle packaging machine adapted to remove bottles laterally from a moving bottle conveyor, of a bottle carrier which will lift the bottles slightly at the time they

are engaged by the carrier so that upon lateral movement they do not drag over the conveyor.

This application is a continuation-in-part of application Serial No. 353,772 filed May 8, 1953, now abandoned.

While in the following figures the invention is shown as being used to fill milk bottle crates with a conventional type of glass milk bottle, it should be clearly understood that by slight variations in sizes of parts, the machine is equally well adapted to handle other types of bottles and crates.

Other objects, advantages, and meritorious features will more fully appear in the following claims, specification, and drawings, wherein:

Fig. 1 (Sheet 1) is a top view of the machine showing the triform bottle conveyor, the carrier, and certain of the control mechanisms;

Fig. 2 (Sheet 2) is an elevation of the right hand end of the machine shown in Fig. 1, but with the marshaling mechanism removed for clarity;

Fig. 3 (Sheet 3) is a front elevation of the machine shown in Fig. 1;

Fig. 4 (Sheet 4) is an elevation of the right hand end of the triform conveyor and one form of the marshaling device looking in the direction of arrow 4 in Fig. 1;

Fig. 5 (Sheet 4) is a top fragmentary view of the triform conveyor and marshaling device shown in Figs. 1 and 4;

Fig. 6 (Sheet 5) is a cross sectional view of the triform conveyor taken on line 6—6 of Fig. 5;

Fig. 7 (Sheet 6) is an enlarged fragmentary front elevation of the carrier and indexing station with parts broken away for clarity;

Fig. 8 (Sheet 7) is an enlarged top view of the indexing station taken on line 8—8 of Fig. 3;

Fig. 9 (Sheet 8) is a cross sectional view taken on line 9—9 of Fig. 1;

Fig. 10 (Sheet 7) is a cross sectional view taken on the line 10—10 of Fig. 7, showing the linkage for the bottle fence mechanism;

Fig. 11 (Sheet 7) is a cross sectional view taken on line 11—11 of Fig. 10, showing the link mechanism that actuates the bottle table;

Fig. 12 (Sheet 5) is a fragmentary top elevation of the carrier mechanism;

Fig. 13 (Sheet 9) is a cross sectional view of the carrier taken on line 13—13 of Fig. 12;

Fig. 14 (Sheet 10) is a cross sectional view of the carrier supporting structure and a modified form of the crate supporting structure taken on line 14—14 of Fig. 1;

Fig. 15 (Sheet 11) is a cross sectional view of one form of the crate positioning means and supporting structure taken along line 15—15 of Fig. 1;

Fig. 16 (Sheet 9) is a cross sectional view of said one form of the crate positioning means and supporting structure taken along line 16—16 of Fig. 1;

Fig. 17 (Sheet 9) is a cross sectional view of a portion of said one form of crate positioning means taken along line 17—17 of Fig. 1;

Fig. 18 (Sheet 12) is a schematic wiring diagram of the electric circuits of the machine when said one form of marshaling device and one form of crate positioning means shown in Figs. 1—17 are employed in the machine;

Fig. 19 (Sheet 13) shows in solid lines a schematic diagram of the hydraulic lines of the invention as shown in Figs. 1—17, while in dotted lines is shown a hydraulic cylinder employed by the embodiment of the crate positioning mechanism of Figs. 20—22;

Fig. 20 (Sheet 14) is a top view, with parts broken away for clarity, of another form of the crate positioning and supporting mechanism;

Fig. 21 (Sheet 15) is a cross sectional view taken on line 21—21 of Fig. 20;

Fig. 22 (Sheet 16) is a cross sectional view of the preferred form of the crate supporting mechanism taken along the line 22—22 of Fig. 20;

Fig. 23 (Sheet 17) is a cross sectional view of a detail of the levers and pivot rods of the crate supporting and positioning mechanism taken along line 23—23 of Fig. 21;

Fig. 24 (Sheet 17) is a cross sectional view of the crate positioning stop taken on line 24—24 of Fig. 21;

Fig. 25 (Sheet 17) is a top view of the crate locking device and with a crate positioned therein;

Fig. 26 (Sheet 18) is a top view of the preferred form of the bottle marshaling device and showing bottles therein;

Fig. 27 (Sheet 18) is a perspective view of the preferred form of the bottle marshaling device;

Fig. 28 (Sheet 19) is a schematic wiring diagram of the electric circuits employed in the machine embodying the forms of crate positioning and bottle marshaling mechanisms shown in Figs. 20—27;

Fig. 29 (Sheet 20) is a front elevation of a dual indexing station bottle packaging machine;

Fig. 30 (Sheet 25) is a top view of a portion of the bottle marshaling device looking in the direction of arrow 30 in Fig. 29;

Fig. 31 (Sheet 21) is a cross sectional view taken on the line 31—31 of Fig. 29 at the bottle stop in the upstream indexing station;

Fig. 32 (Sheet 21) is a left-hand view of the bottle stop shown in Fig. 31 looking in the direction of arrow 32 in Fig. 31;

Fig. 33 (Sheet 22) is a cross sectional view taken on the line 33—33 of Fig. 32;

Fig. 34 (Sheet 23) is a fragmentary elevation of the bottle fence and row separator at the upstream indexing station looking in the same direction as Fig. 29 and with a conveyor side rail broken away for clarity;

Fig. 35 (Sheet 23) is a cross sectional view taken on the line 35—35 of Fig. 34.

Fig. 36 (Sheet 24) is a cross sectional view through the bottle fence of the upstream indexing station taken on line 36—36 of Fig. 35;

Fig. 37 (Sheet 25) is a cross sectional view taken on the line 37—37 of Fig. 36;

Fig. 38 (Sheet 22) is an upstream view of the downstream indexing station taken on the line 38—38 of Fig. 44;

Fig. 39 (Sheet 26) is a top view of the bottle carrier in the downstream indexing station of the machine shown in Fig. 29;

Fig. 40 (Sheet 26) is a cross sectional view taken on the line 40—40 of Fig. 39;

Fig. 41 (Sheet 25) is a cross sectional view taken on line 41—41 of Fig. 39;

Fig. 42 (Sheet 26) is an electric schematic diagram of the control circuit for the dual indexing station machine shown in Fig. 29 and specifically that portion of the circuit for controlling the first bottle indexing station;

Fig. 42-A (Sheet 27) is an electric schematic diagram of the control circuit for the second bottle indexing station of the machine shown in Fig. 29 and is a continuation of the circuit shown in Fig. 42;

Fig. 43 (Sheet 28) is a schematic diagram of the fluid pressure circuit for the dual indexing station machine shown in Fig. 29, and specifically that portion of the circuit relating to the first bottle indexing station and its associated crate positioning station;

Fig. 43-A (Sheet 29) is a schematic diagram of the fluid pressure circuit for the second bottle indexing station of the machine shown in Fig. 29 and the associated crate positioning station, and is a continuation of the diagram shown in Fig. 43;

Fig. 44 (Sheet 30) is a fragmentary side elevation of the dual bottle indexing station machine of Fig. 29 showing the row divider for the second station;

Fig. 45 (Sheet 30) is a cross sectional view taken on the line 45—45 of Fig. 44;

Fig. 46 (Sheet 30) is a fragmentary cross sectional view taken on the line 46—46 of Fig. 44;

Fig. 47 (Sheet 30) is a perspective view of the row divider shown in Fig. 44;

Fig. 48 (Sheet 30) is a fragmentary perspective view showing the connection between the upstream end of the row divider shown in Fig. 44 and the downstream end of the side rails of the conveyor at the first indexing station; and

Fig. 49 (Sheet 30) is a top view of the bottle stop means for the second indexing station.

This invention comprises a machine which is intended to accomplish the final step in a bottle filling, capping, and packaging process. The bottles leave the capping machine usually in single file, one bottle after another, and are so moved along upon a conveyor to a point at which they are deposited in cases or crates. These crates comprise square or rectangularly shaped boxes provided with a plurality of rows of bottle receiving cells. The crates usually also move in single file upon a conveyor to a point adjacent the moving bottles where the latter are deposited in the crates; the filled crates then moving to a storage space or directly onto trucks to be distributed to consumers. This invention contemplates a fully automatic machine which will transfer the bottles to the crates.

The bottles enter the machine upon a conveyor and immediately thereafter are marshaled into a plurality of rows upon another conveyor, the number of rows corresponding to the number of rows of cells in the crates to be filled. Upon this latter conveyor the bottles move toward a transfer device which selects the proper number of bottles from each row and transfers them to an awaiting empty crate. The crate when thus filled moves on out of the machine.

Two embodiments of the invention are disclosed herein, first a single bottle indexing station machine, and second a plural bottle indexing station machine, the former comprising the disclosure of said copending application. While each embodiment will be described separately, it will become apparent that there is substantial common subject matter in the two. The single indexing station machine is adapted to handle bottles of but one size or kind, while the plural station machine is adapted to handle at different times bottles of different sizes or kinds, the number of different sizes or kinds being determined in general by the number of indexing stations.

Single indexing station machine

The various mechanisms and controls comprising this embodiment are generally shown in Figs. 1, 2, and 3. They are supported upon a framework 30 standing on the floor. An electric motor 32 coupled with a hydraulic pump 34, connected by line 36 to a hydraulic fluid storage tank 38, serves as one source of motive power for the machine. A second source of power is an electric motor 40 coupled through a reduction gear 42 to the triform conveyor generally indicated at 44. It should be understood that the reduction gear 42 may be replaced by a fluid motor driven by pump 34, and the electric motor 40 thereby completely eliminated from the machine.

The triform or triple conveyor 44 serves to convey three rows of bottles from the marshaling device 46 to the indexing station where the carrier 178 serves to deposit the bottles in crates. In Figs. 1 and 3, one form of marshaling device is shown, while in Figs. 26 and 27, an alternative form is shown.

Referring first to Figs. 1 and 3, the bottles 50 are fed in single file to the machine by a conveyor 52. As they enter the marshaling device they slide, one behind the other, over platform 54. They slide over the platform because they are urged forward by the bottles still on the conveyor. As shown in Fig. 5, the platform is just long enough, opposite the end of conveyor 44, to receive three bottles. At the far end of the platform an electric control switch, S-1, whose function is hereinafter explained, is provided with an arm 56 adapted to yield to the pressure of the bottles urged against it.

Running along the back of the platform 54 is a backstop 58 which forms a continuation of one of the walls of the conveyor 52. The backstop is rigidly fastened to frame 30 except for a ram portion 58a, which is mounted upon supporting rods 62 which rods are reciprocally supported within bearing heads 60. The heads 60 and rods 62 are disposed in parallelism and aligned with the path of travel of the conveyor 44, so that when the ram reciprocates it will be moved evenly across the platform toward the conveyor 44. Means for reciprocating the ram include: a hydraulic piston and cylinder combination 64 mounted on the frame 30; a bell crank lever 66 pivotally mounted upon the frame; a connecting rod 68 mounted upon the piston rod of the combination 64 and pivotally connected by pin 70 to one arm of the bell crank within a slot 72; a U-shaped loop 74 mounted on the back of the ram 58a, and a roller 76 rotatably mounted on the other arm of the bell crank and in engagement with the ram 58a within the loop. Hydraulic fluid is supplied to the combination 64 by various lines hereinafter described.

When the fluid is supplied through these lines, the hydraulic combination 64 swings the bell crank about its pivot thereby moving the ram 58a which urges the three bottles onto the conveyor 44, whereupon they are moved toward the carrier 178.

To prevent bottles awaiting the next ramming action from getting in behind the ram when it is in the extended position, a stopping shoulder 78 is provided at the appropriate end of the ram. This shoulder serves to prevent movement of the bottles onto the platform 54 while the ram is extended.

Two control switches, or limit switches, control the movements of the ram: S-1 heretofore mentioned, and S-2. A plurality of these switches are used throughout the machine to control various operations. In the schematic wiring diagrams they are indicated by the letter "S" followed by a numerical designation and are shown as a single throw switch with a movable and a stationary contact. The movable contact is normally held by a return spring in either an "open" or "closed" position. Whether the movable contact is normally open or closed depends upon the particular switch. Each switch is further provided, for example, as is shown in Fig. 1, with regard to S-1 and S-2, with a pivotally mounted lever 56. Each lever is coupled with the movable contact so that when the lever is pivoted the movable contact will move either to the "open" or "closed" position. When the lever is released, the return spring coupled with the movable contact will return both the movable contact and the lever to the original or normal position. Each lever of the switches is further provided with a roller 57 which is adapted to abut an object moved against or passing close by the lever.

Switch S-1, as shown in Fig. 5, is disposed at the far side of platform 54, and its lever is adapted to be moved by a bottle coming into contact with it. Obviously a bottle will only contact the lever if such bottle is backed up by other bottles, as when the platform is full of bottles. The contacts of S-1 are so adjusted that an electric circuit will only be made when the bottles have moved across the platform and are in alignment with the conveyor 44. When a circuit is made through S-1, a solenoid operated valve permits hydraulic fluid to enter the cylinder-piston combination 64, and the ram 58a then urges the three bottles onto the conveyor 44.

A second switch S-2, disposed at the other end of the now moving row of three bottles, is a normally closed switch connected in series with S-1. S-2 breaks the circuit when a bottle, passing the switch on conveyor 44, pivots the lever 58. When the circuit is broken, the valve initially moved by S-1 is permitted to redirect the hydraulic fluid to the opposite end of the combination 64, and the ram 58a is retracted. Details of the opera-

tion of the electric circuits and the hydraulic system will be hereinafter explained.

The triform or triple conveyor 44 comprises the first portion of conveying means adapted to convey bottles from the marshaling device to the indexing station. This conveyor is continuously driven during the machine's operation. It comprises three movable endless belts 80, 82, and 84. The links 86 of these belts are pivoted together upon pins 86 as shown in Figs. 4 and 6. The bolts are horizontally supported subjacent their load carrying span by a table 90 extending underneath the belts and secured to the frame 30 as at 91. Upstanding in parallelism, and separating the belts longitudinally, and forming bottle guide channels therebetween, are four wall portions or guides 92, 94, 96, and 98. The ends of guides 94 and 96 nearest the marshaling device are tapered as at 100 and 102. These tapered ends slide between the bottles as they move toward the conveyor ahead of the ram, and separate and align the individual bottles with the respective belts upon which they are to be carried. The guides also serve to keep the bottles aligned in rows upon the belts.

Belts 80, 82, and 84 are suspended for movement upon six sprockets 104, 106, 108, 110, 112, and 114, with one of these sprockets at each end of each belt. The sprockets are keyed upon a pair of shafts 116 and 118 rotatably supported in bearings 120, 122, 124, and 126 mounted upon frame 30. The shaft 118 is driven by a pulley 128 mounted thereon and connected with a belt 130 to the reduction gearing 42. It will be noted that the sprockets mounted on shaft 120 are substantially directly beneath the platform 54 so that the belts in order to pass over these sprockets must extend beyond the free edge of platform 54 as shown in Fig. 6 (Sheet 5).

