

May 21, 1946.

A. C. DAVIS

2,400,542

CASE UNLOADING MACHINE

Filed Dec. 30, 1942

9 Sheets-Sheet 1

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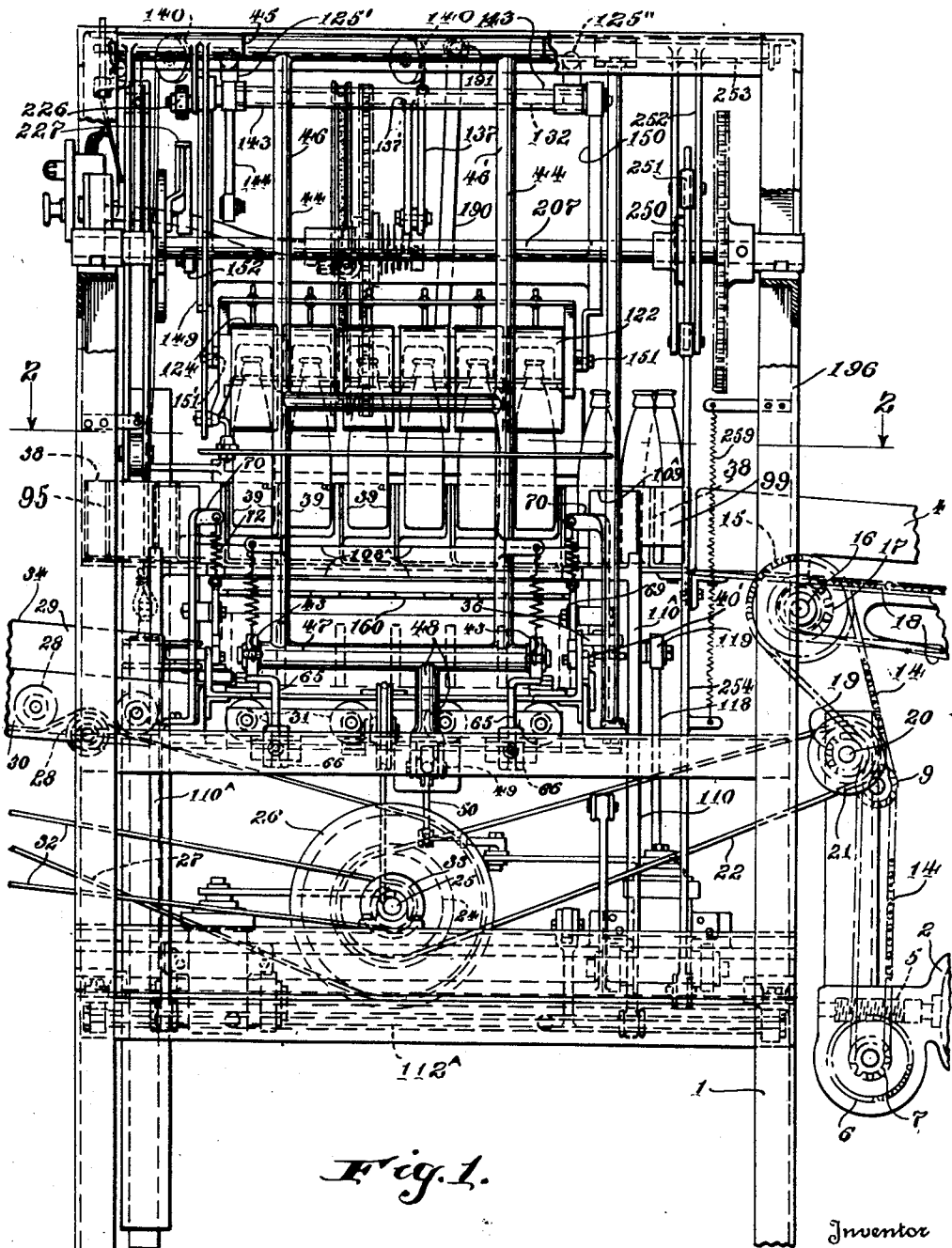


Fig. 1.

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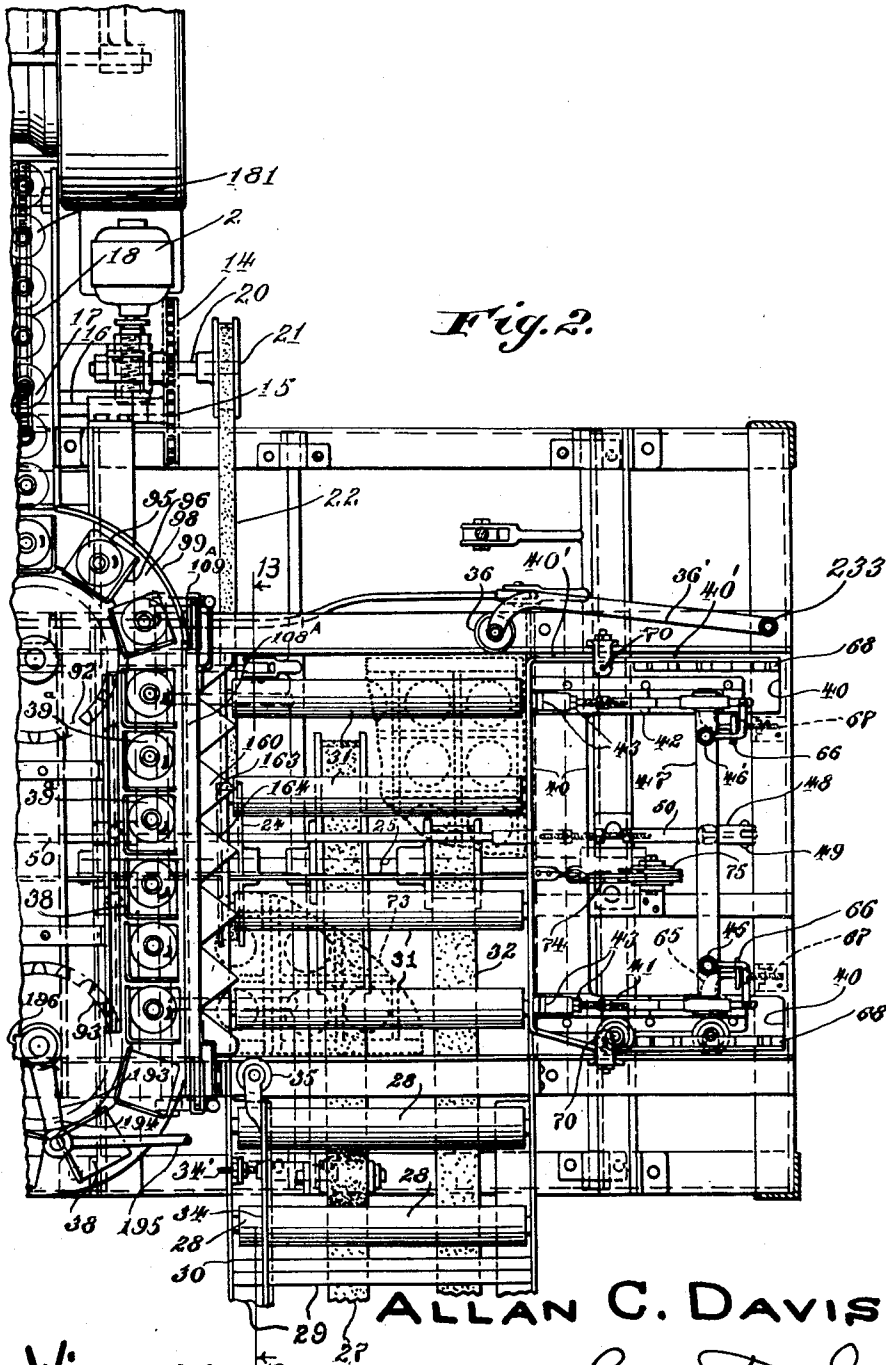
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CASE UNLOADING MACHINE

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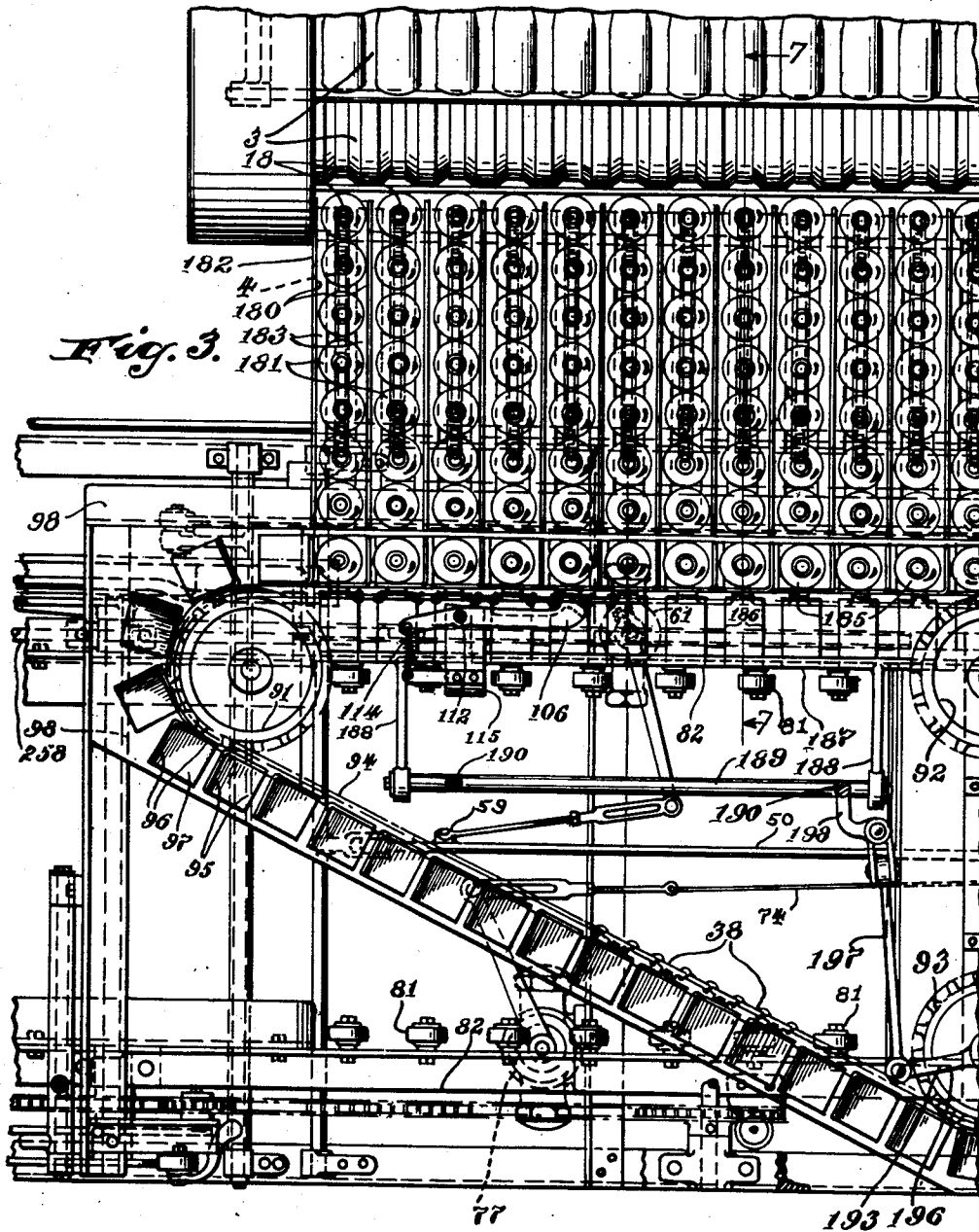
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9 Sheets-Sheet 3



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Fig. 4.

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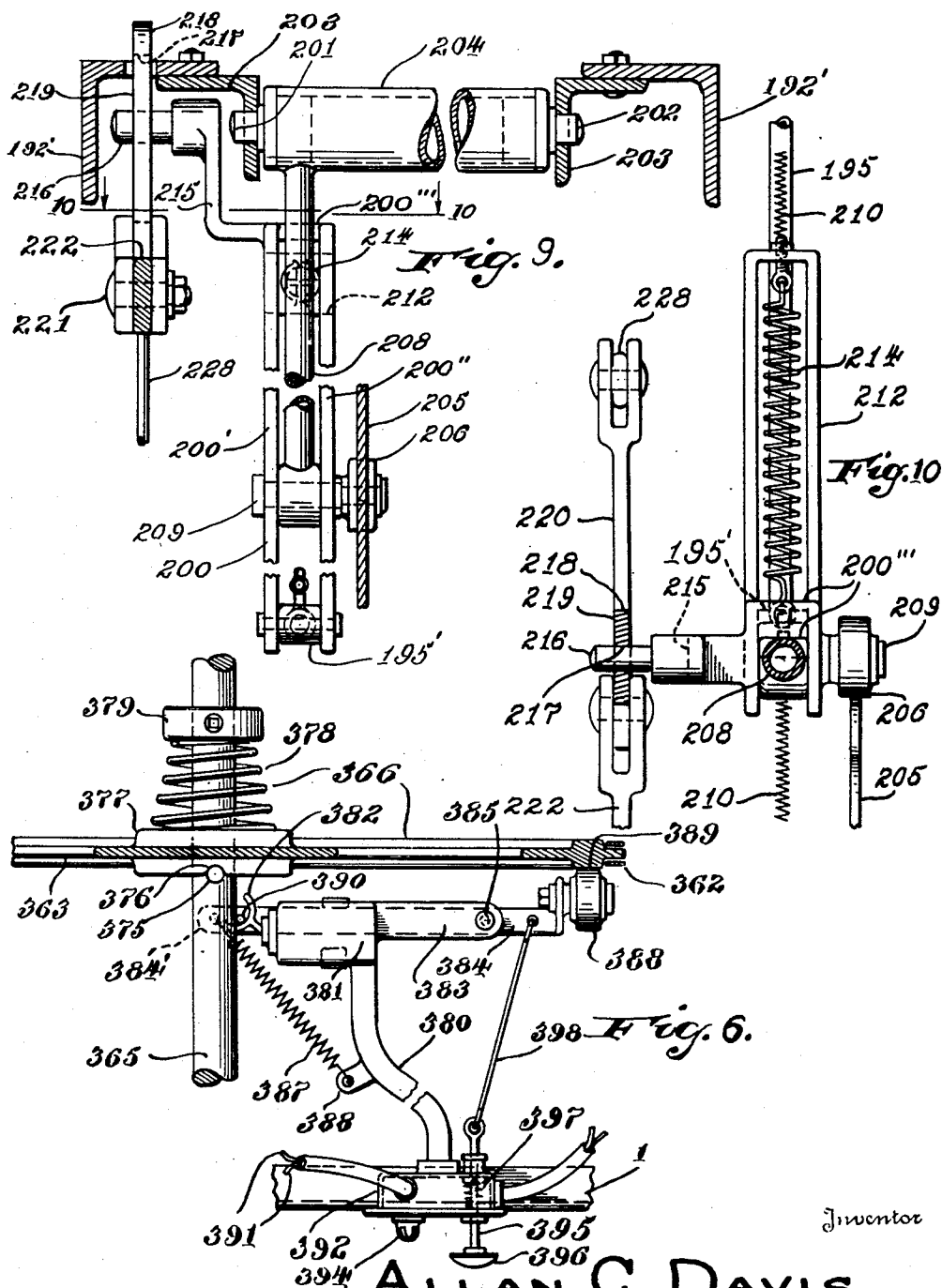
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CASE UNLOADING MACHINE

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9 Sheets-Sheet 6



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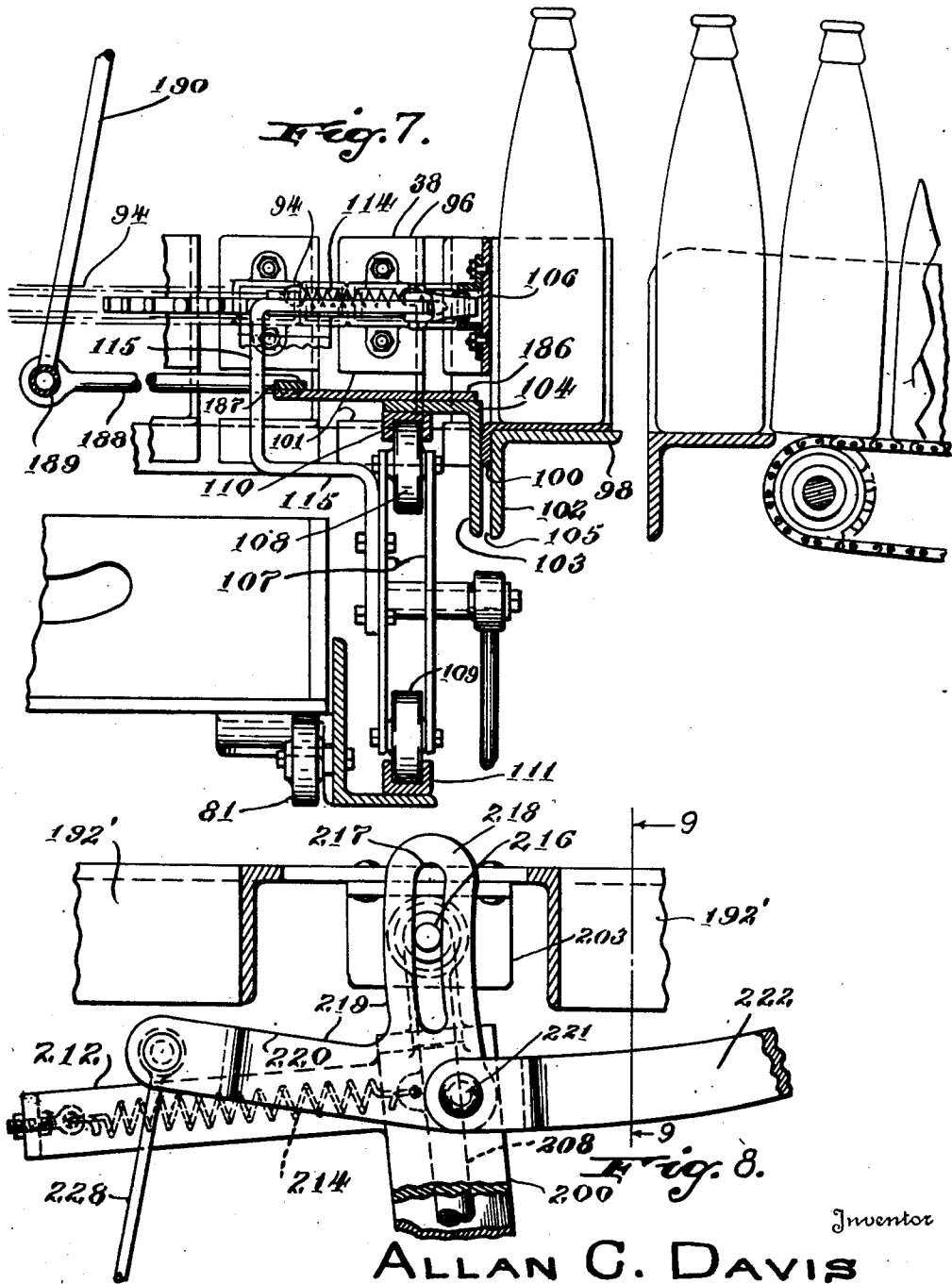
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CASE UNLOADING MACHINE

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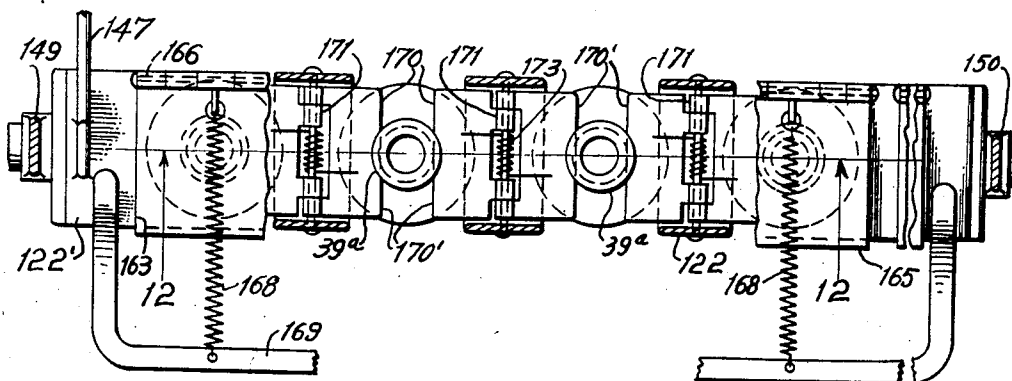
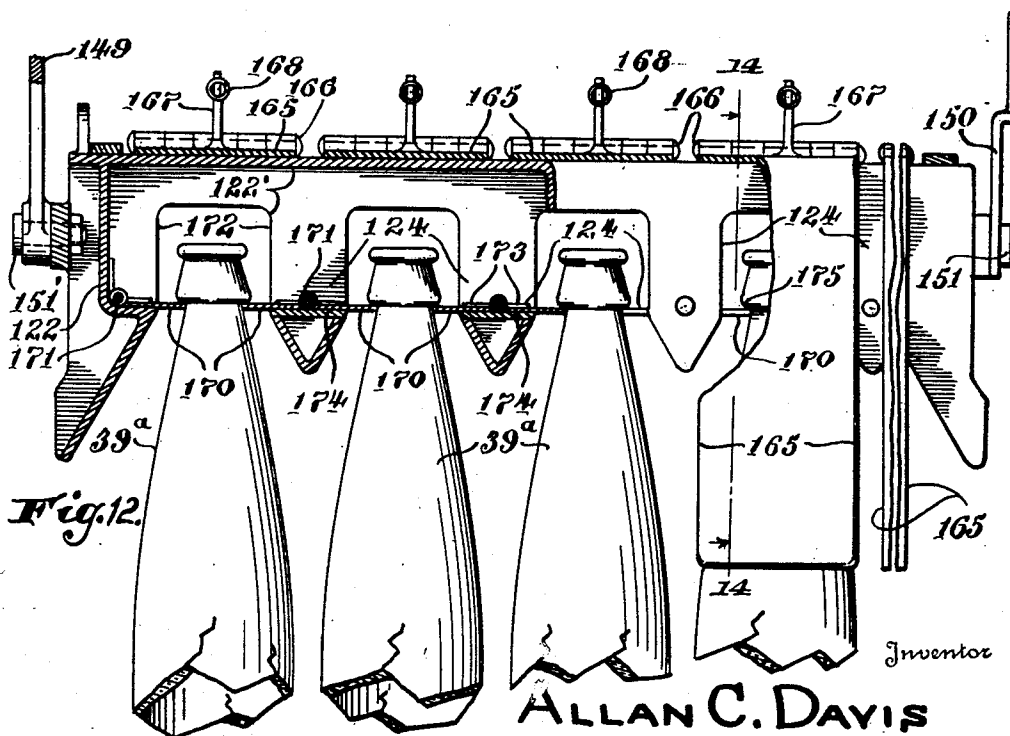


Fig. 11.



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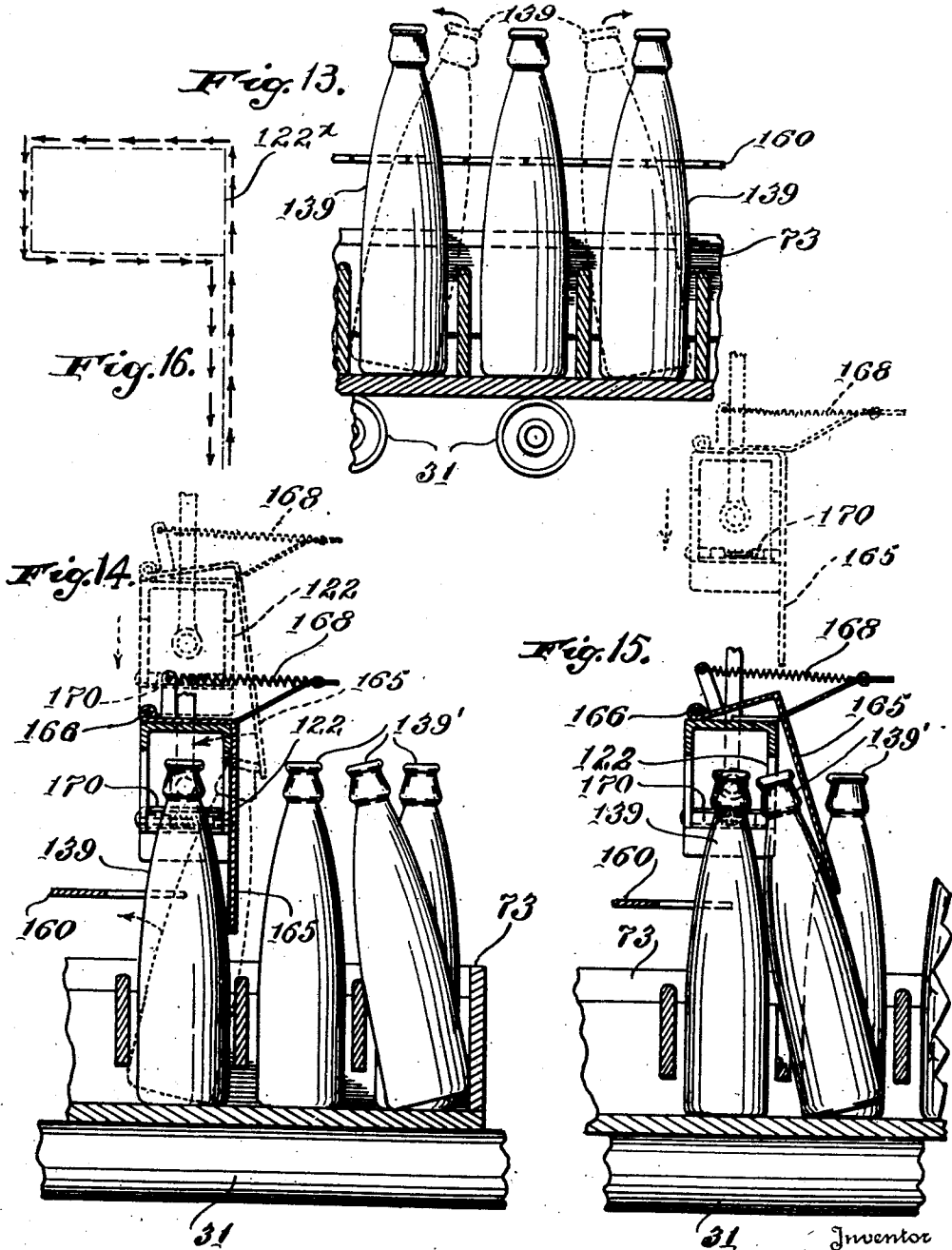
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9 Sheets-Sheet 9



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2,400,542

CASE UNLOADING MACHINE

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Application December 30, 1942, Serial No. 470,654

45 Claims. (Cl. 214—1.1)

In the bottling of soft drinks, beer and other liquids packed in compartment cases, in which the empty bottles are returned, the removal of the bottles from the cases, and their introduction into the infeed of the bottle washing machine, has involved a hand operation. This operation is slow and expensive and notably inefficient. This hand operation slows down and in various ways reduces the efficiency of the line of machines by which the bottles are washed, filled, inspected and placed in the cases or crates.

The object accomplished by the present invention is the provision of an automatic machine to be added to the previously existing line of machines, making it feasible to perform the entire cycle of operations in connection with bottling, case filing, washing and refilling, automatically and with the minimum of supervision. More particularly in the operation of the present machine, the compartment cases as received from the retailer, each case containing empty bottles in a series of rows, are placed on a feeding conveyor which feeds the machine of the invention, and this machine operating automatically almost without supervision for long periods, lifts the bottles row by row including as few or as many bottles as presented, and places the bottles on a bottle conveyor, from which they are duly transferred to a multiple conveyor which constitutes the infeed of a bottle washing machine, which in turn delivers to a bottle filling machine. Each case is advanced during the period of removal of the bottles therefrom preferably with a step by step motion and in a direction transverse to the case conveyor, variation as to such details being contemplated. Thus each row of bottles is brought in turn within the range of the pick up or gripping mechanism, and when each case is thus emptied of bottles it is thereafter advanced most conveniently in the direction of the case infeed to a case clearing mechanism whereby each case in turn is cleared of dirt and other debris.

In addition to the mechanism for accomplishing the functions above outlined the machine of the invention includes various protective devices to prevent damage to the machine and also to prevent damage to the cases and the breaking of bottles.

The line of automatic machines, to perform the complete bottling and case filling cycle referred to, may include as at present intended, a bottle filling machine which delivers to an inspection apparatus and a case filling machine. The present machine would receive the returned cases containing empty bottles, the function of this

machine being to remove the bottles from the cases and deliver the bottles to the intake of a washing machine which would in turn deliver the bottles to the bottle filling machine. All said operations are preferably continuous and automatic with the possible exception of the operation of the inspection apparatus which may require an attendant to note and remove defective bottles. This latter operation may be wholly automatic if desired. Hand feed and hand delivery may be practiced and the various operations may be omitted or rearranged.

In the accompanying drawings I have illustrated a machine embodying the invention in the preferred form, changes of design as to all parts of the machine being contemplated and the use of the various elements of the machine in the absence of the others or with other elements or assemblies being likewise contemplated.

In the drawings:

Figure 1 is a front elevation of the machine looking at the end at which the bottles and cases enter.