The second portion of the carrying means adapted to convey the bottles from the marshaling device to the indexing station is a bridge member 132 mounted on the frame 30 adjacent sprockets 110, 112, and 114. The upper surface of the bridge is disposed in the plane of the bottle carrying surface of the belts. Just as the belts begin to fall away from the bottle supporting plane as they pass around sprockets 110, 112, and 114, the bottles being carried thereon are moved onto the bridge and are urged thereacross by the pressure of the bottles behind still on the belts, as is shown in Figs. 7 and 8. As shown in Fig. 8, the bridge is one arm of a U-shaped plate generally indicated as 134. Mounted on the other arm 136 of the plate 134 are three control switches S-5, S-6, and S-7.

The plate 134 and the frame 30 encircle the third portion of the conveying means adapted to convey bottles from the marshaling device to the indexing station. Such third portion comprises a rectangularly shaped table 138 having a frame 140 rotatably supporting a plurality of parallel spaced apart rollers 142. These rollers are disposed perpendicular to the path of travel of the bottles moving off the triform conveyor, and are adapted to maintain the bottles in parallel rows while they move across the table toward the control switches S-5, S-6, and S-7. The bottles move in such parallel rows across the table and over the rollers because the line of least resistance is along the same path they have been traveling. The dimensions of the table are such that it will support in parallel spaced rows a sufficient number of bottles to fill one bottle case. The table is loaded by bottles leaving the triform conveyor and sliding over the bridge 132 and across the rollers 142. The bottles are urged across these areas by the pressure of bottles still on the triform conveyor. The bottles reach the indexing station when they have traveled as far across the table as is possible or, in other words, when the bottles are urged together in their respective rows with the lead bottle in each row abutting the aligned control switch disposed in its path of travel.

The normally open control switches S-5, S-6, and

S-7 are connected in series and are similar to S-1 except that lever 56 is replaced by a spring loaded plunger 144 which is normally urged outwardly, and tensioned to be displaced inwardly only when the bottles are in the indexing position. When the pressure of bottles on the triform conveyor is transmitted through the bottles resting on the bridge and on the table, to the switches S-5, S-6, and S-7, the outward tension on the plungers 144 is overcome and the plungers are urged inwardly making a circuit through the switches.

The table 138 is movably supported for vertical reciprocation upon four single overhung cranks similarly numbered 146 and mounted in pairs upon two shafts 148 and 150. Each crank exhibits a roller 152 adapted to abut the frame 140 of the table. The shafts 148 and 150 are rotatably mounted in similar bearings 154 secured to the framework 30. They are rotated by a pair of cranks 156 and 158 mounted thereon, and operatively coupled to reciprocable rods, respectively 160 and 162, by link mechanism shown in Fig. 11 (Sheet 7). This link mechanism includes a sleeve 164 fixed upon each rod. The cranks 156 and 158 are coupled to the sleeves by pins 166. A bottle fence 168, shown in Fig. 10, is mounted on the sleeve encircling rod 162. The fence is generally L-shaped and adapted to vertically reciprocate in opposition to the movement of the table 138. When the fence is raised it prevents movement of bottles on the bridge 132 from entering upon the table. The fence is shown in its upward position in Fig. 3.

The table is normally held on a level with the plane of the bridge 132. Coil springs 170 which encircle the rods 160 and 162 urge the rods upwardly. The springs are compressed between adjustable sleeves 172 encircling each rod and collars 174 through which the rods reciprocate. The upper ends of the rods are slidably mounted in collars 176 which are secured to the framework 30. As may now be appreciated, if the rods 162 and 164 are permitted to move upwardly, the table 138 will drop and the bottle fence simultaneously will be raised. Upon movement of the rods downwardly the table will rise while the bottle fence drops. When the table is in its normal upward position the bottle fence will be lowered so that bottles may pass thereover without hindrance by the fence. This upward movement is imparted to the rods when the bottles resting on the table are picked up by the bottle carrier generally indicated as 178 and are moved toward the bottle crate to be filled.

The bottle carrier is disposed above the table a distance such that bottles sliding over the table will pass under the carrier. As shown in the various figures of the drawings, the carrier comprises six bottle clamping bars 180, 182, 184, 186, 188, and 190 laterally slidably disposed within a rectangular frame 192. The frame 192 is itself slidably disposed between the carrier guides 194 and 196 mounted upon the framework 30 of the machine as at 198. These guides are parallel and extend, as shown in Fig. 2, substantially halfway across the width of the machine where they overlappingly meet the movable guides 200 and 202. The guides 194 and 196, as shown in Fig. 13 (Sheet 9), are slotted longitudinally as at 204 and 206 to receive complementary shoulders 208 and 210 formed on two of the opposite sides of the carrier frame 192. These same sides of the carrier frame are also provided with complementary grooves 212 and 214 which are adapted to slidably receive one marginal edge of each of the clamping bar supports 216 and 218. Supports 220 and 222, also provided, lie inside supports 216 and 218. The four supports slidably superimpose the clamping bars. Bars 180, 184, and 188 are suspended by screws or the like 224 from supports 216 and 222, while bars 182, 186, and 200 are suspended by similar screws from supports 218 and 220.

As shown in Fig. 9 (Sheet 8), the clamping bars are L-shaped in cross section. The upstanding legs of such L-

shape are secured, as above described, to the clamping bar supports. The feet of the L-shaped bars are oppositely and complementally notched as at 225 to receive the necks of bottles disposed between the bars. The notches are spaced apart along the bars a distance equal to the spacing of the bottle receiving cells in the crates to be filled. The notches are adapted to permit the necks of the bottles to be partially encircled by the bars and be clamped therebetween.

The bars are opened or closed by a hydraulic cylinder-piston combination 226 mounted on the carrier with the cylinder 228 secured by bracket 230 to clamping bar 190, and the piston rod 232 secured by U-shaped bracket 234 to the bar 180. Because the cylinder is mounted on clamping bar 190, which is in turn coupled by supports 218 and 220 to the bars 186 and 182, if the cylinder moves toward bar 180, the bars 182, 186, and 190 will also move toward bar 180. Similarly, because the piston rod 230 is coupled to bar 180 which is in turn coupled by supports 216 and 222 to bars 184 and 188, when the piston rod contracts into the cylinder, bars 180, 184, and 188 will move toward the oppositely disposed bars. As is obvious, therefore, the cylinder-piston combination and the clamping bars and their supports comprise a bottle clamping device independently slidably disposed within the carrier frame 192. When hydraulic fluid is fed to one end of the cylinder the piston rod will move in one direction out of the cylinder and simultaneously the cylinder will move in the opposite direction; while the reverse will be true if hydraulic fluid is fed to the opposite end of the cylinder.

Control switches S-5, S-6, and S-7 in closing the electric circuit in the manner above mentioned, initiate the clamping movement of the bars about the bottles. Because the normal position of the bars is open, or in the bottle receiving position shown in Fig. 12, the necks of bottles moving off the bridge 132 and across the table 138, pass between the open bars. When the bottles have reached the indexing position in front of the control switches S-5, S-6, and S-7, so that all three switches are closed, the necks of the bottles will be substantially aligned with the notches 225 in the clamping bars. With the switches closed an electric circuit is made which serves to direct hydraulic fluid to the cylinder-piston combination 226 to close the bars and grip the necks of the bottles therebetween.

Though the bottles in the indexing position just prior to being clamped by the bars are pressed against one another by the pressure of the bottles remaining on the triform conveyor, the notches 225 in the bars are so shaped that as the bars begin to embrace the necks of the bottles, the bottles in each row are separated somewhat. This separation occurs to the greatest extent at the necks of the bottles during the clamping movement of the bars, but as will be obvious hereinafter, further separation of the bottles at their bases occurs when the table 140 upon which they have been resting drops away. With the bottles suspended spaced apart from the carrier, separation of the table and carrier permits the bottles to swing so that they are spaced apart at their bases corresponding to the neck spacing.

The table 140 is dropped to permit the aforementioned separation of the bottles and also to facilitate the lateral movement of the bottles away from their indexing position. To accomplish the downward movement of the table 140 and also the removal of the bottles toward the crate to be filled, a control switch S-8 is mounted on the frame 30 of the machine. The switch is in all respects similar to S-1 or S-2. Its actuating lever 233 normally abuts and is held tensioned inwardly by the U-shaped clamp 234 mounted on clamping bar 180, as shown in Figs. 9 and 12. With the lever in this position, the circuit through the switch is open. The lever is released and the circuit made when the clamping bar 180 moves inwardly to grip the bottles. With the circuit through S-8 made,

mechanism hereinafter described moves the carrier in guides 194 and 196 toward the other side of the machine. A pair of bell crank levers 236 and 238 mounted respectively on guides 194 and 196, and provided on one end with similarly numbered rollers 240, abut the frame 192 of the carrier. The other end of each bell crank is received within a slot formed in the rods 160 and 162. As the carrier moves away from and releases the bell cranks, the coil springs 170 urge the rods 162 and 164 upwardly, thereby dropping the table 138 as hereinbefore described.

As shown in Figs. 1 and 2, the mechanism adapted to move the carrier laterally from the bottle receiving position includes: a hydraulic cylinder 242 mounted upon a vertically reciprocable crosshead 243; a piston 244 received by the cylinder and coupled at its outer end to the carrier through a bracket 246; and a cross strap 248 mounted upon the carrier frame 192 by any suitable means such as screws 250, supports the bracket 246. The crosshead 243 is mounted for its vertically reciprocable movement upon four upstanding pillars 252, 254, 256, and 258 which, as shown in Figs. 1, 2, and 14, form a part of the frame of the machine. Four bearing sleeves 260, 262, 264, and 266, encircle these pillars and slidably mount the crosshead thereupon. The cylinder 242 is mounted upon opposite end frame members 268 and 270 of the crosshead which are joined at the sides by the previously mentioned guides 200 and 202. The guides are slotted as at 204a and 206a to slidably receive the carrier from the guides 194 and 196 between which it is supported during the above-mentioned gripping of the bottles.

As now becomes apparent, when the cylinder receives hydraulic fluid at one end, the piston rod will pull the carrier from its position above the table to a position within the guides 200 and 202 of the crosshead, while if hydraulic fluid is fed to the opposite end of the cylinder, the carrier will be returned to its position above the table. S-8, above mentioned, initiates the flow of fluid to the cylinder 242 to draw the carrier into the crosshead. The control switch which initiates the return of the carrier from the crosshead to its position above the table will be described hereinafter.

The next step in the machine's operation is to lower the carrier with the bottles gripped thereby toward an empty crate and release the bottles after they are within the crate. In Fig. 9, an empty crate 272 is shown disposed beneath the carrier (depicted in dotted outline and numbered 274). A hydraulic cylinder 276 and piston rod 278 are vertically attached respectively to the frame 30 and an H-shaped strut 280 forming a part of the crosshead. Control switch S-9, shown in Figs. 7 and 9, is mounted on the frame 30 and provided similar to S-1 and S-2 with an actuating lever 282 and a roller 284; the latter being adapted to abut the bracket 246 as the carriage nears the end of its movement into the crosshead. The electric circuit through this switch is normally "open," but is closed when the lever 282 is pivoted by the contact of the bracket 246 with the roller. When this circuit is made hydraulic fluid is fed to the top of cylinder 276 with the result that piston 278 draws the crosshead and carrier downwardly toward the crate.

The downward movement of the crosshead is limited by control switch S-11 mounted on the frame 30 as shown in Figs. 2 and 14, which when tripped initiates the feed of hydraulic fluid to the lower end of cylinder 276 to return the crosshead to its original position. S-11 is provided with an actuating lever 286 and a roller 288. The end frame member 270 of the crosshead is adapted to abut the roller 288 and thereby actuate the switch.

Mounted on the frame 30 adjacent the control switch S-11, is the control switch S-10, which when tripped in a manner similar to S-11, serves to initiate the flow of hydraulic fluid to the cylinder-piston combination 226 to open the clamping bars and release the bottles. While S-10 and S-11 are tripped simultaneously, there is a greater amount of lag in the reaction time of the hydraulic

system feeding the cylinder 278 than in the system feeding the cylinder 228, and consequently the clamping bars release the bottles before the crosshead begins to rise. With the tripping of S-10 and S-11, the bottles are released from the carrier and remain in the case as the crosshead ascends.

Shown in dotted outline in Fig. 9 and indicated as 274a is the position of the carrier when the bottles are released and just before the crosshead begins to rise. When the limit of upward movement of the piston rod 278 has been reached the guides 200 and 202 are once again aligned with their complementary guides 194 and 196 so that the carrier may return to the bottle receiving position over the table. This movement is initiated by control switch S-12 mounted on the frame 30 and provided with an actuating lever 290 and a roller 291, as shown in Fig. 9. The switch is tripped by a tripper bar 292 mounted on the carrier cross strap 248 by a supporting block 294. The bar strikes the roller 291 as the crosshead reaches its upward limit of travel, thereby tripping the switch. Hydraulic fluid is then fed to the other end of cylinder 242 and the piston rod 244 moves the carrier out of the crosshead and back to its starting position.

When the carrier returns to its starting position the frame 192 of the carrier strikes the rollers 240 mounted on the bell cranks 236 and 238. This actuates the rods 160 and 162 which raise the table, while simultaneously the fence 168 drops below the plane of the bridge 132. Because the clamping bars were opened by the tripping of control switch S-10, when the carrier returns to its starting position, the bracket 234 engages the actuating lever 233 of control switch S-8 and returns the switch to its normally open position.

With the fence 168 in the downward position, the bottles resting on the bridge once again move toward their indexing station. During the interval of time that the fence is raised, the bottles on the bridge and on the belts of the triform conveyor group themselves into long closely packed rows. The belts of the triform conveyor slide beneath the bottles packed together and keep the bottles in this position so that when the fence is lowered all the bottles in each row move forward together and the table is filled with bottles almost immediately. Thereafter the cycle of movements of the carrier, table, and fence are repeated and the bottles are deposited in an awaiting case.

The cases to be filled move in single file toward the machine in the direction of the arrow on a case conveyor indicated as 295 in Fig. 1. They enter the machine and are guided therethrough between a pair of L-shaped guides 296 and 298 mounted upon parallel supports 300 and 302 which form part of the framework 30 of the machine. They are propelled forward by the pressure of cases remaining on the conveyor 295. The two L-shaped supports taken together may be considered a case or crate supporting table.

Two embodiments of means for positioning the cases in a bottle receiving position are shown in the drawings. One form of the positioning means is shown in Fig. 15 as comprising a star wheel or crate fence 304, and shaft 306 rotatably mounted in bearings 308 and 310 suspended from the frame members 300 and 302. A jumping cam 312 fixed on the shaft 306 is adapted, in cooperation with a spring loaded slidably mounted pawl 314, to selectively prevent counter-clockwise rotation of the star wheel. The pawl, which is suspended by brackets 316 and 317 from the frame member 300, is adapted to abut the up-standing bracket 318 mounted on the end of the case ram 320.