Figure 2 is a plan partly in section looking downwardly from the line 2—2 in Figure 1, this view shows the front end of the machine where the bottles and cases enter, being broken away at the left which is toward the rear of the machine.

Figure 3 is a similar plan showing the portion of the machine immediately at the rear of Figure 2 including the bottles in the course of delivery and the bottle delivery mechanism.

Figure 4 is a side elevation looking from the left in Figure 1 showing the front end of the machine, the infeed case conveyor and support being in section.

Figure 5 is a side elevation taken immediately to the rear of Figure 4.

Figure 6 is a fragmentary horizontal section looking downwardly and showing an overload release for the drive and a manually operated re-engaging device.

Figure 7 is a fragmentary vertical section showing the bottle delivery pusher for shifting the bottles from the bottle conveyor of the present machine to the intake of the washing machine, said section being taken on the line 7—7 in Figure 3.

Figure 8 is a fragmentary side elevation of a stop-motion device for stopping the machine when a bottle cannot be ejected by the pusher and when the supply of cases containing empty bottles is insufficient.

Figure 9 is a fragmentary elevation looking

from the right in Figure 8 from line 9—9 in said figure.

Figure 10 is a horizontal section on line 10—10 in Figure 9.

Figure 11 is a fragmentary plan view of the bottle row pick-up mechanism said view being partly broken away to show the bottle neck gripping mechanism in detail.

Figure 12 is a sectional view taken on the vertical plane indicated by the line 12—12 in Figure 11.

Figure 13 is a fragmentary vertical transverse section on line 13—13 in Figure 2 looking to the rear, or in the direction of motion of the cases and illustrating the operation of aligning the bottles with the grippers bringing them to upright position when tipped laterally.

Figure 14 is a fragmentary vertical section on line 14—14 in Figure 12 showing the operation of the swinging guides or flaps in aligning with the grippers and bringing to upright position a bottle which is tipped forwardly.

Figure 15 is a similar view on the same plane showing the escape of the swinging guides or flaps when they encounter bottles tipped rearwardly as when a case partition is broken.

Figure 16 is a diagrammatic view showing the path of the gripper assembly or take up.

Referring to the drawings by numerals the frame of the machine is indicated in a general way by reference character 1.

The infeed of the cases from which the bottles are to be removed and the delivery of cases from the machine and other operations at the front end of the machine are preferably performed in time with the bottle washer and for this purpose these mechanisms are preferably connected to the motor 2 shown at the right in Figure 1, which motor in the form shown operates the bottle washing machine, indicated at 3 in Figure 3, the same being fed by a multiple conveyor 4. This arrangement is not essential.

In the form shown there is a worm drive 5 on or connected to the shaft of the motor. This worm drives the worm wheel 6, the shaft of which carries or drives a small sprocket 7, which in turn drives a chain 14 which engages and operates a sprocket 9 spaced upwardly above the sprocket 7. Sprocket 9 is an idler for spacing the flights of the chain. Chain 14 operates a sprocket 15 secured to a shaft 16, which carries and drives sprockets 17, which operate the conveyor chains 18 of the conveyor 4, which constitutes the infeed for the bottles led to the washing machine.

In the form shown the chain 14 also drives a sprocket 19 which operates a shaft 20 which carries a pulley 21 which drives a belt 22 leading to the left in Figure 1 engaging and driving a pulley 24 secured to and driving a shaft 25 in the front center of the machine. This shaft also carries secured thereto a pulley 26 which drives a belt or belts 27 extending from the left in Figure 1 and downwardly. The belt or belts 27 serve in connection with rollers 28 to feed crates containing empty bottles to the machine. The word bottle is used for convenience to include various articles capable of removal from packages by machines.

The belt 27 and the rollers 29 constitute an infeed case conveyor assembly 29. The rollers 28 may be journaled at their ends in angle irons 30 and the entire conveyor is preferably inclined downwardly toward the machine which is the subject of this invention, and particularly toward

the free rollers 31 which are horizontally arranged across the front of the machine having their axes extending in a fore and aft direction, to support the cases while the bottles are being removed therefrom in the manner previously outlined, and to be further described. The rollers 28, as shown in Figures 1 and 2 have a relatively high speed for bringing each case in turn quickly into position to take immediately the position of the previous case on the rollers 31 for the removal of the bottles from each case in turn without interruption. Each row of bottles in each case is lifted from the case as previously outlined. For convenience this position of the case may be referred to as the bottle take up position and these rollers 31 which are preferably free to rotate, not driven, may be referred to as the bottle take up supporting rollers or bottle take up case supporting rollers.

The belt 32 driven by small pulley 33 on the shaft 25 is a slow speed belt driving slow speed rollers not shown by which the cases containing the empty bottles may be brought from a relatively remote location where they are placed on the conveyor, each case being quickly introduced into the machine in turn by the rollers 28 as the previous case in the take up position on rollers 31 is emptied of bottles and advanced through the machine in the manner to be described. To maintain the speed of the machine and to make the take up operation substantially continuous and uniform this relatively quick motion by which the cases are inserted is helpful or necessary, the slow motion of belt 32 and the rollers driven thereby being sufficient to maintain the supply of cases due to the dwell of each case in turn in the take up position 31.

In connection with the infeed case conveyor assembly 29 it is of interest that the member 34, shown in elevation in Figure 1, is an adjustable guide plate for the cases shown in plan in Figure 2, the direction of adjustment is transverse to the motion of belt 32, said adjustment being indicated at 34'. Figure 2 also shows an anti-friction roller 35 around which the cases pass in moving from the infeed belt 32 or more immediately from rollers 28 to the take up position on rollers 31 and the cases also contact said roller 35 in moving forwardly during the take up operation.

Roller 36 in Figure 2 is a stop motion roller for actuating a stop motion, to be further described, which stop motion stops the machine temporarily in the absence of a sufficient supply of cases. This stop motion is to be described in connection with other protective features of the machine.

In the removal of the bottles from the cases, the cases are advanced with a step by step motion and each row of bottles in turn is lifted and placed on the bottle transfer conveyor 38, shown in plan in Figure 2. A row of bottles in the top position after lifting is shown in elevation at 39a in Figure 1 and in plan in Figure 2.

As a means for advancing the cases with a step by step motion from the take up position on rollers 31, there is a case pusher 40 having rearwardly extending parallel racks 41 and 42 engaged by pawls 43, shown in plan in Figure 2, and in side elevation in Figure 4. These pawls are carried by an oscillating frame 44 seen in front elevation in Figure 1, said frame being pivoted at the top of the machine on a transverse shaft 45. This frame 44 comprises downwardly extending swinging arms 46 and 46' at each side of said frame

44 and these arms carry at their lower ends a transverse cross arm 47 which may be a tubular member as shown. This cross arm is shown as horizontal, extending transversely of the machine. The pawls 43 as shown are pivotally mounted on each end of this tubular cross arm 47 and may be seen in Figure 1, the pawls also being shown in plan in Figure 2, and in side elevation in Figure 4.

The cross arm 47 is shown as provided near its center with a depending arm 48 which is pivotally connected at its lower end at 49 to a tension rod 50, see Figures 1 and 4.

Referring to Figure 5 it will be noted that the tension rod 50 extends rearwardly beyond the center of the machine where it is pivotally connected to the upright arm 51 of a bell crank lever 52 pivotally mounted on the lower portion of the frame at 53, said bell crank having a rearwardly extending arm 54 provided with a cam shoe 55 which as shown is extending in a fore and aft substantially horizontal direction preferably being of a relatively flat S shape. In the form of machine shown this cam shoe is engaged by a roller 56 carried by a radial arm 57 rigidly mounted on a cam shaft 58 extending transversely of the machine and driven in a manner to be later described. The details and manner of drive being subject to wide variation.

The tension rod 50 as shown is connected by way of a depending arm 59 and a tension rod 60 to a pneumatic spring 61, which may be of the door check type. This spring keeps the shoe 55 in the path of the roller 56 returning it thereto after each reciprocation and prevents shock, noise and vibration or hammering incident to the intermittent action of the cam shoe and case pusher 40.

The number of rack teeth on the racks 41 and 42 preferably corresponds to the number of rows in a case, i. e., in the machine shown there are four of these teeth 62 on each rack, see Figure 4.

The pawls are pivoted on the cross arm 47 and are held normally in contact with the racks 41 and 42 by springs 63 connected to suitable lugs 63' on the depending arms 46 and 46' and to the tails 63'' of pawls 43. Each pawl 43 has a depending arm 65 carrying at its lower end a flat vertical transverse plate 66. Each of these plates is engaged on the return or forward swing of the frame 44 by a releasing abutment. These abutments are shown in the form of bolts 67 seated in the frame as best seen in Figure 4, said bolts 67 and plates 66 also being shown in plan in Figure 2.

The infeed case pusher 40 is further provided with a second pair of racks 68, see Figure 2, said racks being shown as spaced outwardly from each corresponding rack 41 and 42. Each of these racks 68 is engaged by and with a corresponding pawl 69 shown as depending directly downwardly in Figure 4. These pawls are pivotally mounted on stationary upright brackets 70 secured to the frame at each side. The purpose of the pawls 69 engaging racks 68 is to retain the pusher 40 in each of the respective positions which it takes as and when it is advanced by the oscillating movement of frame 44 and pawls 43 carried thereby which engage in their successive reciprocations the successive teeth 62 of the racks 41 and 42. Pawls 69 are pivoted at 71 on the upright brackets 70 and are held normally in the depending position shown in Figure 4 by means of relatively weak springs 72 each secured at one end to the upper end of its bracket 70 and at its other

end to the upright tail of the corresponding pawl 69.

It is of interest at this point, that the pusher 40 being advanced by the action of pawls 43 carried by reciprocating frame 44 has imparted to it a backward tendency by which it is finally withdrawn after each case in turn has been emptied. A case in position on take up rollers 31 is indicated by reference character 73 in Figure 4.

The backward tendency referred to is imparted by a tension member shown in the form of cable 74 which is passed around a pulley 75 mounted on the frame at the front of the machine. This cable 74 is connected to the pusher 40 at 76, see Figure 4. Cable 74 also extends rearwardly to the middle section of the machine shown in elevation in Figure 5 where it is connected to a pneumatic spring 77 which as already pointed out imparts a tendency to the pusher 40 whereby it is withdrawn or moved oppositely to the case motion, with a dampened motion.

As the pusher 40 is moved forwardly step by step by the action of pawls 43 on racks 41 and 42, the check pawls 69 engage the racks 68 and thus prevent the pusher 40 from being withdrawn to the right in Figure 2 by action of the cable 74 and spring 77, i. e., pawls 69 hold the pusher 40 stationary after each case pushing stroke of pawl carrying frame 44 and pawls 43. When the check racks 68 have been advanced beyond the pawls 69 the said pawls 69 immediately swing downwardly to the depending position in which these pawls 69 are shown in Figure 4. At this time the case in the bottle pick up position has been advanced beyond roller 35 and hence out of the path of the cases entering by way of conveyor 29. At this time check pawls 69 are released from their racks 68 and when the frame 44 makes its next return stroke, i. e., to the right in Figure 4, pawls 43 being caused to spring upwardly by contact with abutment screws 67, the pusher 40 is withdrawn to the right in Figure 4 by the action of cable 74 and pneumatic spring 77. The withdrawal of pusher 40 by the cable 74 causes racks 68 to move to the right as seen in Figure 2, completely beyond the pawls 69 so that the latter again move to the vertical depending position seen in Figure 4 and when these racks 68 are again advanced with the pusher 40 the pawls 69 are engaged by said racks and inclined downwardly and to the left in Figure 4 so that they again serve as check pawls to prevent the withdrawal of pusher 40 in response to the tension in cable 74. This function is served until the case in take up position has been advanced step by step and has had its successive rows of bottles removed as hereinafter described its forward end having reached the roller 35, Figure 2, the said case having thus passed out of the path of the cases entering from conveyor 29. Springs 77 and 61 prevent excess vibration and hammering. It may be noted that this case motion brings each row of bottles in turn to a bottle gripping position.

It is of interest that the motion imparted to rod 50 and cam shoe 55 on the return stroke by pneumatic spring 61 is a slow motion incident to the operation of such springs. However, in order to determine the extreme limit of the return stroke a stop plate 78 has been placed on the frame of the machine at the extreme right in Figure 4 and in the path of the jaws 79 at the extreme forward end of the rod 50 in which jaws the pivot 49 is mounted. This plate serves in case the machine is stopped when roller 56 is

out of contact with cam shoe 55 to position the latter in the path of said roller 56. It may also be noted at this point that a turn buckle is provided as at 80 or at any suitable location in rod 50 to adjust the length of that rod and hence to locate the cam shoe 55 in the path of roller 56 and to adjust the length and time of the stroke.

To return to the description of the path of the empty cases through the machine it will be noted that as each case is emptied in the bottle take up position on rollers 31 and moves backwardly as each row of bottles is removed, it pushes the previously emptied cases backwardly through the machine forming a continuous line of cases moving through the machine to the case turn over and discharge at the rear end of the machine as previously mentioned.

For this purpose the path of the cases through the machine backwardly from the bottle take up position is defined by a line of anti-friction rollers 81 arranged with their axes horizontal and transverse to the length of the machine. These rollers may be rotatively supported in a pair of angle irons 82 arranged in parallel and extending backwardly on each side of the path thus identified. These rollers are shown in end elevation in Figures 4 and 5 and in plan in Figure 3.

In the form shown there are two sets of short rollers 81, one at each side of the path of the cases having their journals seated in the upright flanges of angle irons 82. In this way the center of the machine is made more accessible particularly from beneath. The extension of the rollers across the entire path of the cases being regarded as undesirable in the particular form of machine shown.

At the extreme forward end of said path of the cases just rearwardly of the bottle take up position on the rollers 31, supporting plate 83, see Figure 4, has been shown instead of anti-friction rollers and at the rear end of the path the drawing shows supporting plates 84, Figure 5.

The handling of the bottles particularly their removal in successive rows from the cases and delivery to the washing machine will now be discussed.

The bottles are moved from the take up position where they are lifted row by row from a case on the rollers 31, see Figure 2, to the discharge position, Figure 3, in which they are pushed on to the washer feed conveyor by means of a conveyor shown in the form of the horizontal bottle transfer conveyor 38. This conveyor is mounted to operate on the horizontal idler sprockets or guide sprockets 91, 92 and 93. The first of these being shown in plan in Fig. 3, and sprockets 92 and 93 being shown fragmentarily in the same figure and also fragmentarily in Fig. 2. This conveyor 38 comprises a horizontal sprocket chain 94 to which are secured individual bottle carriers 95. The chain 94 operates in a counter-clockwise direction about the said three sprockets which turn freely in response to a step by step motion imparted to the chain in a manner hereinafter described. The carriers in the form shown have upright sides which as seen in plan are L shaped, the open sides being disposed in the form shown, forwardly in the direction of clockwise belt motion and outwardly disposed from the enclosure formed by the belt. Said upright sides are indicated by reference character 96, each of these carriers 94 also includes a bottom plate 97 which as shown is approximately square. Throughout the greater portion of its

path the conveyor 38 is supported by horizontal plates 98. The conveyor, and/or plate 98 may be referred to as a bottle row support. Each of the individual carriers is provided with a depending tongue 100, see Fig. 7, which follows the inner edge of plates 98.

At the front of the machine as shown in Fig. 2 there is an upright guide 99 for the bottles the same extending upwardly from the outer edge of the plate 98 on the outside of the curves of the conveyor 38 at sprockets 92 and 93, Figure 7. It may be noted that the bottle guide 99 is absent from a point opposite the roller 35 to a point directly back of detector roller 36 at the front, the entire front flight of the conveyor being open for the admission of bottles and being closed at intervals by a gate to be described.

It may be noted in Figure 7 which pictures the discharge position of the bottles where they leave the chain 38 that the portion of the upright sides 96 which is parallel to the chain, is slotted at 101 in a horizontal direction to admit the bottle pusher to be described and the conveyor supporting plate 98 at this point is shown in the form of an angle iron with a depending flange 102 parallel to the path of the conveyor 38 at this point. This depending flange 102 is vertically placed and parallel to the conveyor, i. e., extending in a direction fore and aft of the machine and there is also shown parallel to the flange 102 and slightly spaced therefrom the depending vertical flange 103 of an angle iron 104. The spacing referred to providing a guide slot 105 for the depending guide tongue 100. Angle iron 104 is part of the frame.

In the form of the invention shown the conveyor 38 is driven with a step by step motion each step being of a length corresponding to the length of a full row of bottles in the cases, and these steps are timed to correspond to the steps of the step by step motion of the cases particularly on rollers 31. This motion takes place in the direction of the axes of these rollers. This step by step motion of conveyor 38 is accomplished or transmitted by means of a reciprocating hook 106 which is best shown in plan in Figure 3. This hook is pivotally mounted on a carriage 107 shown in end elevation in Figure 7 and in side elevation in Figure 5. This carriage in the form shown is provided with upper and lower rollers 108 and 109 there being two upper and two lower rollers. These rollers in the form shown ride in upper and lower channel tracks 110 and 111 which are mounted on the frame and extend longitudinally of the machine.

The hook lever 106 is pivotally mounted on the carriage 107 at 112 as shown in Figure 3, the pivot being intermediate of the length of the lever or hook. The tail of the hook lever is drawn backwardly away from the chain 94 by a spring 114 shown in plan in Figure 3. The rear end of the spring is engaged in a suitable bracket 115 on the carriage 107 in Figure 7 and also shown in Figure 3. The bracket 115 supports the lever 106 and spring 114 and pivot 112.

The carriage 107, see Figure 5, is in the form of the invention shown operated by the arm 57 on shaft 58 which carries at its outer end the roller 56 which operates cam shoe 55 which in turn imparts the step by step motion already described as the motion of the case pusher. The outer swinging end of the arm 57 in the form shown is connected as by a wrist pin 117, Figure 5, to a connecting rod 118 which has similar connection at 119 to the reciprocating carriage 107.

It will thus be apparent that the arm 57 rotating counter-clockwise advances the hook 106 giving no motion of the chain 38 as the roller 56 moves over the cam shoe 55 whereby the case in bottle pick up position is advanced, but on the other hand, when the roller 56 has left the shoe 55 for a considerable period comprising a rotation of about 90° and the bottle lifting motion is complete the hook 106 will engage the chain 94 of the conveyor 38 throughout the remainder of the rotation of the arm 57 advancing bottle conveyor 38. Thus the bottle transfer conveyor 38 is in motion for a period which begins after the take from each case has terminated. The intervening period being sufficient for lifting a row of bottles from the case and placing it on the conveyor 38. The length of the motion of the conveyor 38 is predetermined to correspond to the length of the bottle rows in a case, i. e., in the cases to be emptied. During the motion of the conveyor 38 the case being emptied remains stationary, i. e., the case is stationary for three-fourths of the revolution of the arm 57 and a row of bottles is lifted therefrom and placed on conveyor 38, prior to the initial movement of conveyor 38.

It will be noted by reference to Figure 2 which is a plan of the front end of the machine that each bottle carrier 95 is open at its front side in the position in which the said bottle carriers face the cases in take up position, i. e., as they are located on the take up roll 31, and the guide 99 may be said to begin, or have its forward end opposite and directly to the rear of the detector roller 36, which engages the forward end of each case in take up position.

In order to hold the bottles when deposited on the conveyor 38 particularly in the carriers 95 and to prevent them from falling forwardly therefrom, a vertically reciprocating gate 108A slides in vertical guides 109A. Referring to Figure 4, it will be noted that the gate 108A is operated by upright connecting rods 110A, one at each end of the gate and at each side of the machine as shown in Figures 1 and 4. These upright connecting rods 110A are operated each respectively by an approximately horizontal rearwardly extending arm 111A rigidly secured to a transverse shaft 112A which extends across the machine from side to side near the front. This shaft 112A is rocked by an arm 114A secured to said shaft and in the form shown extending upwardly therefrom. The arms 111A and 114A have the effect of a bell crank lever. The arm 114A at its upper end is pivotally connected to a connecting rod 115A which extends rearwardly from arm 114A being connected at its rear end to an upright arm 116A which in turn is mounted to rock about a horizontal transverse shaft 117A rotatively mounted on the frame, see Figure 5. This shaft 117A carries rigidly secured thereto a follower arm 118A which is approximately upright and carries at its upper end the follower roller 119A which engages a gate operating cam 120, see Figure 5, the same being mounted on shaft 58 to rotate therewith. The arms 116A and 118A may to advantage be made adjustable about the shaft 117A to time the gate 108A.

The cam 120 is so timed and arranged as to advance the roller 119A to the right in Figure 5, and hence to advance the connecting rod 115A, raising the gate 108A once in each revolution of the shaft 58 the gate being lowered by its own weight which keeps the follower 119A in contact with the cam 120. The cam 120 is further so

timed and arranged as to provide for the lowering or opening of the gate 108A after each advancement of the conveyor 38 at the beginning of the dwell of said conveyor permitting a load of bottles to be placed on the conveyor, and immediately thereafter the gate is raised permitting the bottle conveyor 38 to advance with its load without any opportunity to dislodge or tip forwardly the bottles recently placed on said conveyor and permitting the bottle gripper to release. The bottle row lifting mechanism will next be discussed.

Figure 4 shows a bottle neck gripper assembly 122. This gripper assembly as seen from the front in Figure 1 comprises a series or a row of gripper units 124 corresponding in number to the number of bottle compartments in a long row, i. e., to the number of short rows of bottle compartments in a case of the type to be handled by the machine. In other words the cases in bottle take up position have their long dimensions transverse to the length of the machine and to the direction in which the cases pass through the machine after the bottles are removed. This is a matter of choice or election.

This gripper assembly 122 comprising a row of gripper members 124 as explained is suspended in a manner to be described from longitudinal approximately horizontal rocking beam 125 shown at the top of the machine, Figures 4 and 5. This walking beam is pivoted at the rear at 126 on the frame 1 of the machine as shown in Figure 5. This walking beam which comprises two spaced parallel beam members 125' and 125'' is operated by a cam 127 mounted on and rotating with a transverse shaft 128. This cam 127 is engaged by a follower roller 129 mounted on a cross bar 129' connecting the beam members 125' and 125'' which as shown are in the form of trusses designed to have sufficient rigidity in a transverse or vertical direction to support and move the bottles and to overcome their inertia at the speed at which they must be lifted to conform to other operations of the machine at the required output. At its forward end the beam 125 carries pivotally mounted thereon by means of a transverse shaft extending from beam member 125' to beam member 125'', said shaft being indicated by 130 in Figure 4, a bell crank member 131 having two forwardly extending approximately horizontal arms 132 and a single depending arm 133. This depending arm 133 has a rearwardly extending arcuate portion 134 at its lower end containing an arcuate slot 135 which is preferably concentric with the pivot 130. This slot 135 is engaged by a bolt 136 carried by arm 137 rigidly connected to the beam 125 being secured to a transverse rod 137' connecting the beam members 125' and 125''. The position of the bell crank relative to the beam, i. e., the walking beams 125 may be adjusted by moving the depending arm 133 and the arc 134 relative to arm 137 and clamping the bolt 136 in the adjusted position which it takes in the slot 135.

The shaft 130 preferably extends transversely of the machine for approximately the length of the bottle neck gripper assembly 122 and the beam members 125' and 125'' are correspondingly spaced. The beam and parts carried thereby are counterweighted and partially supported by weight 138, see Figure 5, which is in the form shown connected to the transverse rod 137' at a point adjacent the upper end of arm 137 as by cable 139 run upwardly over pulley 140 and rearwardly and then downwardly over pulley 140' to

the beam to which it is connected as aforesaid, adjacent the end of arm 137. When a case in the take up position has reached the end of a single step of its step by step motion bringing a row of bottles to the position shown at 39 in Figure 4 in which said row is ready to be raised from the case, the bottle neck gripper assembly 122 is lowered over the bottle necks of this row, gripping the neck of each bottle in a manner to be described. This lowering motion is controlled by cam or cams 127 which almost immediately raise the beam 125 lifting the row of bottles to a position above the bottle conveyer 38 approximately as shown by the position of the bottles at 39a in the gripper 122 in Figure 4. While this figure shows the row of bottles 39a at the elevation referred to it illustrates a later position in which they have been pushed backwardly by a motion now to be described. As shown in said figure the row of bottles 39a has been elevated and the gate 108A has been lowered to admit them to the conveyor 38 and the gate has thereafter again been raised after this row of bottles was moved backwardly from the initial raised position to the position shown at 39a.

The rearward motion of the gripper assembly is to be described. It may be noted that the bottle neck gripper 122 is suspended from the bell crank arms 132 which extend formally from the forward end of the rocking beam 125. The suspension device may be referred to as a pantograph which it somewhat resembles in its construction and operation. The pantograph being indicated in a general way by reference character 142. A transverse shaft 143 is mounted on the forward ends of approximately horizontal bell crank arms 132 and has secured thereto and depending therefrom an arm 144 to the lower end of which is pivotally connected a positioning rod 145' which extends rearwardly and is pivotally mounted on the frame 1 at its rear end at 146' at the left in Figure 5. There is also secured to this shaft 143 a rearwardly extending approximately horizontal arm 145, the arms 144 and 145 being in the nature of a bell crank, and at the rear end of the arm 145 is pivotally connected a depending arm 146 which in the position shown is inclined rearwardly and downwardly at an angle of a little less than 30° with the vertical, the exact position being unimportant. At the lower end of this arm 146 is pivotally connected an approximately forwardly extending arm 147 which is rigidly connected at its forward end to the top or body of the bottle neck gripper 122. The purpose of the suspension 145, 146, 147 is to maintain the vertical attitude of the bottle gripper assembly 122 approximately as shown in Figure 4 so that the bottles are held in upright position and are not tipped in raising. The member 145 may be referred to as a radius rod and the member 144 as a radius rod arm or crank.

The bottle neck gripper assembly 122 shown in Figures 1, 4, 11 and 12 is suspended from shaft 143 by means of depending arms 149 and 150 the former being shown in Figure 4 and both in Figure 1. These arms are pivotally connected to each side of the bottle neck gripper assembly 122, as at 151 and 151'.

A fore and aft motion is imparted to the gripper assembly 122 by means of a connecting rod 152, Figure 4, pivotally connected to the arm 149 at 153 and extending rearwardly as shown in Figs. 4 and 5 being provided with a turn buckle adjustment at 154 for determining the length of the arm and hence the fore and aft position of

gripper assembly 122. At its rear end the rod 152, see Figure 5, is pivotally connected to the upper end of an upright lever 155 shown as pivoted at its center at 156 on the frame of the machine and having at its lower end a cam follower roller 157 engaging a cam mounted on the shaft 58 previously described. The follower 157 is held in contact with the cam 158 by means of a tension spring 159 connected to the rod or connecting rod 152 and to a stationary point 159' on the frame 1 at the rear or left in Figure 5. The cam 158 is so timed as to move the bottle neck gripper 122 rearwardly or to the left in Figure 4 when the gripper is raised to the top of the path bringing the row of bottles engaged by the gripper over the corresponding carriers 95 of the conveyor 38, said cam also being timed and arranged to move gripper assembly 122 to the right or forwardly when by lowering of the beam or beams 125 the row of bottles has been lowered into contact with base plates 97 of the carriers 95 and the gate 108A has been raised. This forward motion serves to disengage the gripper units 124 from the bottles and the gripper assembly is thereafter lowered in to engagement with the next row of bottles 39 as previously described. It is important that when the gripper assembly 122 is moving forwardly or to the right in Figure 4 to disengage the bottle necks, the gate 108A is in the raised position shown in Figure 4. In this position it holds the bottles preventing rearward motion thereof with the gripper and provides for the release of the bottle necks from gripper units 124.

It may be of interest that the row of bottles 39, Figure 4, is the last row in a case 73' passing through the bottle take up position. The case 73 is approaching the take up position being on rollers 31.

The bottles in the row referred to as in the take up position to be engaged by bottle neck gripper units 124 are located opposite or in line with the respective carriers 95 in which they are to be placed, by means of a positioning member 160 shown in plan in Figure 2, this positioning member has rearwardly tapered guides 163 which in the form shown, as seen in plan, resemble saw teeth. Each converging guide 163 has its center line opposite the center of a corresponding carrier 95. As the case in the take up position on rollers 31 is advanced each step in the step by step motion corresponding to the rows of bottles in the case, the rearward row, about to be taken up, is engaged by the guide member 160 and particularly by the converging guides 163, 164 and positioned in line with a corresponding carrier 95 and incidentally in line with a corresponding take up or gripper unit 124, Figure 1, of the bottle neck gripper assembly 122. There is one of said gripper units 124 for each bottle in the rows to be presented.

The bottle neck gripper 122 is shown in side elevation in Figure 4, in front elevation in Figure 1, and in detail in Figures 11 and 12.

Each bottle neck gripper unit 124 comprises in the preferred form shown a forwardly swinging flap or guide 165 shown as of angular or inverted L shaped outline as seen in side elevation in Figure 4. This cover is pivotally mounted at the top rear at 166 the said pivot extending transversely to the rearward motion of the cases 73 at the time the bottles are being removed therefrom and thereafter. Each cover or flap 165 as shown is provided with an upright arm 167 to the upper end of which is connected a forwardly extending tension spring 168 connected

at its forward end to a corresponding bracket 169 carried by the body or frame 122' of said gripper assembly 122. These flaps 165 tend to prevent the bottle necks from escaping in a forward horizontal direction from the respective gripper units 124 when said units are in the initial gripping position and in a corresponding direction as the units advance and guide the bottles into the gripper jaws.