The ram 320 includes a piston rod 322 received at one end within a hydraulic cylinder 324. A pivotally mounted, spring loaded, case engaging pawl 326 is mounted upon a piston rod and block 328 received over the end of the piston rod. A spring 330 normally urges the pawl 326 against the bracket 318, so that the upper end of

the pawl extends above the case supporting plane of the guides 296 and 298, and in a case engaging position.

As a case slides off the conveyor 295 and moves along between the guides 296 and 298, it passes through three positions, indicated in Fig. 15 as C1, C2, and C3. With the ram in the position shown in Fig. 15, the pawl 314 is disengaged from the jumping cam 312 and the star wheel 304 is free to rotate. As the case moves from C1 to C2, it passes over the star wheel which is free to rotate; over the pawl 326 which pivots downwardly as the case strikes it; and finally contacts the lever arm 330 of control switch S-3 which is mounted on the frame 30 adjacent the path of travel of the case. Upon contact of the lever by the case, the switch is tripped closing an electric circuit which directs the flow of hydraulic fluid to the cylinder 324 in a manner such that the piston rod 322 is drawn into the cylinder. As the piston is drawn into the cylinder, the case, by the pawl 326 on the end of the piston rod, is drawn to the bottle receiving position shown by the dotted outline as C3.

During the movements of this case, a second case has been closely following it and urging it over the guides prior to the time the first case was drawn into the bottle receiving position by the ram. This second case would continue to follow the first case if it was not prevented by the star wheel. As the ram 320 begins to draw the first case into the bottle receiving position, the pawl 314 is released and moves into engagement with the jumping cam 312 by virtue of the tension of spring 332 which encircles rod 334 supporting the pawl 314. The spring is compressed between the pin 336 and the pawl support 317. The ear of the star wheel which extends above the crate supporting plane of the guides 296 and 298 now engages the lower edge of the second case, which has reached the position indicated as C2, and prevents further movement thereof.

When the piston rod nears the end of its inward stroke, the piston rod end block 328 contacts the lever 338 mounted on control switch S-4 and trips the switch. The switch, which is mounted on the frame 30 adjacent the end of cylinder 324, is a normally open switch connected in series with control switches S-5, S-6, and S-7. It is a safety switch because unless it has been tripped the circuit through S-5, S-6, and S-7 cannot be completed and consequently the clamping bars will not be actuated to grip bottles in the indexing position. Control switch S-4 will only be tripped if a case has tripped S-3 and been moved into the bottle receiving position C3. With S-4, S-5, S-6, and S-7 tripped, the clamping bars will grip the bottles and the carrier will deliver the bottles to the case, wherein they will be released.

After the bottles have been deposited in the crate the carrier returns to its starting position, whereupon tripper bar 292 strikes roller 340 mounted on lever 342, of control switch S-13. Switch S-13 when tripped completes a circuit which directs hydraulic fluid to cylinder 324 in a manner such that piston rod 322 extends to the position shown in Fig. 15. With the piston rod in this position, pawl 314 is disengaged from the jumping cam and cases in position C1 and C2 are permitted to advance. When S-3 is tripped, the ram 320 draws the case which was in position C2 up against the filled case in position C3 and propels the filled case ahead of the empty case out of the machine and onto the guides 344 and 346, while at the same time positioning the empty case in the bottle receiving position.

The guides 344 and 346 are similar to guides 296 and 298 and are mounted upon the frame members 300 and 302. A filled case is pushed out upon these guides from the bottle receiving position and remains thereupon until another case is filled which when pushed out upon the guides propels the prior filled case ahead of it onto the conveyor 348 which carries it away from the machine. As may now be appreciated, this cycle of positioning a case in the bottle receiving position and

then moving it on out of the machine after being filled, is repeated continuously in timed relation with the deposit of bottles in the cases. The area of the machine through which the triform conveyor 44 operates may be considered a bottle accumulating or collecting area to one end of which bottles are delivered in a single row by the conveyor 52. The conveyor 44 and pusher 46 together may be considered as mechanism for filling this collecting area with bottles. It will be observed that such mechanism is operative independently of the operation of the carrier 178 so that while carrier 178 is depositing a caseload of bottles in an awaiting crate, the collecting area is simultaneously being filled with bottles by the pusher 46 and conveyors 44. When the carrier 178 returns to a position to receive another caseload of bottles from the collecting area, the caseload is moved into the carrier as a group or, in other words, all at once rather than a few bottles at a time as would be the situation if the collecting area were non-existent. This pre-grouping or accumulation of a caseload of bottles, while the carrier 178 is operating to deposit bottles, materially increases the rate at which cases may be filled as the carrier need only wait at the indexing station for the new pre-collected caseload to be moved beneath it before it grips the load for transfer to the next case. It will also be observed that the pusher 46 and conveyors 44 comprising the mechanism for filling the collecting area move at right angles to the conveyor 52 and that the bottle carrier 178 is disposed at one end of this collecting area and pusher 46 at the other end of the area.

Alternative marshaling mechanism

As mentioned hereinbefore, two forms of marshaling devices are shown in the drawings. A modification of the embodiment above described is shown in Figs. 26 and 27. In this form, bottles are received from the conveyor 52 and are fed by the pressure of bottles remaining on belt 53 of such conveyor across a bridging plate 55 and onto the platform 350. Upstanding at one corner of the platform is a guide wall 352 angling from the end of one side guide wall of the conveyor 52 to the end of the guide 92 of the triform conveyor. Upstanding from the platform 350 and circling around the back thereof is a concave guide wall 354. This guide wall 354 extends from the end of a side guide wall of the conveyor 52, across a portion of belt 84 of the triform conveyor and meets the guide wall 98 of the triform conveyor. The platform 350 is shaped adjacent the triform conveyor to provide a configuration having an edge portion 356 paralleling the side of belt 80, another edge 358 intersecting edge 356 and extending across belts 80 and 82, and another edge 360 intersecting edge 358 and paralleling belt 84 and approaching guide wall 354.

Bottles fed from the conveyor 52 upon platform 350 move thereacross substantially as shown in Fig. 26 by pressure of the bottles remaining on belt 53. The bottles tend to assemble or cluster upon the platform until it is full, whereupon the bottles at the fringe of the cluster adjacent the triform conveyor are jostled off the platform and onto the moving belts of the triform conveyor. The configuration of the platform adjacent the triform conveyor and the disposition of the guide walls 352 and 354 with respect to such configuration serve to guide the bottles assembled on the platform toward and upon the moving belts in a substantially equal distribution therebetween. The pressure of bottles entering upon the platform from the conveyor serves to force the bottles onto the belt 84 furthest from the conveyor, as well as onto belts 80 and 82. The internal pressure of the group and the camming action of separate bottles within the group on the table is directed toward the belts of the triform conveyor by the concave shape of the guide wall 354 and the angular disposition of the guide wall 352.

The bottles which have moved from the platform onto

the belts of the triform conveyor are aligned into separate rows thereon by the guides 92, 94, 96, and 98, and thereafter move aligned in rows toward their indexing station. The guides 92, 94, 96, and 98 therefore not only serve to keep the bottles in rows upon the belts, but the ends of the guides adjacent the platform 350 guide the bottles into their respective rows.

Alternative crate positioning mechanism

In addition to the modified form of marshaling device, an alternative embodiment of the case positioning means is shown in Figs. 20-25. As there shown, a conveyor 362 is disposed between the frame members 300 and 302 with its case engaging surface just above the plane of the case supporting surface of said frame members. The conveyor 362 extends from the conveyor 295 at the right hand end of the machine, Fig. 2, entirely through the machine until meeting the conveyor 348 at the left-hand end. As shown in Figs. 21 and 22, a portion of its length is disposed directly below the bottle receiving position of the case. The conveyor is suspended between a pair of sprockets (not shown), which are driven by any suitable driving means. The conveyor is supported subjacent its case supporting span, intermediate the pair of sprockets, by a channel member 364, and beneath its return span by a channel member 366.

As a case travels through the machine on conveyor 362, in the direction of the arrow in Fig. 20, it passes over the case lifter or crate supporting platform generally indicated at 368. The lifter is adapted to raise the case off the conveyor and lock it in the bottle receiving position. The lifter comprises a pair of parallel spaced apart bars 370 and 372, pivotally supported upon four similarly numbered crank arms 374 for uniform vertical movement. The crank arms are mounted upon a pair of shafts 376 and 378 which are rotatably held by four bearing heads 380 to the frame 30 by similar L-shaped brackets 382. The shafts are tied together for simultaneous equidistant rocking by two cranks 384 and 386 mounted on each shaft and connected by a link 388. The shafts are adapted to be rocked by a crank 390 mounted on shaft 378 and provided with a slot 392 through which fits a pin 394 mounted in the end block 396 of piston 398. The piston is operatively received within a hydraulic cylinder 400, which when energized by fluid at the lower end will raise the piston rod which in turn through the described cranks and shafts raises the lifting bars. Conversely, when fluid is fed to the top of the cylinder, the bars will be lowered.

In their lowered, or normal position, the case engaging surfaces of the bars are disposed just below the case supporting plane of the members 300 and 302, so that a case C may pass freely over the bars. The conveyor 362 moves between the bars with its case engaging surface just above the normally lowered position of the bars. When the bars are raised by the action of cylinder 400 a crate riding on the conveyor above the bars is carried upwardly by them, and thereby raised completely free of the conveyor. In lifting the crate free of the conveyor, the bars move the crate relative to both the conveyor and to the path of travel of bottles to be deposited therein, to a bottle receiving position.

A crate so raised by the bars is locked in a bottle receiving position by the cooperative engagement therewith of the bars and four corner stops similarly numbered 402. These corner stops are notched as at 404 to receive the upstanding stacking lugs similarly numbered 406 mounted at the four corners of the case. The corner stops are fixed to the frame 30 as shown in Fig. 21. The corner stops not only receive the lugs 406 within the notches, but also overhang each corner of the case. Such overhang limits the upward travel of the case, while the interfitting lugs and notches prevent any lateral movement of the case. Consequently, when a case is

raised upon the bars 270 and 272 into position it is disposed free of and above the conveyor 362.

If the lugs are bent outwardly or are not otherwise in their normal aligned position with respect to their crate they will not be received within the notches 404 and the case will not be fully raised. Instead of being received within the notches, the lugs will catch the corner adjacent the notches and the case may be tilted slightly, as when the lugs at one end of the case are properly received within their complementary notches but the deformed lugs at the other end are not. Unless the case is fully raised and seated within the corner stops so as to be properly aligned with the path of movement of bottles to be deposited therein, the carrier will not grip bottles at the indexing station to convey them to the crate. This is explained hereinafter.

To prevent the cases following the one that is to be filled with bottles from interfering with the case filling operation, a case retaining fence, shown in Fig. 21, is operatively coupled with the piston rod 398 to be actuated thereby. This fence comprises a pair of arms 408 and 410 pivotally mounted upon a rocker shaft 412 which is in turn supported within a pair of bearings 414 and 416 mounted on the rails 300 and 302. The arms are coupled by crank 417 and a link 418 to a crank 420 mounted on a shaft 422. The shaft is supported within a pair of bearings 424 and 426 mounted on frame members 428 and 430, which are secured to the framework 30 and to the subjacent rails 300 and 302. The shaft is adapted to be rocked by a crank arm 432 coupled to the piston block 396 by the pin 394 which extends through a slot in the crank. As may be appreciated from the above explanation and with reference to Fig. 21, as the piston rises and elevates the bars 370 and 372, the arms 408 and 410 will be pivoted to the position shown, while if the piston descends, the arms will be pivoted to lie substantially parallel with and below the supporting surface of the conveyor. Therefore, just as the bars 370 and 372 begin to raise a case off the conveyor, the arms of the fence rise above the case supporting surface of the conveyor and engage a lower edge of the case next following the one being raised, and thereby withhold further forward movement of the following cases.

A control switch S-14 is mounted on the framework 30 and provided with a plunger actuating arm adapted to be moved by a spring loaded bell crank type cam 434. The cam is disposed adjacent the path of travel of a case moving upon the conveyor 362, and is adapted, when contacted by a case, to pivot and actuate the control switch and thereby make an electric circuit. This circuit controls the operation of the valves which direct hydraulic fluid to the cylinder 400. The cam 434 is so positioned with respect to the bars 370 and 372 and the corner stops 402, that it will be pivoted to actuate control switch S-14 when a case has reached the proper point of forward movement upon the conveyor to be elevated and locked in the aforementioned bottle receiving position.

Another control switch S-15 is mounted on the frame member 428 below the shaft 422 and is provided with an actuating arm 436 adapted to be contacted by crank 432. With the bars 370 and 372 in their normal position the crank 432 angles sharply downwardly and holds the actuating arm 436 also downwardly. Such downward position of the arm keeps the control switch S-15 open. Switch S-15 is connected in a series circuit with control switches S-5, S-6, and S-7. When crank 432 moves upwardly as the bars rise and lift a case to the bottle receiving position, switch S-15 closes and permits a circuit to be made therethrough.

Switch S-15 is a safety switch which does not permit the bottle clamps to clamp bottles in the indexing position unless a case has been raised to the bottle receiving position and is properly aligned with the path of travel of bottles being carried into the case by the carrier. The

case must be fully raised with its edges in abutment with the carrier stops 402 and the stacking lugs properly received within the notches before the switch will close the circuit therethrough. Its purpose therefore is similar to that of switch S-4 heretofore described in connection with the other form of the case position mechanism, in that unless a case is properly aligned to receive the bottles from the carrier the carrier will not pick up any bottles from their indexing position and move them toward the case.

The hydraulic cylinder 400 is supported for limited vertical movement upon two L-shaped brackets 438 and 440 which slidably encircle the rod 442 fixed to the framework 30 of the machine by a pair of brackets 444 and 446. The cylinder is held normally upwardly by a coil spring 448 which encircles the rod and is compressed between the bracket 438 and an adjustable collar 450 received over the lower end of the rod.

As may readily be appreciated, because the cylinder 400 is held upwardly by the coil spring 448, a crate supported on the bars 370 and 372 in the bottle receiving position may be forced downwardly if sufficient downward pressure is exerted thereupon to overcome the resistance of the coil spring. The crate is therefore floatingly supported above the conveyor 362 when in the bottle receiving position and is subject to downward movement in the aforementioned manner. This floating support of a crate is utilized to provide a safety feature in the machine's operation as hereinafter described.

A normally closed control switch S-16, mounted on the framework 30 and provided with an actuating arm 452, is adapted to be opened by downward movement of the cylinder 400 against the resistance of the coil spring. This switch is a safety switch and forms a part of the electric circuit controlling the flow of hydraulic fluid to the cylinder 276. Bracket 440 on the cylinder 400 is adapted to trip the switch as the cylinder moves downwardly. If one of the cells of the crate is deformed, or a bottle or a portion of a bottle is lodged in one of the cells, or if for any reason the crate will not properly receive and seat bottles being lowered into it by the carrier, it is the function of this switch to cause the carrier to reverse its downward movement and return the bottles to their indexing position.