In the form of the invention shown the lifting engagement of the gripper units 124 with the necks is attained by toggle jaws or gripper plates 170, see Figures 11 and 12. One of these toggle plates is mounted at each side of each gripper unit 124, each said member 170 being mounted on a fore and aft extending horizontal pivot 171 secured in the frame 122' of the gripper 122, at each side of the respective slots 172 formed in the frame of said gripper assembly and corresponding each to one of the bottle neck gripper units 124, each being adapted to receive a bottle neck including the upper portion of the bottle as shown in Figure 12. It may be noted at this point that gripper assembly frame 122' as shown resembles an elongated box of rectangular cross-section, the elongated dimension of the box extending transversely of the machine. This box-like frame is slotted transversely of its length and in the direction of the motion of the cases in passing through the machine. These slots 172 extend through the box and are spaced according to the spacing of bottle carriers 95 on conveyor 38 and hence according to the spacing of the centers of the case compartments.

The toggle grippers or gripper plates 170 are impelled downwardly to horizontal position by coil springs 173 coiled about the pivot pins 171 of said plates and bearing on the top side of the plates or toggle grippers 170. These as shown preferably have straight outer fore and aft extending swinging edges 170', see Fig. 11. Suitable stop means or surfaces to prevent the grippers 170 from going below horizontal position are indicated at 174 in Figure 12. These stops, one on each side of each unit 124 support the weight of the bottles as and when they are lifted by the toggle lever 125, the arrangement described being the preferred form, and variation being contemplated.

In operation the gripper assembly 122 moves downwardly passing each gripper unit 124 over the neck of a corresponding bottle of each row of bottles in turn, the bottles of each row being suitably positioned by the guide 160. Said rows of bottles are thus engaged in turn by the gripper assembly 122 as the cases are advanced to bottle take up position for each row of bottles in turn. The downward motion of the gripper assembly 122 causes the bottle necks to engage the gripper plates 170 near their adjacent swinging ends and to swing them upwardly about pivot pins 171 whereby each bottle neck in the row is caused to enter between the grippers which pass downwardly over the neck portion and over the shoulders or protuberances 175, the grippers 170 springing back toward horizontal position beneath said shoulders or protuberances 175 whereby the grippers 170 rest on the stops or stop surfaces 174. The gripper assembly 122 supported by walking beams 125 and controlled by cam 127, positioning or radius rod 145', pantograph 142 and bell cranks 131 and 144, 145 then moves upwardly and then rearwardly, the gate 108A being withdrawn downwardly, and the gripper units 124 with the bottles 39a therein reach the position

shown in Figure 4 which is the uppermost and rearmost position. From this position the gripper units 124 composing gripper assembly 122 move downwardly until the bottles rest on the bottom plate 97 of the carriers 95 the bottles being held against release in a forward direction by the hinged plates 165 and by the gate 108A which will have moved upwardly to the position shown in Figure 4 in which it is just forward of the bottles 39a extending upwardly to or above their centers of gravity.

At this time gripper assembly 122 moves forwardly which is to the right in Figure 4, the toggle gripper or plate members 170 which preferably have straight fore and aft extending gripping edges 170' being withdrawn forwardly releasing the bottle necks, the bottles being held stationary by gate 108. On the next advancement of the bottle row conveyor 38 the row of bottles just placed thereon is carried forwardly away from the observer in Figure 2, passing contra clockwise around the curve in contact with the guide 99 near the top of said figure.

The swinging guides or flaps 165 by straightening forwardly tipped bottles and bringing them into alignment with the grippers of the gripper assembly 122 serve an important function which constitutes a considerable contribution to the satisfactory result attained by the gripping and take up elements of the machine, and they also serve as already suggested to prevent tipping of the bottles forwardly when released on conveyor 38 prior to the arrival of the gate 108' in its operative relation to conveyor. The flap 165 also prevents the swinging of the bottles pendulum wise in a fore and aft plane whereby they might enter the path of the gate 108 as it moves upwardly, and presses the bottles against guide 160 to straighten them when tipped laterally.

It is also notable that when a bottle is tipped backwardly due to a broken partition in the case the flap yields forwardly and upwardly stretching spring 168, and preventing breakage of bottles and jamming of the machine.

Figure 14 illustrates in broken lines the normal operation of the flap 165 as the gripper assembly descends, one of the bottles 139 being tipped backwardly. In this instance the flap 165 when its lower edge hits the top of the bottle swings or yields upwardly about hinge 166 throwing said bottom edge forwardly so that it slips over the crown of the bottle and moves downwardly along the forward surface of the bottle, the action of spring 168 bringing the bottle to upright position in fore and aft vertical alignment with the corresponding gripper 170.

As the gripper assembly 122 moves rearwardly at the upper level attained, to bring it over conveyor 38, the flaps 165 oppose the lag of the bottles tending to hold them in the gripper. The full line part of the figure shows the final lowermost position of the unit with the flap down and the bottles gripped ready for lifting.

Figure 16 illustrates diagrammatically the path 122x of the gripper unit as previously described the motion being in the direction of the arrows. At times the horizontal portion of the path has been referred to as a transverse motion as well as a fore and aft motion in that it is transverse to the up and down motion.

Figure 15 shows a case 73 with a broken wall, a bottle 139' being tipped rearwardly for this or other reason. As the unit 122 descends the lower edge of flap 165 may contact the crown or top of the bottle 139' or at some other point. Assuming

the former condition, the location of hinge 166 rearwardly of the flap gives a motion of the said lower edge of flap 165 which relieves any tendency of the flap to cramp in connection with the bottle. In other words, the flap swings forwardly and passes down over the bottle without applying destructive pressure, moving at the lower position of unit 122 to the position shown in Figure 15. The broken lines, Figure 15 show the unit moving downwardly empty, to engage the bottles, the depending portion of the flap being vertical.

When the unit is raised from the full line position Figure 15, the flap 165 is released and on the next forward motion the bottle 139' is straightened by contact with guide 160, see Figures 13 and 14.

Figure 13 further illustrates the operation of the saw toothed guide 160. This figure shows bottles 139 in full lines and standing upright, and in broken lines it shows two bottles 139' tipped side wise.

On the further rearward motion of the case 73 bringing bottles 139' into contact with the saw toothed edge of member 160 the bottles tend to be straightened by a transverse swinging motion to upright position, the operation being assisted or completed by the yielding forward pressure of flaps 165 as they move downwardly, pressing the bottles, which tend to lean forwardly as well as side-wise, into the wedge shaped spaces between the teeth.

Assuming for convenience that the rows of bottles lifted from the cases and placed on the conveyor 38 consist each of six bottles the number being varied to suit the design of the cases and the manner of presenting the same, the bottle washer, the intake or infeed end of which is indicated at 3 is designed to receive rows of bottles of a length equal to twice the length of the rows in the cases as lifted therefrom. The bottles may therefore be most conveniently removed from the conveyor 38, Figure 3, and advanced towards the bottle washer in twelve lines comprising successive rows of twelve bottles each.

To this end the conveyor 4 includes twelve or any suitable number of passage ways or ways 180 at right angles to the adjacent portion of conveyor 38 and to the step by step movement of the cases. Each way 180 contains a line of bottles 181 the side walls of the ways being shown in the form of upright elongated plates 182 and in the form shown there is a conveyor chain 18, Figures 1 and 3 at the bottom center of each such way extending longitudinally thereof, the bottom wall 183 of each way being slotted at its center to permit the corresponding chain 18 to project upwardly therethrough and frictionally engage the bottles therein, which in the form shown stand in upright position. The guide plates 99 of conveyor 38 terminate at the first plate 182 of the bottle washer conveyor. If desired a means may be provided at this point to engage the sides of the bottles to prevent capsizing of the bottles in a forward direction prior to their delivery to the intake feed 4 of the washer in case said feed is not always filled with bottles. The purpose may be served by spring supported upright plates which swing about one upright edge yielding to the advancement of the bottles in ways 180.

The means for ejecting the bottles or delivering them from the conveyor 38 to the conveyor 4 will now be discussed, it being understood that this ejecting operation takes place in time with the dwell of the bottle row conveyor 38 and with the operation of the bottle neck gripper 122. This

operation will for convenience be specifically described as taking place once for every two dwells of the conveyor 38, the intake of the washer having twelve lines whereas the take up as shown handles rows of six bottles each.

In this operation the bottles on the chain 38 in the position of the row of bottles 185, Figure 3, are contacted individually by bottle pushers or pusher plates 186 shown in longitudinal vertical cross-section in Figure 7 which is a section on line 7-7 in Figure 3, and also shown in plan in said latter Figure 3.

These pushers are shown in the form of flat horizontal plates elongated in the direction of motion of conveyor 4 and are slidably supported on the angle iron 104 previously described or the top flange thereof, being mounted to slide in a direction transverse to the step by step motion of the cases as they pass through the machine during and after the take up of the bottles therefrom.

Each pusher is secured at its rear end, the term rear as here used having reference to the end opposite to the bottle engaging end, to a longitudinal bar 187 which is parallel to the case motion as previously defined. This bar 187 is shown in plan in Figure 3 and in cross-section in Figure 7. This bar 187, known as the lateral thrust bar, is in the form shown connected near each end to one of two horizontal thrust rods 188, Figs. 3 and 7, and these rods 188 are pivotally connected each at its inner end, i. e. at the left in Figure 7 to a swinging bar 189 which as shown is suspended from pendulum bars or suspension rods 190 which are swingably connected at their upper ends to and supported by a longitudinal shaft 191 mounted in the top longitudinal frame as best shown in Figures 4 and 5, the top frame being indicated for convenience as at 192'.

In the form shown there is a horizontal bell crank lever 193 having a transverse arm 194 operated by a longitudinal thrust rod 195 connected to a cam motion to be further described and a longitudinal arm 196, see Figures 2 and 3 which latter arm 196 is connected by connecting rod 197 to a bracket 198 on the swinging bar 189, whereby the latter is reciprocated transversely to the said case motion and transversely to the row of bottles 185, operating the pushers 186 to move each row in turn from the bottle row conveyor 38 to the bottle washer infeed conveyor 4.

Referring now to Figures 4, 8, 9 and 10 the connecting rod 195 extends forwardly and is pivotally connected at its forward end at 195' to a depending oscillating lever 200. The lever 200 may be described as in normal operation swinging about axially aligned journals or journal pins 201 and 202, Fig. 9 having bearings in depending brackets 203 secured to top frame members 192', Figures 4 and 9, said pins being connected by journal body 204 shown in the form of a tube extending across the machine transversely to the said case motion. The lever 200 is provided with a cam follower 206 and said lever is normally operated by a cam 205 engaging the follower 206 mounted on lever 200 near its center, said cam being mounted on shaft 207 near the front. To prevent crushing of the bottles in case the lines of bottles 181 on ways 180 become filled or otherwise obstructed it is found desirable to provide a sensitive yielding of the thrust mechanism between shaft 207 and pushers 186. To this end the journal member 204 carries a depending suspension rod 208 which may to advantage be of

a length about half the length of lever 200 the proportions shown being satisfactory. This rod 208 is shown as pivotally connected to said lever 200 near the center of the latter at 209.

In the form shown the follower 206 is mounted on pivot pin 209 and said pin extends through the lever 200 which is shown as bifurcated, the suspension or radius rod 208 being between the two plates 200' and 200'' of which lever 200 is composed. Roller or follower 206 is held in contact with cam 205 by tension spring 210, Figs. 4 and 10, one end of which is connected to front frame 196' and the other end of which is secured to lug 211 on connecting rod 195. The lever 200 is shown as of U-shaped cross-section at the top having a cross arm 200''' at the rear. The cam 205 has two actuating surfaces 205' and 205'' timed as already pointed out to give one stroke of pushers 186 for two bottle lifting strokes any suitable timing and various changes of design in all parts of the machine being contemplated.

The pushers 186 in normal operation are advanced moving a row of 12 bottles, two case rows, from bottle conveyor 38 to the washing machine intake conveyor, as each actuating surface 205', 205'' of cam 205 passes the roller 206, rocking the lever 200 backwardly about its fulcrum 204, the axis of which fulcrum coincides with the axis of journals 201, 202. The rocking motion referred to moves the lower end of lever 200 carrying the forward end 195' of rod 195 backwardly on an arc concentric with said last mentioned axis.

In case of obstruction of ways 180, to avoid crushing of the bottles a yielding element or feature has been introduced into the bottle pusher motion, just described, whereby the bottles are transferred from bottle row conveyor 38 to washer intake conveyor 4. This yielding element also trips a temporary stop motion, i. e., a stop motion which permits the machine to start as soon as the obstruction is removed.

To this end the bifurcated portion of lever 200 has near its upper end a rearwardly extending approximately horizontal arm 212, see Figures 4, 8, 9 and 10. This arm is shown as bifurcated and U-shaped in plan with the cross arm of the U at the rear and it contains a tension spring 214, connected at one end to the cross arm of the U and at its other end to suspension or radius rod 208 near its upper end, see Figures 4, 8 and 10. The tension of the spring 214 is sufficient to take up without considerable distortion, the normal thrust required to transfer the successive rows of bottles 181 from bottle row conveyor 38 to washer intake conveyor 4. The spring serves to normally preserve the relation of lever 200 to the radius rod 208 shown in Figure 4. In case of obstruction of passages 180 of conveyor 4 the spring 214 is stretched or expands horizontally and bottle row transfer lever 200 instead of serving as an inflexible means for transmission of the motion of cam 205 to bottle row pushers 186, swings rearwardly at its upper end about the forward end 195' of connecting rod 195. This operation is best seen in Figure 4.

The extreme upper end of arm 200 is shown as in the form of an offset upwardly extending lug 215. This offset is to the left in Fig. 9 and toward the observer in Fig. 4. This lug is provided at its upper end with a transverse pin 216 shown as aligned with the axes of journals 201 and 202 though precise alignment is probably non-essential. This pin 216 extends outwardly to the left in Figure 9 through a substantially upright slot 217 in the upright arm 218 of a bell crank lever

219 having an approximately horizontal rearwardly extending arm 220. This bell crank 219 is pivotally mounted by means of pivot pin 221 at the rear end of a fore and aft horizontal bell crank carrier arm 222 of a bell crank 224 pivoted on the frame member 192' at 224'', Fig. 4, and having a horizontal follower arm 224' and a depending case stop motion arm 225, Figure 4, connected to the case detector roller 36 in a manner to be described. The horizontal arm 224' of said bell crank 224 carries a cam follower roller 226, Figures 1 and 4, which at suitable periods engages a cam segment 227, same figure, on shaft 207. The operation of this cam and follower will be later discussed in connection with the case supply stop motion which stops the machine temporarily in the absence of a full supply of cases. The rearwardly extending horizontal arm 220 of bell crank 219 is connected at its rear end by a connecting rod 228 extending downwardly from arm 220 to the arm 229 of a mercury or equivalent switch or stop device 230 shown in Fig. 4. This switch is in the circuit of motor 353 by which shafts 58, 128 and 207 are driven as hereinafter described.