To illustrate the mode of operation of this switch, assume that a broken bottle in the crate to be filled, or a deformed cell wall, would prevent the proper seating of one or more bottles within the crate. Considering Fig. 22, the crate C is in the bottle receiving position being floatingly supported above the conveyor by the cylinder 400, coil spring 448, and the bars 370 and 372. As the carrier and bottles to be deposited in the crate move downwardly toward the crate, the bottles whose proper entry or seating within the crate is prevented, will abut the deformed cell wall or broken bottle, as the case may be, and force the crate downwardly ahead of the descending bottles. This downward movement of the crate will similarly move the cylinder 400 downwardly, and control switch S-16 will be tripped. When the switch is tripped the hydraulic fluid which has been directed into cylinder 276 to lower the carrier will be re-directed to raise the carrier. Switch S-16 is so disposed relative to the vertical travel of the carrier and the cross-head 243, that it will always be tripped whenever the bottles are not properly received by the crate before the bottle clamp release switch S-10 is tripped. Therefore, when switch S-16 is tripped and the carrier ascends, and they are returned to their indexing position.

Switch S-13, heretofore described, forms in this alternative embodiment of the case positioning mechanism, part of an electric circuit which controls the flow of hydraulic fluid to cylinder 400. When switch S-13 is tripped by the carrier returning to its initial position over the bottle table, the flow of hydraulic fluid to the

cylinder is redirected so that the piston 398 retracts into cylinder 400 and the supporting bars 370 and 372 lower the case to the conveyor 362 whereupon it is carried out of the machine. Therefore, whether a case is filled with bottles, or rejected because bottles will not properly seat within it, when the carrier returns to its starting position, the case will be dropped to the conveyor and carried on out of the machine.

In filling a crate with bottles, the crosshead 243 lowers the carrier and bottles toward the crate until the bottles have entered their cells and are within substantially 1/4 of an inch from the bottle supporting floor of the crate, whereupon the control switch S-10 is tripped and the clamping bars release the bottles. They drop therefore a very short distance to the supporting floor. By repositioning control switch S-10 with respect to the downward movement of the crosshead, the distance above the supporting floor of the crate at which the bottles are released can be varied.

This alternative embodiment of the crate positioning mechanism may be adapted for varying sizes and types of crates by shortening or lengthening the crank arms 374 and replacing the corner stops 402 by stops of a shape complementing the corners of the different type cases. Similarly, the bottle clamping bars of the carrier may be provided with a different number of bottle gripping notches to accommodate various numbers of bottles, and the notches shaped to grip various sizes and types of bottle necks.

By a rearrangement of control switches and other changes that are obvious from this disclosure, the machine may also be used to unload bottle crates, the operation of the carrier simply being in reverse. Obviously these and other modifications may be made in the basic construction herein disclosed without departing from the spirit of the invention.

Control circuits

First considered in the following description are the hydraulic lines and electric circuits for the embodiment of the machine shown in Figs. 1-17, and thereafter the embodiment shown in Figs. 20-25.

Fig. 18 schematically illustrates the wiring of the various switches and the two electric motors. Electric power is supplied through the lines 462, 464, and 466. Branch lines 468, 470, and 472 connect the motors with the source of power through the remote controlled switches 474, 476, 478, and 480. Lines 468 and 472 are also connected to the input side of the transformer 482. The wires 484 and 486 leading from the output side of the transformer supply power to the remaining electric circuits in the machine.

A double throw switch 488 is the main power switch in the system. A pair of start-stop switches 490 and 492, their accompanying relay 494, and the relay operated switches 496 and 498, open and close the motor switches 474, 476, 478, and 498 through the second relay 500 operatively coupled therewith.

As is schematically shown in Fig. 19, sheet 13, the hydraulic pump 34, driven by an electric motor 32, takes hydraulic fluid from the storage tank 38 through the suction line 36 and delivers the fluid through lines 502 and 503 to the various hydraulic cylinders of the machine. The fluid is delivered through these lines respectively at approximately three gallons per minute and seven gallons per minute.

Interposed within the branch lines leading from line 502 to the marshaling device ram cylinder 64 and the case ram cylinder 324 are two control valve units, 504 and 506. Branch lines 510, 512, 514, and 516 connect each of these units with the opposite ends of their respectively controlled cylinders. Exhaust or drain lines lead from each unit back to the storage tank 38 through line 518. Valve unit 504 comprises a conventional type hydraulic line valve 504_v operable in one direction by

a solenoid 504_s, as schematically shown in Figs. 19 and 20, and operable in the other direction by a return spring (not shown).

Control switch S-1, shown in Fig. 20, is electrically connected with solenoid 504_s. Control switch S-2 is connected in series with S-1. S-2 is a normally closed switch, and consequently when S-1 is closed by the bottles moving across the marshaling platform, the solenoid 504_s is energized and valve 504_v feeds hydraulic fluid to the cylinder 64 to extend the ram 58A. When the bottles trip switch S-2, the circuit to solenoid is broken and the return spring moves the valve to redirect fluid to the opposite end of cylinder 64 and thereby retract the ram.

Because control switches S-1 and S-2 are instantaneously actuated, a relay 506 is operatively coupled to the normally open by-pass switch 506_a. This relay maintains the circuit through the solenoid 504_s even though S-1 is closed and then immediately opened. When S-2 is tripped and opened, the current through the solenoid and the relay is broken and does not recontinue upon S-2 thereafter closing.

The bottles are now moving on the triform conveyor toward their indexing position. At the same time, empty cases are moving upon the case conveyor toward the machine. When the lead case actuates control switch S-3, the case ram 324 is supplied with fluid and the case pulled into the bottle receiving position. S-3 is electrically connected to the solenoid 506_s within the unit 506, and upon energization of the solenoid, valve 506_v directs fluid through branch line 514 to retract the piston rod 322. S-3 is held closed only instantaneously when the case first encounters the actuating lever of the switch, but during its closed interval, the valve 506_v is moved to direct the fluid through branch line 516 to the case ram cylinder to extend the piston 322. With projection of the piston, the cases on the conveyor once again move toward the case filling position and the cycle of operation of switches S-3 and S-13 is repeated.

Control switches S-4, S-5, S-6, and S-7, as shown in Fig. 18, are electrically connected in series. S-4 is not closed unless the case ram is fully retracted and the case to be filled is in proper alignment with the path of travel of the bottles to be deposited. S-5, S-6, and S-7 are closed when the bottles have reached their indexing position. With these switches closed an electric circuit is made which energizes the solenoid 522_s operatively coupled within the control unit 522 with the valve 522_v. This valve, which is spring loaded, controls the flow of fluid to the bottle clamp piston-cylinder combination 226, and upon actuation of the valve by the solenoid 522_s, fluid is fed through the branch line 524 to the cylinder to grip the bottles between the clamping bars of the carrier. Because the switches S-5, S-6, and S-7 are opened as soon as the carrier moves the bottles toward the awaiting case, a relay 526 electrically connected to the switches through the normally closed control switch S-10, is coupled to the switch 526_a and serves to sustain the current to solenoid 522_s through switches S-5, S-6, and S-7 have opened.

When control switch S-10 is opened, the circuit through solenoid 522_s is broken and the spring loaded valve 522_v returns to its initial position thereby directing fluid through branch line 528 to the combination 226 and the bottles are released from the clamping bars and deposited in the case.

When the clamping bars have moved to grip the bottles, control switch S-8 is tripped instantaneously closed and opened. This switch is electrically connected to the solenoid 530_s, which is in turn coupled within the control unit 530 with the valve 530_v, controlling the flow of hydraulic fluid to the cylinder 242. Cylinder 242 and piston 244 which move the carrier laterally through the machine, are supplied with fluid through branch lines 532 and 534. Upon actuation of S-8, the solenoid moves

valve 530_v to direct fluid through line 532 which effects the retraction of the piston 244 and draws the carrier into the crosshead.

Control switch S-12 is electrically connected to solenoid 536 which is coupled with valve 530_v and is operable to return the valve to its initial position when the switch is tripped. With the return of the valve to its initial position, fluid is directed through branch line 534 to the cylinder, and the piston is extended, moving the carrier laterally through the machine from its position within the crosshead to the one over the bottle indexing station.

The two remaining switches S-9 and S-11 which initiate the movements of the vertically disposed piston 278, are connected in series and are respectively normally open and closed. They are electrically connected to solenoid 538_s which is coupled within control unit 538 to the valve 538_v. A relay 540 in a circuit by-passing solenoid 538_s is coupled to two switches 540_a and 540_b, respectively, open and closed when the relay is not energized. Switch 540_a is a by-pass for switch S-9 and functions to sustain the current to solenoid 538_s and to the relay 540 though switch S-9 is open. S-9 is an instantaneously closed and opened switch. Upon closure thereof the valve 538_v is moved to direct fluid through branch line 542 to the cylinder 276 and the piston is retracted lowering the crosshead toward an awaiting empty crate. When switch S-11 is tripped and opened, the current to solenoid 538_s and relay 540 is stopped and switch 540_b, heretofore being held open by the relay is closed thereby energizing solenoid 544 which functions to return the valve 538_v to its initial position. Upon return to this position, fluid is directed through branch line 544 and the piston raises the crosshead and carrier to their original positions.

Control circuits for modified embodiments

The control circuits for the machine when the modified embodiments of the marshaling device and case positioning mechanism are substituted for the first described form of such devices, are shown in Figs. 19 and 28. Fig. 19, used in connection with the first described form of such devices, is equally applicable to the modified embodiments by disregarding the bottle ram cylinder 64 and its associated communication lines and control unit 504, and the crate ram cylinder 324 and its associated lines and control unit 506. These cylinders form no part of the modified embodiments. The remaining cylinders, lines, and control units function as above described. The cylinder 400, shown in dotted outline in Fig. 19, and which is coupled with and actuates the crate lifting bars 370 and 372, is connected by hydraulic communication lines 546 and 548 to a control unit 550. As schematically shown in Fig. 28, the control unit comprises a valve 550_v coupled to a solenoid 550_s which when energized will move the valve to direct hydraulic fluid through line 548 to the cylinder and thereby extend the piston 398. A second solenoid 552 is also coupled with the valve 550_v and is adapted, when energized, to move the valve to direct hydraulic fluid through line 546 and retract the piston.

As the crates move on the crate conveyor toward the bottle receiving position, switch S-14 is contacted by the lead crate. At the time when such switch is contacted, the crate is disposed directly above the lifting bars 370 and 372. Upon contact by a crate the switch is instantaneously closed and opened, and as is shown in Fig. 28, closure of the switch will energize the solenoid 550_s, thereby actuating valve 550_v, and the crate is elevated into the bottle receiving position. Though the switch is only closed instantaneously, the valve 550_v, during energization of the solenoid is moved to direct fluid as aforementioned. The valve will remain in this position until solenoid 552 is energized and the valve then moved to redirect fluid through line 546 to retract the piston.

If the crate is properly received within the notches, the switch S-15 will be tripped and held closed. S-15

replaces the previously described switch S-4. S-15 is connected in series with switches S-5, S-6, and S-7. Therefore, unless S-15 is tripped closed, no current will flow through these switches. S-15 is closed when the crate positioning mechanism has raised the crate to the bottle receiving position.

Switch S-13 heretofore mentioned, when used in the machine with the alternative embodiments of the marshaling device and crate positioning mechanism, is modified in that it is made a two-way switch with one side normally open leading to solenoid 552 and the other side normally closed and connected in series with switch S-15. S-13 is tripped when the carrier returns to the bottle indexing position over the table 138. When tripped the circuit to solenoid 552 is maintained instantaneously and this effects movement of the valve 550_v to retract the piston 398 and lower a crate to the conveyor. The other side of the switch, when the switch is tripped, is maintained instantaneously open, breaking the circuit leading to the bottle clamping cylinder solenoid 522_s heretofore mentioned, and thereby effecting the release of bottles that are returned to the indexing position because they were not deposited in the crate. If one of the bottles that is so returned to the indexing position is broken or otherwise damaged during the attempted deposit of the bottles in a crate, whose condition would not permit the deposit thereof, such damaged bottle may then be removed from the indexing table without the necessity of turning off the circuit to the entire machine to effect the release of such bottle by the carrier. It should also be apparent that if the machine, instead of depositing bottles in a crate, was adapted to remove bottles therefrom, as previously suggested, S-13 would serve to release the bottles from the clamps when the carrier reached the indexing position over the table.

Aside from the modification of switch S-13, and the substitution of switch S-15 for switch S-4, only one other control switch is added, being S-16. This switch is placed in the circuit leading to the relay solenoid 540, and functions as a safety switch to interrupt the downward movement of the carrier toward a crate if the bottles being transferred by the carrier are not properly received by the crate, as hereinabove more particularly described. S-16 is a normally closed switch and is tripped open when the crate positioning or supporting mechanism is forced downwardly ahead of the descending bottles. When so tripped the circuit to solenoid 540 is interrupted thereby effecting the opening of the relay switch 540_a and the closing of relay switch 540_b. The opening and closing of these switches electrically reacts upon the solenoids 538_s and 544 to actuate the valve 538_v, controlling the flow of fluid to cylinder 276, to cause the piston 278 to elevate the crosshead and thereby initiate the return of the carrier to the bottle indexing position. S-16 is so disposed relative to the downward movement of the carrier and bottles that it will be actuated by the crate supporting or positioning mechanism before the carrier has moved far enough downwardly to actuate the switch S-10 to effect release of the bottles by the clamps.

General operation

From the foregoing description of the machine, its operation should be apparent. In review, and considering the embodiments shown in Figs. 1 through 19, a succession of milk bottles enter the machine in single file on the conveyor 52. They move off the conveyor onto the platform or table 54 and when the leading bottle contacts switch S-1, the bottles on the table are urged toward the triform conveyor 44. The movement of the bottles off the conveyor 52 and onto the table 54 is suspended by virtue of the stop 78 at the end of the ram 46. After the ram has moved the bottles onto the triform conveyor, they move thereover toward the bottle indexing position. As they pass switch S-2, it is

actuated to return the ram to its position behind the table. Bottles are then permitted to once again move across the table and actuate switch S-1.

This cycle of bottles leaving the conveyor 52, traveling across the table, actuating the switch S-1, and then being moved onto the triform conveyor by the ram is continuously repeated during the machine's operation. If for some reason the bottles do not pass off the discharge end of the triform conveyor, they begin to collect thereon in three long lines of bottles with the moving belts of the triform conveyor sliding thereunder. If the lines of bottles grow so that they extend back to the table 54, the switch S-2 will be constantly engaged by the last bottle in the line of bottles on belt 30 and therefore the ram 46 will not move to urge the bottles on the table toward the triform conveyor.

The movement of bottles off the triform conveyor is controlled by the bottle fence 168 disposed adjacent one edge of the bottle supporting platform 138. The fence is raised when the platform is filled with bottles and when the bottles are being gripped by the carrier to be removed from the platform. When the platform is empty and the carrier is disposed thereabove the bottles pass over the fence which is at this time lowered and moved onto the platform and thereacross to engage and actuate the switches S-5, S-6, and S-7.

When these switches are actuated a circuit is completed which is operative to close the bottle gripping bars of the carrier about the necks of the bottles. Upon the gripping of the necks of the bottles by the bars, switch S-8 is tripped which initiates the movement of the carrier away from its position above the supporting table. As the carrier begins to move, the linkage coupled with the fence, and which normally bears against the carrier through the rollers 240 is actuated to raise the fence, thereby withholding further movement of bottles onto the bottle supporting platform.

The bottles being supported by the carrier are now in transit toward a crate disposed in the bottle receiving position. Such crate is one of a succession which moves into the machine from the conveyor 295. It is guided through the machine by a pair of guides 296 and 298, as shown in Fig. 1. It is passed over the crate fence 304 shown in Fig. 15 and has been picked up by the case ram 320 and moved into the bottle receiving position. It is held in such position by the case ram while it is awaiting deposit of bottles from the carrier.

As the carrier moves downwardly toward the crate in a bottle receiving position it engages switches S-10 and S-11 simultaneously. These switches serve to release the bottles from the carrier and return the carrier to its position over the bottle supporting platform. Such switches are disposed so that the bottles will be released from the carrier when spaced slightly above the supporting floor of the crate. After deposit of the bottles into the crate, and as the carrier returns to the bottle indexing position, the rollers 240 are engaged by the frame of the carrier and actuate the linkage controlling the bottle fence to lower the fence and raise the platform; the platform was first lowered by such linkage when the bottles were removed from the platform and carried to the crate. With the bottle fence lowered, bottles once again moved off the triform conveyor onto the supporting platform, switches S-5, S-6, and S-7 are once again tripped and the cycle is repeated.

When the carrier returns from depositing bottles into the crate, switch S-13 is actuated thereby extending the case ram to engage another case and draw it into the bottle receiving position. Upon drawing the successive case into the bottle receiving position, the case which has been filled is moved ahead of the empty case out of the machine. The cycle of moving cases or crates into the bottle receiving position and then out of the machine upon being filled with bottles, is repeated continuously during

the operation of the machine and in synchronism with the movements of the bottle carrier.

The operation of the machine when it embodies the modifications shown in Figs. 20 through 28 is similar in many respects to the foregoing description. The bottles move into the machine off the conveyor 52 onto the table 350. The bottles move across the table 350 by pressure of the bottles remaining on the belt 53 of the conveyor 52. They tend to assemble or cluster upon the table until it is full whereupon they are jostled off the table and onto the moving belts of the triform conveyor. The configuration of the table adjacent the triform conveyor and the disposition of the guide walls 352 and 354 with respect to such configuration serve to guide the bottles assembled on the table toward and upon the moving belts in a substantially equal distribution therebetween. The internal pressure of the group of bottles on the table and the camming action of the separate bottles within the group is directed toward the belts of the triform conveyor by the concave shape of the guide wall 354 and the angular disposition of the guide wall 352.

As with the description of the operation of the foregoing embodiment the bottles move upon the triform conveyor toward the bottle indexing position. The bottle fence again controls the movement of the bottles off the conveyor and onto the and the conveyor off bottles onto the bottle supporting platform. The operation of the carrier to remove the bottles from the supporting platform is the same as with the foregoing description of the operation of the machine. The crate positioning mechanism, however, as shown in Figs. 20 through 25, differs substantially from the other form of crate positioning mechanism. As shown in Figs. 20 through 25, the succession of crates moves into the machine upon the conveyor 295 and is guided therethrough upon the conveyor 362 and the guides 300 and 302. As the lead crate nears the bottle receiving position it actuates switch S-14 which serves to initiate upward movement of the crate supporting platform 363. As soon as such platform is raised the crate fence 410 elevates to withhold further movement of successive crates thereby preventing such crates from disturbing the crate elevated upon the platform. The crate so elevated is received within the four positioning brackets 402 to be held thereby against lateral movement during deposit of bottle within the crate.

The bottle carrier, as in the description of the operation of the previous embodiment, moves downwardly toward the crate and the crosshead supporting the carrier actuates switches S-10 and S-11 to release the bottles held by the carrier. Once again switches S-10 and S-11 are so disposed as to release the bottles and return the carrier when the bottles have approached to a position slightly above the bottle supporting bottom wall of the crate.

As the carrier returns to the indexing position it trips switch S-13 which serves to initiate lowering of the crate supporting platform thereby returning a crate supported thereon to the conveyor 362. The crate is then carried out of the machine on the conveyor 362. If one of the cells of the crate supported on the crate supporting platform is deformed in a manner such that a bottle will not be properly received thereby, or if a bottle is already disposed within a cell of a crate so supported, as the carrier approaches the crate the bottles suspended from the carrier will engage the deformed cell or bottle disposed within the crate. The force of the downward movement of the carrier will be transmitted through the bottles suspended thereby to the crate on the platform and will tend to force the platform downwardly. Downward movement of the platform will trip switch S-16 which will promptly initiate return of the carrier to the bottle receiving position, without releasing the bottles. Such construction of the crate supporting or positioning mechanism therefore serves as a safety feature which will

not permit bottles to be deposited in defective crates or in crates already supporting bottles.

It is also apparent that the safety features of the crate supporting mechanism will prevent breakage of bottles lowered by the carrier toward a crate positioned on the supporting mechanism. Upon return of the carrier to the bottle indexing position after the bottles supported by the carrier have been rejected by the safety features of the crate supporting mechanism, the switch S-13 is tripped thereby initiating downward movement of the platform 368 to lower the crate supported thereon to the conveyor 362 upon which it is carried out of the machine.

Following the discharge of this crate from the machine a succeeding crate takes its place over the crate supporting mechanism and is thereupon raised to the bottle receiving position. The carrier once again returns the bottles for deposit within the crate. Therefore it is obvious that whenever a defective crate or crate not capable of receiving the entire number of bottles from the carrier that should be deposited within the crate, is received in the crate positioning station, the machine will reject such crate by permitting it to pass therethrough without receiving any bottles. Such crate may then be removed from the succession of filled crates which leave the machine.

Reference has also been made to the possibility of unloading bottles from bottle crates. With the foregoing description in mind, it is apparent that with the rearrangement of certain of the control switches the empty bottle carrier may be permitted to descend to a point over a filled crate such that upon closure of the gripping bars the bottles in the crate can be grippingly retained by the carrier and returned to the bottle indexing position.

It has also been suggested that the sizes of the arcuate recesses in each gripping bar could be varied to accommodate different sizes of bottles. It should be pointed out also that the control switches and sizes of the bottle conveyor as well as the crate conveyor could also be varied so that a machine embodying the general structure of the machine specifically described above could be constructed without departing from the spirit of the invention. Such modified form of the machine could be adapted to fill cardboard crates and handle bottles of smaller sizes both as to height of bottles and shape of the neck.

Multiple indexing station machine

Fig. 29 et seq. show a machine utilizing much of the mechanism heretofore described but with certain modifications, combinations, and additions thereto resulting in a machine having a plurality of bottle indexing stations arranged along a bottle conveyor with each station operable to group a caseload of bottles for transfer to an awaiting crate. The primary advantage of this machine over the machine heretofore described is that it enables the packaging of different sized bottles with one machine without any rebuilding, physical substitution of parts, or the like in the machine. In just a few moments the machine may be converted from one adapted to handle, for example, one-quart bottles, to a machine capable of handling half-gallon bottles. This universality of the machine ideally suits it for use in bottle-packaging operations where the size of bottles being packaged is changed from time to time.

The machine includes a frame 600, shown in Fig. 29, adapted to rest on the floor, and except for length is generally similar to the frame 30 heretofore mentioned. An electric motor 602, supported by bracket 604 secured to the frame, continuously drives a tri-form conveyor 606 by means of a drive 608. The conveyor 606 may comprise three metal link belts as described in connection with the tri-form conveyor 44 heretofore mentioned. The conveyor includes a bottle-supporting span 606' which is flush with the upper edge of the frame 600. The upper span extends between rollers 610 and 612 journaled at opposite ends of the frame. The conveyor is provided

with side guide walls, one of which is shown at 614, which extend along opposite sides of the conveyor to keep the bottles thereon.

At the right-hand end of the machine is a bottle infeed conveyor 616 generally similar to conveyor 52 shown in Fig. 1, but instead of a single line conveyor, such as conveyor 52, it is shown as a double line conveyor to handle the high capacity of the machine.

Marshaling means are provided at the right-hand end of the machine for marshaling bottles entering on the infeed conveyor into rows which move on conveyor 606 toward the bottle indexing stations. Such means includes a pusher 618 generally similar to the pusher or ram mechanism shown in Fig. 1. The pusher transfers bottles laterally from the infeed conveyor to the bottle supporting span 606' of bottle conveyor 606. Suitable switches, such as S-1 and S-2, shown in Fig. 1, may be provided in the machine of Fig. 29 for the same purpose.

The marshaling means also includes a bottle row regulating device 617 shown particularly in Figs. 29 and 30. Such device is disposed at the inside corner between the conveyors 606 and 616 and serves to increase or decrease the effective width of the conveyors at their point of intersection. The device comprises a generally L-shaped adjustable side wall 619 consisting of members 620 and 621 tied together by vertical spacers 638 and 639. Such side wall is common to both conveyors and is shiftable between the solid and dotted outline positions shown in Fig. 30. The side wall is supported by screws or the like 622 which extend through slots 626 and 628 formed in a plate 630 mounted on the machine frame by brackets 634, with thumb nuts 632 threaded on the screws and overlying the opposite side of plate 630 from the wall 619. Opposed surfaces of wall 619 and plate 630 are provided with fixed cams 636 and 638 which cooperate with one another to cam wall 619 inwardly as it is shifted toward conveyor 616 so that it assumes the dotted outline position 619'.

In the dotted outline position at 619, the conveyors 616 and 606 are adapted for handling, for example, one-quart bottles, while at the solid outline position 619, the conveyors are adapted to handle one-half gallon bottles. A double row of one-quart bottles being fed to the machine by the infeed conveyor 616 has a width slightly less than that of a double row of half-gallon bottles and adjustment of the device 617 accommodates for this varying width. Conveyor 616 does not, per se, form a part of this machine. However, the same is shown in the drawings because of its cooperation with the machine in supplying bottles thereto.

When a double row of bottles from conveyor 616 have moved in front of the pusher mechanism 618 to a trip a switch such as S-1 in Fig. 1, the pusher 618 is actuated to move the double row onto conveyor 606. Conveyor 606 carries the bottle toward the indexing stations at which they are grouped and transferred to an awaiting crate. The machine is adapted to group caseloads of bottles at each indexing station for transfer to awaiting crates. In the machine shown in Fig. 29, two indexing stations are provided as indicated. The first station is adapted to handle, for example, half-gallon bottles while the second station, one-quart bottles. Six half-gallon bottles comprise a caseload while twelve quart bottles comprise a caseload.

Operatively associated with each indexing station is a crate positioning station, such as the crate positioning station shown in Figs. 20 and 21. The two crate positioning stations are arranged in tandem relation along a crate conveyor 640 similar to crate conveyor 362 heretofore described. The crate conveyor is continuously operative, and either one or the other of the crate positioning stations is operated depending upon which of the indexing stations is in use. If half-gallon bottles are to be crated, the first indexing station is used for this purpose and the second station is inoperative. When the second indexing station is operative to crate one-quart bottles, the crate

positioning station associated therewith is made operative while the crate positioning station associated with the first indexing station is made inoperative. Suitable electric circuits such as those heretofore described in connection with the bottle indexing stations and crate positioning stations may be provided with on and off switches which de-energize those circuits not intended to be operated.

Construction and operation of first bottle indexing station

The first bottle indexing station is for the most part similar to the bottle indexing station heretofore described with certain modifications. One of the primary differences is that the first station shown in Fig. 29 removes the bottles after they are grouped in a caseload from a live bottle conveyor, rather than from a bottle supporting platform 140 as shown in Fig. 7. Because the bottles are being removed from a live conveyor, this necessitates certain changes in the structure associated with the control of the bottles on the conveyor and changes in the bottle carrier head. The bottle fence shown at 168 in Fig. 3 and described in detail in connection with Figs. 7 and 10 is replaced by a pair of bottle fences, one at each side of the double row of bottles entering the first station, with such pair adapted to interrupt the continued entry, or attempted entry, of bottles on conveyor 606 into the indexing station once a caseload of bottles has been conveyed thereto. This modified form of bottle fence includes means which are extensible and retractable across the conveyor to release or stop bottles moving thereon and hold the same against continued movement while the bottle conveyor 606 continues to operate, sliding beneath the bottles.

This bottle fence is shown particularly in Figs. 34-37. It includes a pair of self-contained units 644 and 648 at each side of the entrance to the first bottle indexing station. Each unit is of similar but reverse construction so that the description of one will suffice for both. Considering unit 644, the same includes a base plate 645 secured to frame member 646 of the machine frame by screws 647. A fluid pressure cylinder 650, secured to the base plate, has a piston rod 652 connected by an apertured block 654 to a pin 656 as shown in Fig. 34. The pin is supported for vertically guided movement within slots 658 formed in opposed plates 659 and 660 secured to the base plate 645. One end of pin 656 is received within a diagonal slot 662 formed in a fence plate 664 overlying the outside of plate 659, as shown particularly in Figs. 35-37.

Plate 659 is provided adjacent its upper and lower edges with a pair of horizontally extending T-slots 670 and 672, and bolts 676 received through the slots are provided with heads machined to fit slidably the step in the T-slots. The bolts are threaded into fence plate 664 to support the same for horizontal movement transversely of conveyor 606. Considering Fig. 37, it will be apparent that upon vertical shifting of pin 656 in the slots 658, the plate 664 will be horizontally shifted in a direction transversely of conveyor 606. That surface of plate 664 which comes into contact with bottles on conveyor 606 is provided with a nylon or the like insert 678 which will prevent scratching of the bottles. The fence plate is cut away as at 679 for a purpose hereinafter mentioned.

Cooperating with the fence units in controlling bottle entry to the first indexing station is a row divider 680 shown in Figs. 29 and 36. The row divider includes a long slender partition 682 extending longitudinally of conveyor 606 and dividing the same into equal halves at the upstream side of the first indexing station such that bottles will enter the first indexing station in two slightly separated, generally parallel rows. This row divider is swingable upon a pivot 684 to an inoperative position shown in phantom at 682' in Fig. 29 when one-quart bottles are to be delivered to the second indexing station. The hanger for member 682 comprises a generally tri-

angular arrangement of members 686 and 688 suitably secured together and to the member 682. The upper end of member 686, Fig. 36, is secured as by welding to a sleeve 690 carried by pivot rod 692 in turn supported at opposite ends by a bracket 694 fastened in any convenient fashion to the frame member 696 of the machine frame. Sleeve 690 may be rotated upon the pivot rod 692. The row divider is locked in the inoperative phantom position of Fig. 29 by a pin removably received through hole 691 in member 686 and a recess in block 693 secured to the machine frame.