In the operation of bottle pushers 186 in case of an obstruction of ways 180, the upper end of arm 200 swings rearwardly about its lower end at 195'. The upright arm 218 of bell crank 219 also swings rearwardly about pin 221 and horizontal arm 220 of said bell crank swings downwardly about the same pin pushing the rod 228 downwardly and likewise rocking stop motion arm 229 downwardly, changing the position of mercury switch 230, and operating said switch or other stop mechanism to stop the machine. The stoppage of the machine thus effected is preferably temporary the overcoming or removal of the obstruction permits the spring 214 to restore lever 200 to its operative condition and position and to its normal relation to radius rod 208, as shown in Figure 4. Bell crank 219 is thus rocked in counter clockwise direction swinging the switch arm 229 upwardly, closing switch 230 and causing the machine to resume its operation. The slot 217 permits lever arm 222 and arm 224' to move up and down freely relatively to bracket 215 and pin 216 and without affecting the operation of transfer lever 200, and arm 200 does not affect the operation of the case stop motion to be described.

The purpose of the case stop motion referred to as tripped by roller 36, Figure 2, in connection with bell crank lever 224 is to stop the machine, preferably temporarily in the absence for a predetermined period of a case on take up rollers 31, ready to present rows of bottles to the bottle take up gripper assembly 122 or other take up mechanism.

As shown the roller 36 is journaled in the rear end of a horizontal fore and aft extending lever 36', see Figures 2 and 4, which lever is in the nature of a rearwardly extending arm secured to the upright shaft 233 mounted to oscillate in bearings carried by the frame at the front, see Fig. 4. This shaft 233 is provided above with a transverse horizontal arm 234 which is connected by a connecting rod 235 to the lower end of the depending arm 225 of the bell crank 224. The roller 36 and the connections 36', 233, 234, 235 and 224' at times support the follower 226 on arm 224' of bell crank 224 and this weight tends to advance the roller 36 into the path of the cases on rollers 31. At other times the follower 226 and its said connections are supported by said

cam 227. This latter cam rotates with shaft 207 and is so timed as to support roller 226 in a period, after a case emptied of bottles has passed rearwardly and the pusher member 40 with its upright side wall 40' which also supports roller 36 has been withdrawn forwardly by spring 77 and cable 74. At this time there is a period during which the full case is normally advancing from conveyor 29 onto rollers 31 in which roller 36 is withheld from the case path by the action of said cam 227. But in the instance of a retardation or cessation of the case supply causing roller 36 to be free of contact with a case end in take up position, after pusher 40, 40' has been withdrawn and roller 226 is free to drop, not being in contact with cam segment 227, the weight of lever arms 222 and 224' and roller 226 which normally rests on said cam or by way of roller 36 and the mechanism 36', 233, 234, 235, 225 on the forward end of the case being emptied or on pusher 40, 40' causes the roller 226 and arm 222 to drop.

This depression of lever arm 222, lowers the bell crank lever 219, the slot 217 permitting the lever 219 to move downwardly relative to pin 216 without affecting lever 200.

The arm 222 of bell crank 224 and the arm 220 of bell crank 219 are thus lowered without notable disalignment, causing a corresponding downward motion of connecting rod 228 whereby the stop motion operating arm 229 is turned through a short arc, operating the mercury switch 230 or other stop motion, stopping the machine. This inoperative condition in the form of the device shown is temporary, the presence of a case in take up position on rollers 31 serving to expel roller 36 from the stopping position which acts through the connections recited, raising the arm 222 and bell crank arm 220, holding them in the normal relation, i. e., in the form shown in practical alignment. The raising of arm 220 taking effect through connecting rod 228 on stop motion arm 229 closes the switch 230 or effects a corresponding operation of such other stop motion device as may be employed starting the machine.

Thus the machine is stopped whenever a bottle row way 180 leading to the washer or any of these ways are obstructed and whenever the case feed is delayed or fails to operate, so that for an abnormally long period there is no case on the bottle take up case supporting rollers 31 in bottle take up position. In the form shown, which is the preferred form, relief of the obstruction in and of the ways 180 and/or the arrival of a case in bottle take up position causes the operation of the machine to be automatically resumed without the intervention of an operator.

Referring now to Figs. 4, 5 and 6, it will be noted that the various motions with the exception of the case in-feed, the bottle delivery to the washer, and the case delivery are as shown driven from an electric motor 353, Fig. 5.

It may be noted that the intake and delivery motion referred to as separately driven are not positive motions, the cases and bottles in all these instances being so related to the conveyor that free slippage occurs and there need be no difficulty due to variation of timing. The motor 2, shown in Fig. 1 as driving these agencies may be the bottle washer motor or any other motor.

In the arrangement shown the motor 353 carries on its shaft a small pulley 354 which drives pulley 356 by way of belt 355. Said pulley 356 is secured to its shaft 357 which carries secured thereto a toothed sprocket 359. Sprocket 359

drives a chain 362 which engages and drives a sprocket 363 on shaft 365. Shaft 365 has secured thereto a sprocket 361 which by way of chain 360 drives a sprocket 358 which drives shaft 128 which carries mounted thereon and driven thereby the rocking beam cams 127 previously described in connection with the motion of the rocking beams which control the vertical motion of the bottle row gripping assembly 122 and hence of the rows of bottles as lifted from the cases.

It is further of interest that the large sprocket 363 mounted on shaft 365 drives said shaft through the overload stop motion device 366 shown in detail in Fig. 6 which is a top plan view. This feature of the machine will be further described. The shaft 365 carries secured thereto and driven thereby a sprocket 367 which engages and drives a chain 368 which drives a sprocket 369 which is operatively connected to and drives cam shaft 58, Fig. 5 which carries and drives the follower 56 and cams 120 and 158. Shaft 365 also carries secured thereto and driven thereby a sprocket 370 which carries operatively related thereto, a chain 371 which extends forwardly and drives a sprocket 372, Fig. 4, mounted on and secured to the cam shaft 207, whereby said shaft and the cams 227 and 205 thereon are driven in the operations previously discussed in connection with the description thereof the motion of these cams being relatively slow.

Referring now to Fig. 6 the sprocket 363 driven by chain 362 as described, is releasably connected to shaft 365 in the form shown, by means of a pin 375 which extends diametrically through the shaft 365 and provides a releasable engagement of said shaft with sprocket 363. The sprocket in the form shown is slidably and rotatably mounted on shaft 365, a driving connection of the sprocket to the shaft being provided by the seating of pin 375 in an open slot or groove 376 in the hub 377 of the sprocket 363.

A coil spring 378 encloses the shaft on the side of the hub 377 opposite to the pin 375 and seat 376, and bears at one end against the said hub and at its other end against a suitable abutment on the shaft 365, shown in the form of a collar 379 secured in predetermined position as by means of a set screw or any suitable securing means. The various features and details here and elsewhere in the machine being subject to a considerable degree of variation. Fig. 6 shows a bracket 380 mounted on the frame of the machine. This bracket supports a snap switch 381 having a forked actuating member 382 projecting therefrom. The bracket also has a rigid arm 383 transverse to shaft 365. Pivotally mounted on said bracket arm at 385 is a lever 384 which is normally transverse to shaft 365 and approximately radially related to the sprocket 363. This lever 384 has a long arm extending to the left in Fig. 6 from pivot 385 and a short arm extending to the right from said pivot. The left hand end of the arm is urged backwardly from said sprocket and toward the observer by a spring 387 connected at one end to the left hand end of lever 384 near shaft 365 and at its other end to bracket 380 as by lug 388 nearer the observer in Fig. 6 than said switch 381 and lever 384. It may be noted that spring 387 is connected to the swinging end of the long arm of lever 384. A roller 388 mounted on the swinging end of the short arm of said lever engages the rim 389 of said sprocket, the said roller having its axis radially related to the sprocket

and said roller being pressed against the rim of the sprocket by the tension of spring 387 as multiplied by the leverage of said long and short arm respectively. The fork 382 of switch 381 is engaged by a pin 390, shown as carried by the long arm of said lever 384, the details being illustrative of a practical embodiment of the invention.

It is of importance that the sides of groove or slot 376 are so designed as to expel the pin and move the sprocket 363 along its shaft 365 away from the observer, in Fig. 6, whenever the load on said shaft 365, resisting the driving tendency applied to the shaft 365 by sprocket 363 exceeds a predetermined maximum. When such overload occurs the side wall of slot 376 has a cam action on pin 375 forcing the sprocket along shaft 365 away from the observer in Figure 6. Under these circumstances the sprocket 363 and the track or rim 389 recede from the position of the observer in Fig. 6 and roller 388 is advanced in the same direction as lever 384 swings counterclockwise about pivot 385 in response to the tension of spring 287. The swinging end 384' moves toward the observer, the roller 388 receding from the observer in Fig. 6, following the sprocket 363 and its track 389.

As lever 384 swings counterclockwise pin 390 engaging fork 382 opens switch 381 which controls the circuit of motor 353 stopping the motor and the parts driven thereby. In the preferred form, the motor wires 391 may be led from switch 381 through the shank of bracket 380 to a hand switch 392 operated by button or the like 394. When switch 381 has been automatically opened as described, the difficulty of wedged or broken bottles or cases will be removed. It is then again desirable to start the machine, switch 392 having been opened.

To do this the switch 392 is first closed, to do this pull rod 395 is conveniently grasped by button 396 and drawn toward the observer in Fig. 6. This rod which slides in the frame or through the box of switch 392 is balanced by spring 397 and connected by cable 398 to the short end of lever 384 which carries the roller 388. Thus roller 388 is returned to the position shown in Figure 6 and switch 381 is closed, starting the motor. The rotation of the motor turns sprocket 363 bringing groove 376 opposite pin 375 in shaft 365. Spring 378 advances gear 363 causing pin 375 to enter said groove whereby operation of the parts of the machine driven by motor 353 is resumed.

The motor wiring 391, Fig. 5, is shown as leading to a solenoid, not shown, but mounted in a casing 399 this solenoid has a core not shown which is drawn downwardly by a spring not shown, the spring and solenoid core are connected to a vertically sliding rod 400 which is connected centrally of a toggle 401 which controls motor brake shoes 402 on motor 353. This is a recognized type of brake. When the circuit is closed the brake is released and when it is opened the brake is applied by the said spring. Various types of brake may be employed, the purpose being to stop the motor and the parts directly driven thereby instantly as the overload stop motion, Fig. 6, operates.

The objects and the accomplishment of the invention and the operation of the machine have been fully discussed in the preamble and in the detailed description of the elements of the machine shown and described is an example of a practical embodiment of the invention.

I have thus described a machine embodying the invention, the description being specific and in minute detail in order that the construction and operation of a machine embodying the various features of the invention may be fully disclosed for the benefit of those familiar with case filling and similar machines and hence able to understand this machine: however the specific terms herein are used in a descriptive rather than in a limiting sense, the construction disclosed being regarded as a practical embodiment of the invention of which other forms are contemplated.

What I claim as new and desire to secure by Letters Patent is:

1. A machine for removing bottles from compartment cases comprising means for advancing each case in turn with a step by step motion bringing each row of compartments in the cases in turn to rest in a predetermined bottle row gripping position the cases and bottles being upright, bottle row gripping means, a bottle row support spaced from said gripping position, means for moving said bottle row gripping means on a path extending from bottle row gripping position to position to deposit bottles on said bottle row support and back to gripping position, and means for operating said gripping means to alternately grip and release rows of bottles in said positions, in the case and in upright position on the support respectively whereby bottles comprising the rows in said predetermined position are removed from the cases and placed on said support, and the gripping means comprising a row of bottle neck gripping units each having bottle neck engaging jaws extending in the direction of said step by step motion of the cases the jaws being spaced apart transversely of said case motion, and being mounted to yield upwardly and outwardly, the path of the row gripping means comprising a downward and a forward motion, the latter being approximately parallel to the said case motion and taking place when said gripping means is in said depositing relation to the bottle row support, the jaws of the respective units are engaged in turn with the bottle necks of each row in said predetermined row gripping positions and disengaged therefrom in a releasing position in which the bottles are on said bottle row support.

2. A machine for removing bottles from compartment cases comprising means for advancing the cases with a step by step motion bringing rows of compartments in the cases in turn to a predetermined bottle row gripping position for the bottles therein, bottle row gripping means comprising a row of bottle gripping units, a bottle row support spaced rearwardly from said gripping position, means for moving said bottle row gripping means on a path from bottle row gripping position to position to deposit bottles on said bottle row support and back to gripping position and means for operating said gripping means to alternately grip and release rows of bottles in said respective positions, in the case and on said support respectively, whereby bottles comprising the rows in said predetermined position are removed from the cases and deposited on said support, each gripping unit having a flexibly supported depending member extending beyond the bottle gripping units to guide bottles to the gripping units and to partially prevent tipping of the bottles upon their release.

3. Means for removing rows of upright bottles from compartment cases comprising a gripper

member mounted to move on a predetermined path having horizontal and vertical courses and including a row of bottle neck gripper units, each unit having a pair of bottle neck gripping jaws movably mounted and having resilient means whereby they are urged towards each other, said jaws being adapted to receive the thrust of a bottle neck applied in the direction of the bottle axis and to yield to said thrust to admit the bottle neck between the jaws and to close on the neck to grip the same, each unit being open on one side horizontally and in the direction of a horizontal course of said path and transverse to the bottle axis, a support for the cases and means for locating each case in a succession of positions in each of which a row of bottles, is in the path of the grippers with their axes aligned therewith, a conveyor for bottle rows spaced from said gripping position, means for moving the gripper member in said path whereby the gripper units are moved into contact with the bottle necks of each said row in the direction of the bottle axes and toward the center of each bottle and thus caused to grip the necks, said moving means also moving the gripper member to transfer the bottles to said conveyor and to thereafter move the gripper member in a horizontal direction opposite to the direction of said openings in the gripper units to release the jaws of the gripper units from the bottles.