The downstream end of partition 682 may be provided, see Fig. 36, with nylon or the like pads 698 and 700 to prevent scratching of the bottles. The downstream end of member 682 cooperates with the fence plates 664 of the fence units in preventing entry of bottles on conveyor 606 into the indexing station. As the plates 664 are extended to the position shown in Fig. 36, they engage the outside leading corners of bottles B-1 and B-2 and at the same time urge the bottles slightly inwardly toward the partition 682. The cooperation between the fence plates 664 and the downstream end of partition 682 wedge the bottles against continued travel into the indexing station.

At the downstream side of the first indexing station is a bottle stop means adapted to prevent bottles from passing completely through the first indexing station. Such means also cooperates with the bottle fence in grouping a caseload of bottles in the first indexing station for transfer to an awaiting crate. The bottle stop means includes stop members which are positioned across the bottle conveyor 606 when the first station is operative to encase bottles and are shiftable out of the path of bottles on the conveyor to allow bottles to pass completely through the first indexing station to the second station when the latter is to encase bottles. The stop means is generally indicated at 702 in Fig. 29. It includes electric switch means which are responsive to the presence of a caseload of bottles in the indexing station to energize the bottle fence to interrupt further movement of bottles into the station and also cause the bottle carrier to grip the caseload of bottles for transfer to an awaiting crate in the crate positioning station associated with the first indexing station.

Such stop means comprise a pair of self-contained units, one mounted at each side of the indexing station at the downstream end thereof. Because the units are similar but of reverse construction, a description of one will suffice for both. As shown in Fig. 31 each unit of the stop means includes a fluid pressure cylinder 704 mounted in any convenient fashion on the frame of the indexing station. It is secured to the downstream side of vertical frame member 706. The cylinder includes a piston 708 which, at the bottom, carries a block 710 provided with a square aperture 712 extending therethrough. Pivotally supported by shaft 714 received through a block 716 secured to the frame 600 of the machine in any convenient fashion is a generally triangularly shaped plate 718. The plate is spring-tensioned in a clockwise direction by spring 720 received over a lug 722 fastened to frame 706 of the machine and connected to a lug 724 on the plate 718. The plate 718 carries a pin 726 projecting through aperture 712 in the block 710. The pin is substantially smaller than the aperture to allow limited swingable movement of the plate without movement of block 710. Plate 718 assumes three different positions, during operation of the stop means, represented by the solid and phantom outline positions 726, 726', and 726'' of the pin.

Plate 718 is provided with a slot within which is pivotally mounted a stop member 728. The stop member is supported on a pin 730 received through the plate. The pivot shaft 714 is connected to plate 718 to swing therewith and at its inner end carries an upstanding arm 732 which is notched as at 734 to receive and support the stop member 728 in a position extending across the conveyor. The upstream face of the stop member is provided with a nylon pad or the like 735 to prevent scratching of the

bottles. It is apparent that upon swinging the stop members 728 upward and outward, to position 728', as viewed in Fig. 31, they may be removed from the path of travel of bottles on conveyor 606 to permit the bottles to pass completely through the first indexing station and to the second indexing station.

An electric switch is associated with one of the stop units, the switch being shown in Figs. 29 and 32 at 7-A. Switch 7-A, mounted on frame member 706, is provided with a depending swingable arm 738 carrying a roller 740 adapted to abut a portion 742 of the plate 718. Switch 7-A serves to control the gripping of the bottles in the indexing station and the actuation of the fence to prevent further entry of bottles into the station, all as described more particularly hereinafter.

The circuit diagram of Fig. 42 shows the electrical connection of switch 7-A in the circuit of the machine. The circuit is basically the same as the circuit of Fig. 28. It will be noted in comparing Figs. 28 and 42 that two new circuits have been added and switches S-5, S-6, and S-7 have been combined in one switch 7-A. The main switch 488 of Fig. 28 is shown at 488' in Fig. 42 as a double-pole switch connecting the source of power either to conductors 746 and 748 to supply current to the control circuit of the first indexing station, or to conductors 750 and 752 which supply power to the control circuit for the second indexing station shown in Fig. 42-A and its associated crate-positioning station. Just above the switch 488', as shown in Fig. 42, are switches S-1 and S-2 whose function is the same as correspondingly identified switches in Fig. 18 (sheet 12). Above switches S-1 and S-2 in Fig. 42 is a main power control switch 754.

Switch S-17 is shown in Fig. 29 mounted on the frame of the machine adjacent the bottle carrier head when the same is positioned in the indexing station to grip bottles for transfer from the station. Switch S-17' for the second indexing station is also shown in Fig. 29 as well as in Figs. 41 and 42-A. Both switches have the same function and are similarly mounted. Each switch is provided with an arm 756 adapted to be urged in a direction closing the switch when the bottle carrier is in a bottle receiving position at the indexing station. Solenoid valve V-6, shown in Figs. 42 and 43, is so constructed that upon energization it will serve to cause the fence units to retract the fence plates 664 and permit bottles to enter the first indexing station, while upon de-energization will serve to cause the fence units to extend the plates and deny entry of bottles to the indexing station. Switch S-17 is a safety switch ensuring that no bottles enter the indexing station unless the carrier is present to receive them. Slave switch 526b, under the control of relay 526, see Figs. 42 and 43, serves to break the circuit of solenoid valve V-6 when a caseload of bottles is in the indexing station and at the time the bottles are gripped by the carrier.

Figs. 43 and 43-A are schematic fluid pressure diagrams for the machine using the case positioning stations shown in Figs. 20-22 for each of the bottle indexing stations. The same reference numerals have been used to designate solenoid valves and fluid pressure cylinders as were used in Fig. 19 to facilitate understanding the diagrams. It will be noted that solenoid valve 500 and cylinder 324 shown in Fig. 19 have been omitted from Fig. 43 because of the use of the case positioning stations of Figs. 20-22, and that a new solenoid valve V-6 and associated fence cylinders 650 have been added. Also stop unit cylinders 704 are shown under the control of fluid valve 522. The solenoid valves for the second indexing station indicated at 530', V-6', 522', 550', and 538', are shown in Fig. 43-A.

As shown in Figs. 29 and 36, a switch 4-A is mounted on the machine frame adjacent the conveyor 606 and

is provided with an arm 760 tensioned to extend across the path of bottles traveling on conveyor 606 adjacent the switch. Switch 4-A is what might be termed a backlog switch. It is shown in Fig. 42 connected in series with a time relay unit, the solenoid valve V-6, switch S-17, and slave relay switch 526b. Upon closure of switch 4-A by a bottle against arm 760, the time delay unit TD is energized and begins to measure a predetermined time interval as long as the bottle rams against arm 760. If switch 4-A is held closed by a bottle sufficiently long, the time delay unit will measure the predetermined time interval and upon the expiration of this interval, will permit current to pass to solenoid valve V-6 in the event that switches S-17 and 526b are closed. Switch 4-A serves to ensure that there is a full caseload of bottles waiting to enter the indexing station. It is disposed spaced from the fence units 644 upstream thereof a distance such that arm 760 will bear against that bottle on conveyor 606 just upstream of a full caseload of bottles waiting to enter the station. The bottles will be initially prevented from entry to the station by the fence units.

Associated with the first bottle indexing station is a carrier head 744 more fully described in another application. For purposes of the present description, such head is of a construction similar to the carrier head heretofore described. However, instead of being provided with three pairs of jaws as was the carrier previously described, the carrier for the first indexing station is provided with two pairs of jaws, one pair for each row of bottles in the indexing station. As the bottles enter the indexing station they pass between the jaws of each pair and as the bottle fence is actuated to prevent the further entry of bottles into the station, the jaws are actuated to grip the necks of the bottles. At the time the jaws grip the bottles, they lift the bottles slightly raising them from the bottle conveyor 606. The construction of the jaws, in order to effect the lifting of the bottles, is hereinafter described in connection with the second bottle-indexing station and as shown in Figs. 39-41.

It is to be understood that the crate-positioning station associated with the first bottle-indexing station functions to position successive crates in a bottle-receiving position as did the crate-positioning stations heretofore described, and that the control circuits operating the crate-positioning station and controlling movement of the carrier head are the same as those heretofore described.

Referring to Figs. 32, 42, and 43, and assuming that no bottles are in the indexing station, but that a caseload of bottles is awaiting entry to the station, plate 718 of each bottle stop unit is swung clockwise to the phantom position 726' of pin 726, and nylon pad 735 is at the phantom outline position of 735'. With the parts in such position, switch 7-A is open as shown in Fig. 42. With the bottle carrier in a bottle-receiving position in the station, switch S-17 is closed. With a caseload of bottles awaiting entry to the station, switch 4-A is closed. Time delay unit TD measures its predetermined time interval causing energization of solenoid valve V-6 and the fence units open to allow the caseload of bottles to enter the indexing station. As the leading bottle opposite the stop member 728 of stop unit 702 engages the nylon pad 735, it pushes the stop member in a direction pivoting plate 718 and causing switch 7-A to close. A similar action occurs with respect to the bottle-engaging stop member 728 of the stop unit 704 but because no electric switch is associated with this latter unit, the bottle does not serve to initiate operation of any of the cycles in the operation of the machine. Upon closure of switch 7-A, solenoid valve 522, shown in Figs. 42 and 43, is energized to pressurize the cylinder 226 which closes the gripping bars about the necks of the bottles, and at the same time pressurizes cylinders 704 of the stop units causing pistons 708 to pivot plates 718 away from the caseload of bottles

swinging the nylon pads 735 away from contact with the bottles.

It will also be noted that closure of switch 7-A energizes relay 526, see Fig. 42, which effects opening of normally closed slave switch 526b deenergizing solenoid valve V-6 and causing the bottle fence units to close the fence plates against further entry of bottles into the indexing station. Spring 720 of stop unit 702, see Fig. 32, is so designed that it will not permit swinging of plate 718 sufficiently to close switch 7-A until three bottles have entered the indexing station in line with stop member 728 of unit 702. Because the caseload of bottles awaiting entry to the first indexing station moves as a group into the station when the fence plates are retracted, the pressure of the three bottles of the actuating switch 7-A is a sufficient guarantee that the entire caseload has entered the station. Once the caseload of bottles has been gripped by the carrier, the further operation of the machine to transfer the bottles to an awaiting crate is the same as that heretofore described under the heading of General Operation.

Second indexing station

The second bottle indexing station is shown in Fig. 29, located at the downstream side of the first station and, in the embodiment shown, is adapted to handle one-quart bottles. When this station is to be operated, the row divider 680 is swung upwardly to the phantom outline position shown in Fig. 29, and the bottle stop members 728 shown in Fig. 31, are swung upwardly out of the way to the phantom outline position shown, for example, at 728'. Bottles can then pass completely through the first station to the second station. Of course the second station must be prepared for operation and this would include throwing the switch 488' shown in Fig. 42 to connect conductors 750 and 752 to the control circuit for the second station.

The second station includes a fence 770 shown in Figs. 29 and 38. The fence comprises a horizontal bar 772 secured at opposite ends to sleeves which are in turn slidably mounted on rods 774 secured at opposite ends to the frame 796 of the second indexing station. Depending from the bar are two fence rods 776 rounded at their lower ends. A fluid pressure cylinder 778 is mounted on the indexing station frame with its piston connected to the bar as shown. The cylinder is operatively connected to solenoid valve V-6' shown in Fig. 43. Upon alternate pressurization of opposite ends of the cylinder by valve V-6', the fence is raised or lowered. In phantom outline the position of the lower ends of the rods 776 when in the raised position is indicated at 776'.

A row separator is associated with the second indexing station. The separator is shown in Figs. 44-48. In Fig. 44 the separator is shown in its operative position extending upstream and almost completely through the first indexing station. It serves to guide the bottles through the first station in parallel rows to the second station. The divider comprises a pair of U-shaped brackets 780 and 782, to the legs 784 of which are connected side rails 786 having longitudinally extending T-slots 788. Secured to bracket 782 between legs 784 are two T-shaped dividers 790. They are disposed to permit a row of bottles to pass between them in one row at either side, as shown in Fig. 45. A hook-shaped part 792 is secured to the upstream end of the rails 786, to be engaged over the side rails 614 of conveyor 606 as shown in Fig. 48. To hold the divider in either the extended or retracted position, a bolt 794 is extended through the slot 788 of each rail 786 and through frame 796 at opposite sides of conveyor 606, with a thumb nut threaded on each bolt, as shown, for example, in Fig. 46.

In the inoperative or retracted position, the divider is shown in phantom outline position at 789' and 782' of Fig. 44. It is manually shifted to the solid outline position preparatory to use of the second indexing station. As shown in Fig. 38, the side rails 786 hold the

bottles against lateral movement when the fence 770 is in its lower position thereby preventing bottles from passing around the rod 776 and into the second indexing station.

As shown in Figs. 29 and 42-A, the second indexing station has a backlog switch 4-A' operatively associated therewith. This switch operates in the same fashion and for the same purpose as backlog switch 4-A heretofore described. Switch 4-A' is located upstream from fence 770, a distance in excess of that required to accumulate a caseload of bottles on the upstream side of the fence. Switch 4-A' is connected in series with a time delay relay TD'. If switch 4-A' is held closed sufficiently long so that time delay relay TD' measures a predetermined time interval, the relay will close slave switch TDX and energize solenoid valve V-6' to cause the fence 770 to rise and admit bottles to the second indexing station. This, of course, presupposes that safety switch S-17' is closed by the presence of the bottle carrier in the second indexing station, and that slave switch 526'b is closed. As the bottles enter the second station and move therein between the bottle gripping bars of the carrier, the leading bottles eventually contact arm 798 of switch 7-A'. As the leading bottles contact this arm, they serve to close switch 7-A'.

Switch 7-A' is mounted on bottle stop means 800 shown in Figs. 29 and 49. Such bottle stop means include an abutment or barrier which is shiftable in the direction of conveyor movement from a position spaced downstream of the fence by a distance just sufficient to allow a caseload of bottles to be disposed therebetween, to another position at a greater distance from the fence. Upon consideration of Fig. 29, it will be noted that the solid outline position of the stop unit is spaced from fence 770 a distance such that more than one caseload of bottles might be disposed between the stop and the fence. Because the conveyor 606 is constantly operative, it is necessary that the fence be lowered after but one caseload of bottles has entered the second station, and because such bottles would not be in proper position to be gripped by the carrier, it is necessary that the grouped caseload be allowed to move along through the second station to the proper bottle gripping position.

At 800' in Fig. 29 the phantom outline position of the stop means is shown, such position being spaced from the bottle fence 770 by a distance just sufficient to allow one caseload of bottles to lie between the stop and the fence. In solid outline the stop means is shown in the position which it assumes when the bottles are positioned to be gripped by the carrier. Such stop means includes, as shown in Figs. 29 and 49, a plate 802 which is secured to the frame 600 of the machine in any suitable fashion. The plate is disposed just above the upper span 606' of the bottle conveyor to allow the conveyor to pass around the drive roller at the left-hand end of the machine. Two pairs of aligned bearings 804 and 806 are secured to the plate with slidable rods 808 and 810 extending therethrough and carrying a generally L-shaped member 812. Secured to the upstream face of member 812 is a nylon abutment pad 814. Mounted on the upper face of member 812 is the switch 7-A'. Secured to the plate 802 is a fluid pressure cylinder 816, the piston of which is connected to member 812. It is apparent that upon extension of the piston of cylinder 816 the nylon abutment pad will be shifted upstream of the conveyor and vice versa.