4. Means for removing rows of bottles from compartment cases comprising a gripper member mounted to move on a predetermined path having horizontal and vertical courses and including a row of bottle neck gripper units, each unit having a pair of bottle neck gripping jaws movably mounted and having resilient means whereby they are urged towards each other, said movable jaws being adapted to receive the thrust of the bottle neck applied in the direction of the bottle axis and to yield to said thrust to admit the bottle neck between the jaws and to close on the neck to grip the same, each unit being open on one side horizontally and in the direction of a horizontal course of said path transverse to the bottle axes, a support for the cases and means for locating each case in a succession of positions in each of which a row of bottles, is in the path of the gripper member with their axes aligned therewith, a conveyor for bottle rows spaced from said gripping position, means for moving the gripper member on said path whereby the gripper units are moved into contact with the bottle necks of said row in the direction of the bottle axes and thus caused to grip the necks, said moving means moving the gripper member to transfer the bottles to said conveyor in upright position and to thereafter move the gripper member horizontal in a direction opposite to the direction of said openings in the gripper units to release the jaws of the gripper units from the bottles, a gate and means for moving the gate to a position parallel to said row on the conveyor and in front of the same as each row of bottles is placed thereon and removing it after the bottles of each row are released, said position being adjacent to and on the side of the row of bottles opposite that towards which the openings in the gripper units are disposed, to prevent displacement of the bottles when the gripper units are thus released.

5. In a machine for removing bottles from compartment cases, a gripper comprising a row of bottle neck gripper units, means for moving the gripper on a path comprising vertical and

substantially horizontal portions, means for moving the cases with the bottles upright, bringing the rows of bottles therein, in turn, to a take up position in which the necks of the bottles project upwardly into a portion of the path in which the grippers move downwardly, the gripper units having yielding means for admitting and thereafter gripping the necks which are thus brought into engagement with the respective units, a support for the rows of bottles, each gripper unit being open horizontally in a direction to permit the release of the bottle necks upon the substantially horizontal movement of the grippers, said last named movement being timed to take place when each row of bottles is on the support, the said path extending between the take up position and support and back to take up position.

6. In a machine for removing bottles from compartment cases, a gripper comprising a row of bottle neck gripper units, means for moving the gripper on a path comprising vertical and substantially horizontal portions, means for moving the cases with a step by step motion with the bottles upright bringing the rows of bottles therein, in turn, to take up position in which the bottles are stationary and the neck of each bottle in the row projects upwardly into a portion of the path in which a corresponding gripper unit moves downwardly, the gripper units having yielding means for admitting and thereafter gripping the necks in the downward portion of said path which necks are thus brought into lifting engagement with the respective units, a support for receiving the deposit of the rows of bottles, the gripper path extending between said take up position and the deposit position, the grippers being adapted to bring the successive rows engaged by the grippers to the support, each gripper unit being releasable when moved substantially horizontally away from the support, said support comprising a bottle row conveyor, means for moving said bottle row conveyor with a step by step motion having dwells whereby the conveyor is stationary when the rows of bottles are placed thereon.

7. In a machine for removing empty bottles row by row from compartment cases, means for gripping a row of bottles in take up position and lifting them and depositing them in a predetermined location, means for supporting each case in turn beneath said gripping means, means for moving cases on said support with a step by step motion bringing each row of bottles in each case in turn to said take up position, said means for moving the cases comprising a rack adapted to apply a thrust to the cases on said support, said rack being mounted to move transversely to the length of said rows and having teeth corresponding to the respective rows of compartments in a case and a reciprocating pawl for engaging said teeth and advancing the rack imparting the said step by step motion to a case on said support, means tending to withdraw the rack in a direction opposite to the case motion, a check for preventing the withdrawal of the rack between the strokes of the pawl and means for releasing said check when the rack is fully advanced to permit its withdrawal, providing for the introduction of a new case into the path of said rack as each case in turn is emptied.

8. In a machine for removing bottles from compartment cases, means for gripping rows of bottles and lifting them from the cases and placing them in a predetermined location and for releasing the gripping means, said gripping means

being adapted to engage rows of bottles in a predetermined gripping position, means for supporting cases with rows of bottles in and adjacent said gripping position, means for advancing said cases with a step by step motion bringing the rows successively to said gripping position, said means for advancing the cases comprising a rack adapted to apply a thrust to the cases on said support, said rack being mounted to move transversely to the length of said rows and having teeth corresponding to the respective rows of compartments in a case and a reciprocating pawl for engaging said teeth and advancing the rack, imparting the said step by step motion to a case on said support, means for placing said advancing means in condition to receive and advance a new case after each case in turn is emptied and conveyor means arranged in transverse relation to said step by step motion for bringing cases to and placing them on said support in operative relation to said advancing means said conveyor means forming a line of cases leading to the initial position of the cases advanced by said step by step motion.

9. In a machine for removing bottles from compartment cases, means for gripping bottles and removing them from the cases and placing them in a predetermined location and for releasing the gripping means, said gripping means being adapted to engage bottles in a predetermined gripping position, means for supporting cases with bottles in and adjacent said gripping position, means for advancing said cases with a step by step motion bringing the bottles successively to said gripping position, means for placing said advancing means in condition to receive and advance a new case after each case in turn is emptied, and conveyor means arranged in transverse relation to said step by step motion for bringing cases to and placing them on said support in operative relation to said advancing means and in the initial position for advancement by said advancing means, said conveyor means forming a line of cases leading to the initial position of the cases advanced by said step by step motion, a detector and yielding means whereby the detector tends to enter the path of the cases in said initial position at the extreme forward end of said line and means controlled by said detector for stopping said case advancing means, and said bottle gripping and removing means when said detector is in said path during predetermined intervals and means for determining said intervals relative to said advancing means whereby the controlled means is operative when and only when said advancing means is ready to receive a new case.

10. In a machine for removing bottles from compartment cases, means for gripping bottles and removing them from the cases and placing them in a predetermined location and for releasing the gripping means, said gripping means being adapted to engage bottles in a predetermined gripping position, means for supporting cases with bottles in and adjacent said gripping position, means for advancing said cases with a step by step motion bringing the bottles successively to said gripping position, means for placing said advancing means in condition to receive and advance a new case after each case is emptied and conveyor means for bringing cases to and placing them on said support in operative relation to said advancing means and in the initial position for advancement by said advancing means a detector and yielding means whereby the detector

tends to enter the path of the cases in said initial position and means controlled by the detector for stopping said case advancing means in the absence of a supply of cases delivered to said position sufficient to take the place of those advanced by said advancing means and delay means for said controlled means timed in correspondence with said advancing means whereby the controlled means is effective only when the advancing means is in condition to receive a new case.

11. In a machine for removing bottles from compartment cases, means for gripping bottles and removing them from the cases and placing them in a predetermined location and for releasing the gripping means, said gripping means being adapted to engage the bottles in a predetermined gripping position, means for supporting cases with bottles in and adjacent said gripping position, means for advancing said cases from an initial position with a step by step motion bringing the bottles successively to said gripping position, means for placing said advancing means in position to receive and advance a new case after each case is emptied, and conveyor means arranged in transverse relation to said step by step motion for bringing cases to and placing them in turn on said support in said initial position in operative relation to said advancing means, a source of power for driving the machine said case feeding conveyor being independent of said source, a detector and means whereby it tends to enter the path of the cases in said initial position at the extreme forward end of the said line of cases as fed by said conveyor, and means controlled by said detector for cutting off said first source of power and timing means correlated with said advancing means limiting said operation to instances, when said detector is within said case position for a predetermined period of the operation after said advancing means has been ready to receive a new case, said period being sufficient to permit a new case to fully occupy said initial position.

12. In a machine for removing bottles from compartment cases, means for gripping bottles and removing them from the cases and placing them in a predetermined location and for releasing the gripping means, said gripping means being adapted to engage bottles in a predetermined gripping position, means for supporting cases with bottles in and adjacent said gripping position, means for advancing said cases with a step by step motion bringing the bottles successively to said gripping position whereby each case in turn is emptied and conveyor means operating independently of the elements of said machine and arranged in transverse relation to said advancing means for bringing cases to and placing them on said support in an initial position in operative relation to said advancing means, forming a line of cases leading to said initial position the latter being in operative relation to said advancing means, said advancing means serving to remove each case in turn from the line when empty, a detector resiliently controlled to enter the path of the cases in said initial position, means controlled by said detector for stopping the said advancing means and said gripping means when said detector enters said path and delay means connected to operate in timed relation to said advancing means for preventing the operation of said stop means and permitting said operation after the elapse of a predetermined interval fol-

lowing the advancement of each empty case by said advancing means out of said line of the cases said interval being sufficient for the normal advancement of the case into said initial position.

13. In a machine for removing vertical bottles from compartment cases, means for advancing the cases of bottles with a step by step motion bringing the bottles in each compartment in turn to a gripping position, a support for bottles spaced from said position and means for gripping the bottles in said position, stationary guiding means to turn each separate bottle to vertical position under said gripping means when it is advanced to gripping position and prior to its engagement by said gripping means, means for moving the gripper to grip the bottles, remove them from the cases and place them on the support.

14. In a machine for removing bottles from compartment cases, means for advancing the cases bringing the bottles in each compartment in turn to a gripping position, a support for bottles spaced from said position and means for gripping the bottles in said position and removing them from the case and placing them on the support, guiding means extending transversely of the direction of movement of said advancing means to align each bottle separately with its respective gripping means when it is advanced to gripping position and prior to its engagement by said gripping means.

15. In a machine for removing bottles from compartment cases, means for advancing the cases with a step by step motion bringing the successive rows of bottles in each compartment in turn to a gripping position, a support for bottles spaced from said position and means for gripping the rows of bottles in said position, removing them from the case and placing the rows end to end on the support and a row of bottle positioning means parallel to said gripping means in the path of the rows of bottles as they approach gripping position to locate the necks of the bottles in correspondence with the gripping means.

16. In a machine for removing bottles from compartment cases, means for advancing the cases with a step by step motion bringing the rows of bottles in turn to a gripping position, a support for the rows of bottles spaced from said position, a gripper assembly comprising a row of gripper units for gripping the necks of the bottles in the rows in said position, means for moving the said assembly on a path during which the gripper units grip the bottles, remove them from the cases and place them on the support, and a row of bottle positioning means parallel to said row of gripper units and in the path of the rows as they approach said gripping position, said positioning means comprising two guide surfaces for each unit adapted to admit and to span the respective bottles composing the rows approaching gripping position and conveying in the direction of the case motion to locate the bottle necks in correspondence with the spacing of the gripper units and said path.

17. In a machine for removing rows of bottles from compartment cases, means for advancing the cases bringing the bottle rows in turn to a gripping position, a support for the removed bottles spaced from said position, a gripper assembly comprising a row of gripper units one for each bottle in a row, for gripping the rows of bottles in turn and means for moving the gripper assembly in successive cycles each including a down-

ward motion of the grippers in line with the bottle axes which are upright and in which cycles the gripper units grip the bottles on said downward motion, remove them from the cases and

5 place them on the support, each unit having on its side which is remote from the bottle support in the bottle gripping position of the gripper a movable member with yielding means controlling the same, said member being movably supported at its upper end on said assembly whereby it normally extends downwardly over and beyond said gripper preventing escape of the bottles from the gripper units in a direction opposite to the case motion, said member yielding upwardly and in the direction opposite to said advancement engaging the bottles as the gripper assembly approaches each row of bottles serving as a guide to bring misplaced bottles into alignment with the corresponding gripper units.

18. In a machine for removing bottles from compartment cases, a bottle row gripping assembly, means for moving the cases with a step by step motion to bring rows of bottles therein in turn to a predetermined gripping position, a bottle row support for the removed bottles, said support being spaced from said position, a gripper assembly comprising gripper units, means for moving said assembly on a path, a portion of which approximately follows the axes of the necks of the bottles of a row of bottles in said position into gripping relation with said necks, said path also extending in bottle depositing relation to said support, said respective gripper units having jaws yieldingly mounted to admit the bottle neck when inserted therein in the direction of the bottle axis and to thereafter grip said neck, said jaws being spaced apart in gripping position and open toward said support in the gripping position of the gripping assembly and oppositely to said support, means normally closing each unit to prevent release of the bottle necks in the direction opposite to the support, said gripper path also including a motion of the gripper assembly in said depositing relation to the support in the direction in which said closing means is forward to release the bottle necks.

19. In a machine for removing bottles from compartment cases, a bottle row gripping assembly, means for moving the cases with a step by step motion to bring rows of bottles therein in turn to a predetermined gripping position, a bottle row support spaced from said position, a gripper assembly comprising gripper units, means for moving said assembly on a path, a portion of which approximately follows the axes of the necks of the bottles of a row of bottles in said position into gripping relation therewith, said path also extending in bottle depositing relation to said support, said respective gripper units having jaws yieldingly mounted to admit the bottle neck when inserted therein in the direction of the bottle axes and to thereafter grip said necks, said jaws being spaced apart and open in the direction of case motion, yielding means for normally closing each unit to prevent release of the bottle necks, said gripper path also including a motion of the gripper assembly in said depositing relation to the support and opposite to the case motion to release the bottle necks, means for preventing the bottles from moving with the gripper units in said latter gripper motion and means for moving said preventing means into operative position ahead of said latter gripper motion.

20. In a machine for removing rows of bottles

from compartment cases, means for advancing the cases with a step by step motion with the bottles upright bringing each row of bottles in turn to a predetermined gripping position, a gripper assembly comprising a row of gripper units, means for moving the gripper assembly on a path which comprises a downward motion of the units composing said assembly on lines coincident with the axes of the bottles in said position, into gripping relation to and with the bottles in a row said gripper units each comprising gripping means adapted to yield and admit the bottle necks in the direction of said axes and to thereafter grip the bottle necks providing a lifting engagement of the bottle by the gripper, each gripper unit having in addition to said gripping means a member pivoted at its upper end to said unit and extending downwardly therefrom well below said gripping means contacting the bottles on one side only to guide the bottle necks into the gripping means as the gripper assembly descends.

21. In a machine for removing rows of bottles from compartment cases, means for advancing the cases with a step by step motion with the bottles upright bringing each row in turn to a predetermined gripping position, a support for the bottles spaced from said position, a gripper assembly and means for moving the same on a path which comprises a downward motion of the grippers composing said assembly in coincidence with the axes of the necks of the bottles in said gripping position and into gripping relation with said necks, said path also bringing the gripper assembly into bottle depositing relation to the support, said gripper assembly being composed of a row of gripper units each of which comprises gripping jaws open in the direction toward said support in the gripping position and adapted to yield and admit the bottle necks in an axial direction and to thereafter grip the bottle necks providing a lifting engagement of the bottles with the gripper units, each gripper unit having a member supported at its upper part on said unit and extending downwardly on the side of the unit remote from the support in said gripping position to guide the bottle necks into the gripping means as the gripper assembly descends, said gripping jaws of the units releasing the bottles through the jaw openings onto the support.