Cylinder 816 is under the control of solenoid valve V-6' shown in Fig. 43-A. Bottle fence 770 is also under the control of solenoid valve V-6'. It will be noted that pressurization of cylinder 816 to extend the bottle stop upstream of the conveyor also serves to cause a raising of the bottle fence to permit the entry of bottles to the second station, and vice versa.

Mounted on an upright frame member 818 of the second indexing station is electric switch 8-A as shown

in Fig. 49. This switch is in series with solenoid valve 522' which controls the pressurization of cylinder 226' of the carrier head for the second indexing station. Unless switch 8-A is closed, as shown in Fig. 42-A, solenoid valve 522' will not be energized to cause cylinder 226' to actuate the gripping bars to grip bottles in the station.

Assuming that the fence 770 is raised and a caseload of bottles is moving into the station and that the stop means 800 is extended to the phantom outline position 800' shown in Fig. 29, as the lead bottles engage arm 798 of switch 7-A', the switch will be closed, thereby energizing relay 526' and causing the fence cylinder to be pressurized, lowering the fence and preventing further entry of bottles to the second indexing station. As the bottle fence is lowered to prevent further entry of bottles, stop unit cylinder 816 is pressurized to move the stop unit downstream to the solid outline position of Fig. 29. When the stop means reaches the solid outline position, it is in abutment with the actuating arm of switch 8-A and the switch is thereby closed. If for any reason the bottles have not closely followed the stop means during its movement to the solid outline position, and therefore switch 7-A' is momentarily open though the stop means has closed switch 8-A, solenoid valve 522' will not be energized because it is necessary for switch 7-A' to be closed. With both switches 7-A' and 8-A closed, solenoid valve 522' will be energized to cause the gripper cylinder 226' to be pressurized, effecting gripping of bottles by the carrier in the second indexing station. This will also energize relay 820, closing slave switch 820a so that the bottles will remain gripped by the carrier though switch 7-A' later opens by virtue of the bottles being transferred out of the second indexing station.

The bottle carrier for the second indexing station, shown in Figs. 39-41, is substantially the same as that shown in Fig. 9 of copending application Serial No. 417,448 filed March 19, 1954, except that the bottle gripping bars are adapted to lift the bottles slightly at the time they are gripped. Each of the bars is provided with a nylon or the like insert 824. These inserts are provided with bottle lip engaging portions of an arcuate shape and having a tapering surface acting somewhat as a cam in that, as cooperating arcuate recesses of cooperating bars engage the bottle lip, the camming surface will lift the bottle slightly as it is gripped, raising it off the conveyor 606. Such camming surfaces are indicated at 826. It will be noted that the inserts terminate at 828 just below the camming surface 826 so that there is no interference with the neck of the bottle. Because the conveyor 606 is constantly operative while the bottles are being gripped by the carrier and transferred to an awaiting crate for deposit therein, in order to prevent the bottles from being dragged across the conveyor at the time they are removed from the indexing station, and in order to prevent undue strain on them at the time of their removal, it is necessary to raise them slightly.

It is to be understood that the case positioning mechanism for the second bottle indexing station will operate in the fashion of the indexing station disclosed in Figs. 20-22 to position and hold the case for the reception of bottles by deposit of the carrier.

Summary

It is now apparent that I have disclosed apparatus for encasing bottles and that in the first described form, the bottles are removed from a collection table disposed at the downstream end of a conveyor, the table being lowered away from the bottles after they were gripped by a carrier for transfer to an awaiting crate. Two forms of case positioning mechanism have been disclosed, one in which the cases remain on the conveyor at the time they are filled, and another in which the cases are raised from the conveyor and the conveyor is constantly operative. This is the preferred form of the case positioning mechanism. In addition, I have shown apparatus which is capa-

ble of removing a caseload of bottles from a constantly operative bottle conveyor and depositing them in cases raised above a constantly operative case conveyor, such latter apparatus being shown in connection with a machine for handling different size bottles at different times without any physical replacement of parts.

What is claimed is:

1. A bottle handling machine comprising, in combination, a bottle conveyor, a crate conveyor, a bottle carrier supported to reciprocate between the conveyors in timed relation with the movements of bottles and crates on the conveyors, said carrier provided with a pair of spaced bottle gripping members shiftable to engage opposite sides of a bottle on the conveyor, power means mounted on the carrier and including mechanism superposing the gripping members adapted upon actuation by the power means to reciprocate the members to grip or release a bottle disposed between the members, electric control mechanism coupled with said means and including one part responsive to movement of bottles on the bottle conveyor to cause said means to actuate the members to grip bottles on the conveyor and including another part connected in series with the first part and responsive to the movement of the carrier as it shifts toward a crate to cause said means to actuate the members to release the bottles gripped therebetween.

2. A bottle handling machine comprising, in combination, bottle conveying mechanism, crate conveying mechanism, a bottle carrier reciprocally supported for lateral shiftable bottle transfer movement above the bottle conveying mechanism and for movement between said conveying mechanisms, one end portion of said bottle conveying mechanism adapted to serve as a bottle positioning station, said end portion supported for shiftable movement toward and away from the bottle carrier and perpendicular to the plane of the remaining portion of the bottle conveying mechanism, and means coupling the carrier and said end portion of the bottle conveying mechanism together and responsive to lateral movement of the carrier away from the bottle conveying mechanism to shift the end portion away from the carrier and responsive to movement of the carrier toward the bottle conveying mechanism to shift the end portion toward the carrier.

3. In a bottle handling machine, bottle conveying mechanism, crate supporting mechanism, a bottle carrier mounted for reciprocation between a portion of said bottle conveying mechanism and said crate supporting mechanism, means mounting said portion of the bottle conveying mechanism for movement downwardly away from the bottle carrier, and control means coupling said portion of the bottle conveying mechanism with the bottle carrier for movement of said portion toward and away from the carrier in timed sequence with the movements of the carrier.

4. In a bottle handling machine, a bottle conveyor, a bottle supporting and positioning platform to receive and support bottles delivered from the conveyor, crate conveying mechanism including a crate conveyor, a bottle carrier supported for reciprocation between said platform and the crate conveyor, bottle gripping means provided on the carrier adapted to grip bottles supported on the bottle supporting platform, said bottle supporting and positioning platform mounted for reciprocation toward and away from the carrier and normal to the plane of reciprocation thereof, and means coupled with the bottle gripping means on the carrier and with the bottle supporting and positioning platform to cause the platform to move away from the carrier as the bottle gripping means grips the bottles on the platform.

5. In a bottle handling machine, a pair of spaced apart conveyors, a bottle carrier mounted for reciprocating bottle transfer movement between said conveyors, a bottle supporting platform disposed adjacent one end of one of the conveyors in bottle exchange relationship

therewith, said carrier provided with bottle engaging devices adapted to engage a plurality of bottles, means coupled with said platform and responsive to bottle transfer movement of the carrier to raise the platform toward the carrier as the carrier approaches the platform and to lower the platform away from the carrier as the bottle engaging devices of the carrier engage the bottles.

6. A bottle handling machine comprising, in combination, a bottle conveyor, a crate conveyor, a bottle supporting platform disposed adjacent one end of the bottle conveyor in bottle exchange relationship therewith, a crate supporting platform disposed in crate exchange relationship with the crate conveyor, a bottle carrier supported for horizontal reciprocation between said platforms, said bottle supporting platform supported for vertical reciprocation toward and away from the carrier, and control means responsive to the movements of the bottle carrier to move said bottle supporting platform toward and away from the carrier.

7. A bottle handling machine comprising, in combination, a crate supporting platform, a bottle supporting platform, a bottle carrier supported for shiftable movement between said platforms to shift bottles from the bottle platform to a crate upon the crate platform, each platform mounted for movement toward and away from the carrier, said crate platform yieldable to predetermined crate pressure thereupon to move away from the carrier, and means responsive to said yieldable movement of the crate platform under pressure of bottles upon a supported crate to interrupt the bottle shifting movement of the carrier.

8. In a bottle handling machine, a bottle conveyor, a bottle supporting and positioning mechanism adapted to receive bottles from the conveyor, a crate conveyor, crate supporting and positioning mechanism adapted to receive a crate from the crate conveyor, a bottle carrier supported for reciprocation and transfer of bottles between the bottle supporting and positioning mechanism and the crate supporting and positioning mechanism, said bottle supporting and positioning mechanism mounted for shiftable movement toward and away from the carrier to interrupt the movement of bottles from the bottle conveyor to the bottle supporting and positioning mechanism, said crate supporting and positioning mechanism mounted for shiftable movement toward and away from the carrier to interrupt bottle delivery by the carrier to a crate on the crate supporting and positioning mechanism.

9. A bottle handling machine as defined in claim numbered 8 characterized in that control means is provided responsive to bottle pressure against the crate supporting mechanism to prevent delivery of bottles to the crate from the carrier.

10. A bottle handling machine as defined in claim numbered 8 characterized in that control means is provided responsive to a determined movement of the crate supporting mechanism to prevent delivery of bottles from the carrier to a crate supported upon said mechanism.

11. In a bottle handling machine the combination comprising: a crate supporting table; a crate conveyor adapted to deliver a succession of crates to the table and urge the crates over the table; a reciprocable crate positioning ram movable over a portion of the length of the table to engage successively each crate moving on the table and draw it to a bottle receiving position on the table; a bottle carrier operable to deliver bottles to a crate in the bottle receiving position on the table; first control means responsive to movement of crates on the table to initiate movement of the ram to draw a crate into the bottle receiving position; and second control means responsive to movement of the carrier to initiate return movement of the ram to engage a successive crate preparatory to moving such crate into the bottle receiving position.

12. In a bottle handling machine the combination comprising: a crate supporting table; a crate conveyor adapted to deliver a succession of crates to the table; a reciprocable crate positioning ram operable over a portion of the length of the table to engage successively each crate on the conveyor and draw it to a bottle receiving position; control means responsive to movement of crates on the conveyor to initiate movement of the ram; and a crate fence coupled with the ram to withhold movement of crates off the conveyor when the ram has moved a crate into the bottle receiving position and release such withheld crates when the ram moves to a position to engage another crate preparatory to drawing it into the bottle receiving position.

13. In a bottle handling machine, a bottle conveyor, a crate conveyor, a crate platform disposed to receive crates from the crate conveyor, said crate platform supported for raising and lowering with respect to the crate conveyor, a bottle carrier supported for reciprocation between the bottle conveyor and said platform to transfer bottles from the bottle conveyor to a crate on the crate platform, said crate platform support including means yieldable to a predetermined pressure of bottles against the crate supported on the crate platform to lower the crate away from the carrier, and bottle carrier control means responsive to said lowering movement of the crate platform to interrupt delivery of bottles by the carrier.

14. A bottle handling machine as defined in claim numbered 13 characterized in that a crate fence is supported and coupled with the crate platform to be shifted into position to prevent delivery of a crate onto the crate platform from the crate conveyor when the crate platform is elevated, said fence so coupled with the crate platform as to be shifted out of position to permit delivery of a crate from the conveyor to the platform when the platform is lowered.

15. A bottle handling machine comprising, in combination, a crate supporting station, a bottle accumulating station, a conveyor adapted to urge a grouped caseload of aligned rows of bottles to the bottle accumulating station, bottle interrupting means responsive to the presence of bottles in the accumulating station to interrupt delivery of additional bottles to the accumulating station, mechanism for transferring the bottles in the accumulating station to a crate in the crate supporting station, and means coupled with said interrupting means responsive to the deposit of bottles in a crate by said mechanism to permit continued movement of said additional bottles into the accumulating station.

16. A bottle handling machine comprising, in combination, a crate supporting station, a bottle accumulating station, means operable between the stations to transfer bottles from the accumulating station to a crate in the crate supporting station, mechanism coupled with said means and responsive to the improper seating of a bottle in a crate by said means to cause said means to withdraw such improperly seated bottle from the crate.

17. The invention defined in claim numbered 16, characterized in that said mechanism is responsive to the improper seating of a bottle in a crate by said means to cause said means to withdraw the improperly seated bottle from the crate and return it to the accumulating station.

18. A bottle handling machine comprising, in combination, a crate supporting station, a bottle accumulating station, means operable between the stations to transfer simultaneously a plurality of bottles from the accumulating station to a crate in the crate supporting station, mechanism coupled with said means and responsive to the improper seating of a bottle in a crate by said means to cause said means to withdraw said plurality of bottles from the crate and return them to the accumulating station.

19. A bottle handling machine comprising, in combination, a crate supporting station including crate positioning mechanism for holding a crate in a bottle receiving position; conveyor means for feeding crates from said station; a bottle accumulating station; a carrier operable between the stations to transfer bottles from the accumulating station to a crate in the crate supporting station; mechanism coupled with the carrier and with said crate positioning mechanism responsive to the improper seating of a bottle in a crate by said carrier to cause the carrier to withdraw the bottles transferred to the crate and cause the crate positioning mechanism to release the crate and permit said conveyor to feed the crate from the crate supporting station.

20. A bottle handling machine comprising, in combination: a crate supporting station, a bottle conveyor, means operable between the bottle conveyor and the crate supporting station to transfer bottles from the conveyor to a crate in the station, and mechanism coupled with said means and responsive to the improper seating of a bottle in a crate by said means to cause said means to withdraw such improperly seated bottle from the crate.

21. A bottle handling machine comprising, in combination: a crate supporting station, a bottle conveyor, means movable between the bottle conveyor and the crate supporting station to transfer bottles from the conveyor to a crate in said station, and mechanism coupled with said means and responsive to improper seating of a bottle in a crate by said means to interrupt delivery movement of such improperly seated bottle.

22. The invention as defined in claim 21 characterized in that said means being operative to reverse its direction of movement and withdraw the improperly seated bottle from the crate.

23. A bottle handling machine comprising, in combination: a crate positioning station, a bottle accumulating station including a bottle supporting platform, a single line bottle conveyor disposed in bottle discharge relation with a constantly operative multi-line bottle conveyor disposed to urge a grouped plurality of rows of bottles directly into the accumulating station and onto the supporting platform, a carrier operable between the accumulating station and the crate positioning station for transferring bottles from the bottle accumulating station to a crate in the crate positioning station, and bottle interrupting mechanism operative in the path of discharge of bottles from the multi-line conveyor and responsive to the presence of a caseload of bottles in the accumulating station to restrain further movement of bottles into the accumulating station and onto the platform by the multi-line bottle conveyor and responsive upon transfer of bottles by the carrier into a crate to permit further movement of bottles into the accumulating station.

24. A bottle handling machine comprising, in combination: bottle conveying and supporting mechanism; a continuously operative crate conveyor; a bottle carrier supported to move between the bottle supporting mechanism and the crate conveyor to transfer bottles from the supporting mechanism to a crate on the crate conveyor; elevating means adjacent the crate conveyor and responsive to the presence of a crate thereabove to raise the crate off the crate conveyor and hold it stationary in a bottle receiving position thereabove while the crate conveyor continues to operate; and means coupling together the bottle conveying and supporting mechanism, carrier, and the elevating means for synchronized function.