22. In a machine for removing rows of bottles from compartment cases, means for advancing the cases with a step by step motion with the bottles upright bringing each row in turn to a predetermined gripping position, a support for bottle rows spaced from said position, a gripper assembly and means for moving the same on a path which comprises a downward motion of the grippers composing said assembly in coincidence with the axes of the necks of the bottles into gripping relation with said necks of a row in said gripping position said path bringing the gripper assembly into bottle depositing relation to the support, said gripper assembly being composed of a row of gripper units each of which comprises gripping jaws open for release of the bottle necks on the side of said jaws which is towards the support in said gripping position and adapted to yield and admit the bottle necks in an axial direction and to thereafter grip the bottle necks providing a lifting engagement of the bottles with the gripper units, each gripper unit having a member supported at its upper part on said unit and extending downwardly on the side opposite the support in said gripping position to guide

the bottle necks into the gripping means as the gripper assembly descends, said gripper path also including a motion in the direction opposite to said opening and at said depositing position of the grippers, to release the bottles on the support, and means connected to move in time with the gripper assembly into supporting relation with the sides of the bottles of each row on the side opposite to said opening for preventing motion of the bottles in said latter direction from the support whereby their release is facilitated.

23. In a machine for removing articles from compartment cases, a gripper, means moving the gripper on a path, means for moving the cases with a step by step motion providing stationary periods between steps to bring all the articles in a case in upright position in turn to a takeup position in which part of the articles in the case are in the path of the gripper ready to be engaged thereby in gripping relation, guiding means extending transversely of the direction of movement of said moving means to align each article separately with its respective gripper when it is advanced to take up position and prior to its engagement by said gripper, a support for the articles, the gripper path including a motion extending to and from said take up position in gripping relation to the bottles into depositing relation to the support to bring the articles in turn as engaged by the gripper, in an upright position of equilibrium to the support, releasing means adapted to release the articles on the support.

24. In a machine for removing bottles from compartment cases, means for gripping rows of bottles and lifting them from the cases and placing them in a predetermined location and for releasing the gripping means, said gripping means being adapted to engage rows of bottles in a predetermined gripping position, means for supporting cases with rows of bottles in and adjacent said gripping position, means for advancing said cases in turn with a step by step motion from an initial gripping position in which the first row of bottles is in said predetermined gripping position, bringing the rows successively to said initial gripping position until each case in turn is emptied and advanced, means for withdrawing said advancing means after each case is thus emptied and advanced, means for presenting cases to said initial position on said support in operative relation to said advancing means, a detector and means tending to advance the detector into the path of the cases in said initial position on the support, and means connected to said detector to be controlled thereby to stop said advancing means and gripping means when said detector is in said path, and means controlling said stopping means to limit its said operation to periods spaced after withdrawal of the advancing means by a period sufficient to advance a case of the kind being handled by the machine into operative relation to the advancing means.

25. In a machine for removing bottles from compartment cases, means for gripping rows of bottles and lifting them from the cases and placing them in a predetermined location and for releasing the gripping means, said gripping means being adapted to engage rows of bottles in a predetermined gripping position, means for supporting cases with rows of bottles in and adjacent said gripping position, means for advancing said cases in turn with a step by step motion from an initial gripping position in which the first row of bottles is in said predetermined gripping position, bringing the rows successively to said gripping posi-

tion until each case is emptied and advanced, clearing said initial position and conveyor means arranged in delivery relation to said advancing means for bringing cases to and placing them on said support in operative relation to said advancing means, a detector and means tending to advance the detector into the path of the cases in said initial position on the support, and means connected to said detector to be controlled thereby to stop said advancing means and said gripping means, and means controlling said stopping means to limit the said operation to periods in which there is a space in said initial position of the cases sufficient to admit a case of the kind being handled by the machine, said controlling means having timing means to prevent action of the stopping means for a period sufficient for each new case in moving across the area occupied by the previous case to initial gripping position, in which it would support said detector, holding it out of the path of the cases.

26. In a machine for lifting bottles from cases, said machine having case presenting means whereby the cases are presented with the bottles approximately upright, the bottles in the case being thus brought successively to a take up position and bottle receiving means located adjacent said take up position, a bottle neck gripper assembly having automatically operating neck gripping means, means for moving the gripper assembly on a path whereby it grips the neck of a bottle in said take up position and raises the bottle, and deposits it on the said receiving means said path including an approximately up and down motion and a motion transverse to said up and down motion near the top of said path whereby the bottles are in turn picked up and deposited on said receiving means and a yielding guide flap depending from gripper assembly on its side and extending below the gripper to guide the bottle neck into said gripper and, tending to prevent its displacement by said transverse motion, said guide flap being pivotally mounted on a transverse axis spaced in the direction of said transverse motion from the center of said bottle neck gripper.

27. In a machine for removing bottles from cases having a case presenting means whereby the cases are presented with the bottles approximately upright, the bottles in the case being brought successively to a take up position, approximately horizontal bottle receiving and supporting means located adjacent said take up position, a bottle neck gripper assembly having automatically operating neck gripping means, means for moving the gripper assembly on a path including both vertical motions and horizontal motions, from said take up position to depositing position on said receiving and supporting means and returning to said take up position, said neck gripping means being open for the width of the bottle neck in the direction of the horizontal motion of the gripping means from the depositing position to the take up position, whereby the gripper assembly grips the neck of a bottle in said take up position and raises the bottle and deposits it in an upright position of equilibrium on the said receiving means, the horizontal motion of the gripper assembly in returning to take up position serving to release said neck gripping means, and a yielding guide flap depending from the gripper assembly on the side of said gripping means which is forward from the releasing position and extending below the gripping means to guide the bottle neck in to said

gripping means, said guide flap being swingably mounted on a horizontal axis spaced from said bottle neck gripper assembly on the side of the gripper opposite the flap whereby the lower portion of the flap yields upwardly and in said forward direction when the downward motion of said lower portion is checked relatively to the downward motion of the gripper assembly.

28. In a machine for lifting bottles from cases means for moving the cases on a predetermined path to bring the bottles in turn in approximately upright attitude to bottle neck gripping position, bottle receiving means rearwardly of said position, a bottle neck gripping assembly having a bottle neck gripper which grips the necks when brought into engagement with the necks on a predetermined path, means for moving the said assembly downwardly to and along said predetermined path into gripping relation with the neck of a bottle in said position and for thereafter moving it on a predetermined path having upwardly, rearwardly and forwardly extending portions in depositing relation to said receiving means and a yielding guide flap depending from said assembly and extending below said gripper on its forward side and adapted to engage the forward side of the bottles to straighten them and align the necks with the gripper in a fore and aft upright plane.

29. In a machine for lifting bottles from cases means for moving the cases on a predetermined path to bring the bottles in turn in approximately upright attitude to bottle neck gripping position, bottle receiving means located rearwardly of said position, a bottle neck gripping assembly having gripping means which grips the necks when brought into engagement with the necks on a predetermined path, means for moving the said assembly forwardly and downwardly to and along said predetermined path into gripping relation with the neck of a bottle in said position, and for thereafter moving it on a predetermined path having upwardly and rearwardly extending portions and a yielding guide flap depending from said assembly and extending below said gripper on its forward side and adapted to engage the forward sides of the bottles to straighten them and align the necks with the gripper in a fore and aft upright plane, and horizontally operating guiding means located rearwardly of and adjacent said bottle neck gripping position for erecting and aligning the bottle with the gripper in a vertical plane transverse to said fore and aft plane, the engagement of said flap with the forward side of the bottle serving to hold it in contact with said guide.

30. In a machine for lifting bottles from cases in which the bottles are in approximately upright attitude in bottle neck gripping position, bottle receiving means located adjacent said position, a bottle neck gripping assembly having a bottle neck gripper which grips the necks when brought into engagement with the necks on a predetermined path, said gripper having fore and aft extending neck engaging jaws, means for moving the said assembly downwardly to and along said predetermined path into gripping relation with the neck of a bottle in said position and for thereafter moving it on a predetermined path having upwardly and rearwardly and forwardly extending portions, the latter in depositing relation to said receiving means, and a yielding guide flap depending from said assembly and extending below said gripper on its forward side and adapted to engage the forward side of the bottles to

straighten them and align the necks with the gripper in a fore and aft upright plane, and a gate for preventing forward motion of the bottles from said receiving means and means for moving the gate into operative position in front of the bottles on said receiving means prior to the end of said forward motion of each depositing motion and for thereafter removing it.

31. In a machine for lifting bottles from cases in which the bottles are in an approximately upright attitude in bottle neck gripping position, bottle receiving means for the removed bottles located rearwardly of said position a bottle neck gripping assembly having a bottle neck gripper which grips the necks when brought into engagement with the necks on a predetermined axial path as related to the bottles being handled, said gripper comprising upwardly opening jaws having gripping edges extending in a fore and aft direction, means for moving the said assembly forwardly and downwardly to and along said predetermined path into gripping relation with the neck of a bottle in said position and for thereafter moving it on a predetermined path having upwardly and rearwardly and forwardly extending portions the latter in depositing relation to said receiving means, and a yielding guide flap having a portion depending from said assembly and extending below said gripper on its forward side and adapted to engage the forward side of the bottles to straighten them and align the necks with the gripper, said flap being mounted to swing approximately about a transverse axis located rearwardly of the gripper.

32. In a machine for lifting bottles from cases, means for moving the cases on a predetermined path to bring the bottles in turn in approximately upright attitude to bottle neck gripping position, bottle receiving means located rearwardly of said position, a bottle neck gripping assembly moved in a predetermined path and having a bottle neck gripper which grips the necks when brought into engagement with the necks in said predetermined path, means for moving the said assembly forwardly and downwardly to and along said predetermined path into gripping relation with the neck of a bottle in said position and for thereafter moving it on said predetermined path having upwardly and rearwardly extending portions and a yielding guide flap having a portion depending from said assembly and extending below said gripper on its forward side and adapted to engage the forward side of the bottles to straighten them and align the necks with the gripper, said flap being mounted to swing approximately about a transverse axis located rearwardly of the gripper, said guide flap having a portion extending forwardly from said axis and said depending portion extending downwardly from said forwardly extending portion.

33. A bottle neck gripper having a pair of opposed gripping jaws pivoted to swing upwardly to admit a substantially vertical bottle neck in the direction of its axis and downwardly to clamp said neck, the gripping edges of said jaws being parallel and substantially horizontal, means for moving the gripper downwardly to engage the neck of an upright bottle and for then moving it upwardly and parallel to said edges of said jaws to a depositing position and then oppositely to said latter motion to release the gripper, the gripper having a depending guiding and retaining flap movably mounted on the gripper to engage the side of the bottle which is transverse to the substantially horizontal path of motion im-

parted to said grippers and at the extremity of said path when the gripper is in clamping position.

34. A bottle neck gripper as per claim 33, having a support to receive the bottles in said depositing position and a gate and means for moving the gate into position in the path of the bottles on said support in time with and ahead of said releasing movement of the gripper and for removing the gate from said position.

35. A bottle neck gripper as per claim 33, in which said flap has a supporting arm extending over and across to the opposite side of the gripper, the same being pivotally mounted at its end removed from the flap to move with the gripper and to swing upwardly relatively thereto.

36. A bottle neck gripper having a pair of opposed approximately horizontal jaws with parallel gripping edges, the jaws being yieldingly mounted to admit a bottle neck in a vertical direction between said edges, means for moving said gripper on a path, including a downward motion to engage the neck of a bottle in upright position, said path including a subsequent motion to a bottle depositing position, with the bottle upright, and the motion of the gripper in a direction of said parallelism from said depositing position, releasing the bottle by motion in the opposite direction of parallelism and means in the path of the bottle as it tends to move with the gripper in the releasing direction, to separate it from the gripper.

37. A bottle neck gripper as per claim 36, in which the gripper has a depending flap mounted to swing outward, radially from the axis of the gripped bottle and located on the side of the gripper which is forward in said releasing motion direction and engaging the bottle on said side.

38. A gripper as per claim 36, in which said means in the path of the bottle is a movable gate and means for moving the same into said path of the gripped bottle in said releasing motion and removing it therefrom.

39. In a machine for removing upright bottles from compartment cases, means for advancing a case step by step, each step bringing a row of bottles in turn to a gripping position, means for gripping the row of bottles in said position and for removing them from the case, said last named means including a gripping unit for each bottle, and means to guide the separate bottles when advanced by said advancing means to gripping position into alignment with the gripping means.

40. In a machine for removing upright bottles from compartment cases, means for advancing a case step by step, each step bringing a row of bottles in turn to a gripping position, means for gripping the row of bottles in said position and for removing them from the case, said last named means including a gripping unit for each bottle, means to move said gripping means on a path, the path including a vertical downward motion in line with the bottle axes when each bottle row is in gripping position and means to guide the separate bottles in the cases when advanced by said advancing means into alignment with said downward portion of the path of the gripping means.

41. In a machine for removing upright bottles from compartment cases, means for advancing a case step by step, each step bringing a row of bottles in turn to a gripping position, means for gripping the row of bottles in said position and for removing them from the case, said last named means including a gripping unit for each bottle, and means to guide the separate bottles when

advanced by said advancing means to gripping position into alignment with the gripping means, and means carried by the gripping means and reaching over the bottles after their advance by said advancing means to gripping position, in a direction opposite to their advance, constraining them toward said guiding means.

42. In a machine for removing upright bottles from compartment cases, means for advancing a case step by step, each step bringing a row of bottles in turn to a gripping position, means for gripping the row of bottles in said position and for removing them from the case, said last named means including a gripping unit for each bottle, means to move said gripping means on a path, the path including a vertical downward motion in line with the bottle axes when each bottle row is in gripping position and means to guide the separate bottles in the cases when advanced by said advancing means into alignment with said downward portion of the path of the gripping means, and means carried by the gripping means and reaching over the bottles after their advance by said advancing means to gripping position, in a direction opposite to their advance, constraining them toward said guiding means.

43. In a machine for removing upright bottles from compartment cases, means for advancing a case step by step, each step bringing a row of bottles in turn to a gripping position, means for gripping the row of bottles in said position and for removing them from the case, said last named means including a gripping unit for each bottle, and means to guide the separate bottles when advanced by said advancing means to gripping

position into alignment with the gripping means, and means carried by the gripping means and reaching over the bottles after their advance by said advancing means to gripping position, in a direction opposite to their advance, constraining them toward said guiding means, said reaching and constraining means yielding in the direction of their reaching and including means to restore them to their position prior to yielding.

44. In a machine for removing upright bottles from compartment cases, means for advancing a case step by step, each step bringing a row of bottles in turn to a gripping position, means for gripping the row of bottles in said position and for removing them from the case, said last named means including a gripping unit for each bottle, means to move said gripping means on a path, the path including a vertical downward motion in line with the bottle axes when each bottle row is in gripping position and means to guide the separate bottles in the cases when advanced by said advancing means into alignment with said downward portion of the path of the gripping means, and means carried by the gripping means and reaching over the bottles after their advance by said advancing means to gripping position, in a direction opposite to their advance, constraining them toward said guiding means, said reaching and constraining means yielding in the direction of their reaching and including means to restore them to their position prior to yielding.

45. A bottle neck gripper according to claim 33 in which the flap has means to constrain the same, to bring the bottles to vertical position.

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