25. A bottle handling machine comprising, in combination: a crate conveyor; a crate positioning station in the path of the crate conveyor and including crate interrupting and positioning means operable to hold and position a crate in the station; a bottle conveyor; a bottle indexing station in the path of the bottle conveyor, and including bottle interrupting means operable to interrupt the movement of bottles into the station; a bottle carrier movable between the stations to transfer bottles from the indexing station to a crate in the crate positioning station, said

carrier provided with coacting bottle gripping elements between which bottles move in entering the indexing station; control means coupled with the crate interrupting and positioning means, and with the bottle interrupting means, and with the bottle gripping elements, and responsive to the simultaneous presence of a crate in the crate positioning station, and a determined plurality of bottles in the indexing station, and the coaction of the gripping elements to grip the bottles in the station to move the carrier to the crate positioning station to deposit the bottles in a crate disposed therein.

26. A bottle handling machine comprising, in combination, a bottle conveyor, a crate conveyor, a bottle carrier supported for reciprocation between the conveyors, means for reciprocating the carrier, said carrier provided with a pair of oppositely disposed relatively shiftable coacting bottle gripping members disposed when the carrier is above the bottle conveyor at a height above the conveyor such that when the gripping members are open, the necks of bottles on the conveyor will pass between the members, a fluid pressure actuator supported upon the carrier and coupled with said members and operable to shift the same toward and away from each other, a source of fluid pressure coupled with said actuator, control means for controlling the admission of fluid pressure to said actuator and the operation of said means for reciprocating the carrier and responsive to movement of bottles on the bottle conveyor to cause said actuator to shift the bottle gripping members to grip bottles on the conveyor and to cause the carrier to move between said conveyors, and said control means including devices responsive to the movement of the carrier as it reaches a determined point with respect to a crate to cause said actuator to shift the bottle gripping members to release the bottles gripped therebetween.

27. A bottle handling machine adapted to receive bottles delivered by a bottle conveyor comprising, in combination: a crate conveyor, a bottle accumulating station, a continuously operative multiple line bottle conveyor to receive bottles delivered thereto by said bottle conveyor, said multiple line conveyor operative to deliver a grouped caseload of aligned rows of bottles to the bottle accumulating station, a carrier operable between the station and the crate conveyor for transferring bottles from the station to a crate on the crate conveyor, bottle interrupting mechanism movable in front of bottles being delivered by said multiple lines bottle conveyor and responsive to the presence of a determined plurality of bottles in the station to interrupt further delivery of bottles to the station by the multiple line conveyor while the multiple line conveyor continues to operate, and said interrupting mechanism responsive upon the transfer of bottles from the station into a crate to permit further delivery of bottles into the accumulating station by the multiple line conveyor.

28. A bottle handling machine comprising, in combination: a bottle conveyor, a pair of bottle indexing stations arranged along said conveyor, a bottle crate positioning station for each indexing station, means extending across the conveyor at each indexing station for grouping and isolating a plurality of bottles moving on the conveyor, mechanism for transferring said isolated grouped plurality of bottles to a crate in the crate positioning station, and said means at the upstream indexing station being shiftable out of the path of travel of bottles on the conveyor to permit bottles to pass through such station to the downstream station.

29. A bottle handling machine comprising, in combination: a bottle conveyor, at least two bottle indexing stations arranged along the conveyor, means at each station for grouping and isolating a determined plurality of bottles on the conveyor, said means at the upstream station selectively operable either to group and isolate a determined number of bottles or inoperable to group and isolate bottles permitting bottles to pass through

the station on said conveyor to the downstream station, a crate positioning station associated with each indexing station, and a bottle carrier associated with each indexing station and crate positioning station and responsive to the presence of an isolated grouped plurality of bottles in the indexing station to transfer the group to a crate in the crate positioning station.

30. A bottle handling machine comprising, in combination: a bottle conveyor, a plurality of bottle indexing stations arranged along the conveyor and through which the conveyor runs with each selectively operable to group and isolate a determined plurality of bottles on the conveyor, a crate positioning station associated with each indexing station, means for transferring a grouped and isolated plurality of bottles from each indexing station to a crate in the associated crate positioning station, and mechanism coupled with said means and responsive to the improper seating of a bottle in a crate by said means to withdraw such improperly seated bottle from the crate.

31. A bottle handling machine comprising, in combination: a bottle conveyor, a pair of bottle indexing stations arranged along the path of travel of the conveyor, a crate positioning station associated with each indexing station, carrier mechanism operable between each indexing station and the associated crate positioning station to transfer bottles from the conveyor to a crate, said conveyor passing directly through the upstream station to convey bottles to the downstream station when the upstream station is inoperative, means at each station for grouping bottles therein and isolating the group from succeeding bottles on the conveyor, and said means at the upstream station being shiftable to an inoperative position to permit bottles on the conveyor to pass through the station to the downstream station.

32. The invention as defined in claim 31 characterized in that said means at the upstream station includes a divider for marshaling bottles on the conveyor into a determined number of rows which move into the station.

33. A bottle handling machine comprising, in combination: a bottle conveyor, marshaling means at the upstream end of the conveyor for marshaling bottles delivered to the conveyor into rows, said marshaling means adjustable to vary the number of rows of bottles, a plurality of bottle indexing stations arranged along the conveyor and each selectively operable to group and isolate bottles of a determined number of rows as determined by said marshaling means, a crate positioning station associated with each indexing station, and carrier means for transferring the grouped and isolated rows of bottles in each indexing station to a crate in the associated crate positioning station.

34. A bottle handling machine comprising, in combination: a bottle indexing station, a bottle conveyor running directly through the station, means for removing bottles from the station, a bottle fence at the upstream side of the station, bottle stop means in the station shiftable between a first position spaced from the fence only sufficient to allow a determined number of bottles to be disposed between the stop means and the fence and another position allowing said determined number of bottles to completely enter the station, and means coupled with the fence and responsive to the presence of a determined plurality of bottles between the fence and the said first position of the stop means to shift the fence to a position preventing movement of bottles upstream of said determined plurality into the indexing station.

35. The invention as defined in claim 34 characterized in that said stop moves along the path of travel of the conveyor between an extended first position and a retracted second position.

36. The invention as defined in claim 34 characterized in that the means responsive to the presence of bottles between the stop means and the fence is mounted on said stop means for movement therewith.

37. In a bottle packaging machine: a continuously operating bottle conveyor having a bottle supporting span upon which bottles rest and over which bottles slide upon arrested movement of the bottles, a bottle indexing station over the conveyor, an abutment in the path of travel of bottles moving into the station on the conveyor and against which continued movement of the bottles is arrested, said abutment disposed adjacent the downstream side of the station, a bottle fence extensible across the path of travel of bottles on said conveyor and disposed at the upstream side of said station and operable to permit or prevent bottle entry to the station, and a bottle carrier movable laterally into and out of the station to remove the bottles therefrom and including means for gripping and lifting the bottles vertically off the conveyor.

38. A bottle handling machine comprising, in combination: a bottle conveyor, at least two bottle indexing stations arranged along the conveyor, means at each station for grouping and isolating a determined plurality of bottles, said means at the upstream station selectively operable either to group and isolate a determined number of bottles or inoperable to group and isolate bottles permitting bottles to pass through the station on said conveyor to the downstream station, a crate positioning station associated with the indexing stations, and a bottle carrier associated with each indexing station and the crate positioning station and responsive to the presence of an isolated grouped plurality of bottles in the indexing station to transfer the group to a crate in the crate positioning station.

39. A bottle handling machine comprising, in combination: a bottle conveyor, two bottle indexing stations arranged along the conveyor and through each of which the same passes, means for removing bottles from each station and depositing them in awaiting crates, a bottle fence at the upstream side of each station, bottle stop means in each station shiftable between a first position spaced from the fence only sufficient to allow a determined number of bottles to be disposed between the stop means and the fence and another position allowing said determined number of bottles to completely enter the station, said stop means at the upstream station shiftable to a position out of the path of the path of travel of bottles on the conveyor to allow bottles to pass through the station to the downstream station, means at each station coupled with the fence and responsive to the presence of a determined plurality of bottles between the fence and the said first position of the stop means to shift the fence to a position preventing movement of bottles upstream of said determined plurality into the indexing station.

40. A bottle handling machine comprising, in combination: bottle conveying and supporting mechanism; a continuously operative crate conveyor; a bottle carrier supported to move between the bottle supporting mechanism and the crate conveyor to transfer bottles from the supporting mechanism to a crate on the crate conveyor; elevating means adjacent the crate conveyor and responsive to the presence of a crate thereabove to raise the crate off the conveyor and hold it stationary in a bottle receiving position thereabove while the crate conveyor continues to operate; and control means coupling together the carrier and the elevating means for synchronized function.

41. The invention as defined in claim 40 characterized in that said control means includes a portion responsive to the improper positioning of a crate by said elevating means to prevent bottle deposit by the carrier in such crate.

42. A bottle handling machine comprising, in combination: a constantly operative crate conveyor, crate elevating means disposed adjacent the crate conveyor to raise a crate therefrom and yieldingly hold the same above the conveyor, a bottle conveyor, mechanism operable to transfer bottles from the bottle conveyor to a

crate raised above the crate conveyor by said elevating means, and control means coupled with said mechanism and responsive to a downward yielding of the crate elevating means by the improper seating of the bottles in the crate to interrupt delivery by said mechanism.

43. In a bottle handling machine having a bottle conveyor: a pair of bottle indexing stations arranged adjacent each other along the conveyor and at each of which a determined plurality of bottles arranged in rows may be removed from the conveyor, means at the upstream station for dividing bottles on the conveyor into a determined plurality of rows, such means being shiftable between effective and ineffective positions, a stop at the downstream side of the upstream station and selectively operable to allow bottles to leave or prevent bottles from leaving the station and passing on the conveyor to the downstream station, and a row divider for the downstream station shiftable from an ineffective position downstream from said stop to an effective position extending through the upstream station and operable to divide bottles on the conveyor entering the upstream station into a determined plurality of rows and guide such rows into the downstream station.

44. In a bottle handling machine: a bottle collecting area for supporting and collecting a caseload of bottles preparatory to transfer to an awaiting case, a plurality of walls at the sides of the area for grouping the bottles in a plurality of rows therein in substantially the same pattern they will assume in the case, a vertically movable fluid pressure operated bottle carrier at one end of said area, said carrier provided with a plurality of pairs of cooperating bottle gripping jaws disposed at such level above the collecting area that upper portions of bottles in the collecting area will slide therebetween when leaving the area, a conveyor for feeding a plurality of bottles into the area in a single row and disposed at the end of said collecting area opposite the carrier, mechanism for filling said area with a plurality of compacted rows of bottles independently of carrier operation and moving through said collecting area at right angles to said conveyor and toward the carrier end of the area and operative to urge bottles simultaneously as a group caseload out of the area and between the jaws of the carrier, said mechanism including a pusher at the other end of said area from the carrier movable at right angles to said conveyor for moving a single row of bottles at a time out of the path of said conveyor, and control means to cause said carrier to descend with said plurality of rows of bottles to deposit them simultaneously in a case beneath the carrier.

45. A bottle handling machine comprising, in combination: a bottle supporting table; means for delivering a plurality of bottles slidably on to the table; a continuously operative crate conveyor; a bottle carrier supported to move between a bottle receiving position above said table and a bottle depositing position above an awaiting crate on the crate conveyor; said carrier provided with means for gripping bottles resting on said table; said table supported for movement beneath bottles thereupon between a bottle supporting position and a position retracted away from a bottle supporting position; means operatively coupled with said carrier and said table for synchronizing movement of the table with the gripping of bottles resting thereupon by the carrier; a crate elevator adjacent the crate conveyor responsive to the presence of a crate thereabove to raise the crate off the conveyor and hold it stationary while the crate conveyor continues to operate; and control means coupling together the carrier and elevator for synchronized functioning.

46. The invention as defined in claim 40 characterized in that said control means includes a part responsive to the improper positioning of a crate by said elevating means to withhold the deposit of bottles by said carrier.

47. The invention as defined in claim 40 characterized in that said control means includes a part responsive to

the deposit of bottles in a crate by said carrier to cause the carrier to lower the crate back down to the crate conveyor for discharge from the machine.

48. A bottle handling machine comprising, in combination: bottle conveying and supporting mechanism; a continuously operative crate conveyor; a bottle carrier supported to move between the bottle supporting mechanism and the crate conveyor to transfer bottles from the supporting mechanism to a crate on the crate conveyor; a crate elevator adjacent the crate conveyor and responsive to the presence of a crate thereabove to raise the crate off the crate conveyor and hold it stationary in a bottle receiving position while the crate conveyor continues to operate; and mechanism coupled with said carrier and elevator and responsive to the improper seating of a bottle in the crate by said carrier to cause the carrier to withdraw such improperly seated bottle from the crate and cause the elevator to lower the crate back to the crate conveyor for discharge from the machine.

49. A bottle handling machine comprising, in combination: a crate supporting station; a bottle indexing station; a conveyor for successively marshalling caseloads of aligned rows of bottles at one side of the indexing station and urging each caseload as a group into the station; mechanism responsive to the deposit of a caseload of bottles in the station by said conveyor to withhold the deposit of additional bottles by said conveyor; a bottle carrier for gripping a caseload of bottles in the indexing station at their upper ends for suspended transfer to a crate in the crate supporting station; and said mechanism responsive to the return of the carrier to the bottle receiving position to cause the conveyor to urge another caseload of bottles into the indexing station.

50. In a bottle handling machine: a bottle collecting area for supporting and collecting a caseload of bottles preparatory to transfer to an awaiting case, a plurality of walls at the sides of the area for grouping the bottles in a plurality of rows therein in substantially the same pattern they will assume in the case, a vertically movable fluid pressure operated bottle carrier at one end of said area, a bottle supporting table at said one end of the collecting area in bottle receiving relation with said area and upon which bottles may rest preparatory to gripping by the carrier, said carrier provided with a plurality of pairs of cooperating bottle gripping elements disposed at such level above the table that upper portions of bottles will extend therebetween for gripping by said elements when bottles rest on the table, a conveyor for feeding a plurality of bottles into the area in a single row and disposed at the end of said collecting area opposite the carrier, mechanism for filling said area with a plurality of compacted rows of bottles independently of carrier operation and moving through said collecting area at right angles to said conveyor and toward the carrier end of the area and operative to urge bottles simultaneously as a group out of the area and across said table and between the jaws of the carrier, said mechanism including a pusher at the other end of said area from the carrier movable at right angles to said conveyor for moving a single row of bottles at a time out of the path of said conveyor, means supporting said table for shiftable movement between a position supporting bottles thereon preparatory to gripping by said carrier and a position retracted away from a bottle supporting position beneath bottles gripped by the carrier, and control means to cause said carrier to descend with said plurality of rows of bottles to deposit them simultaneously in a case beneath the carrier.

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