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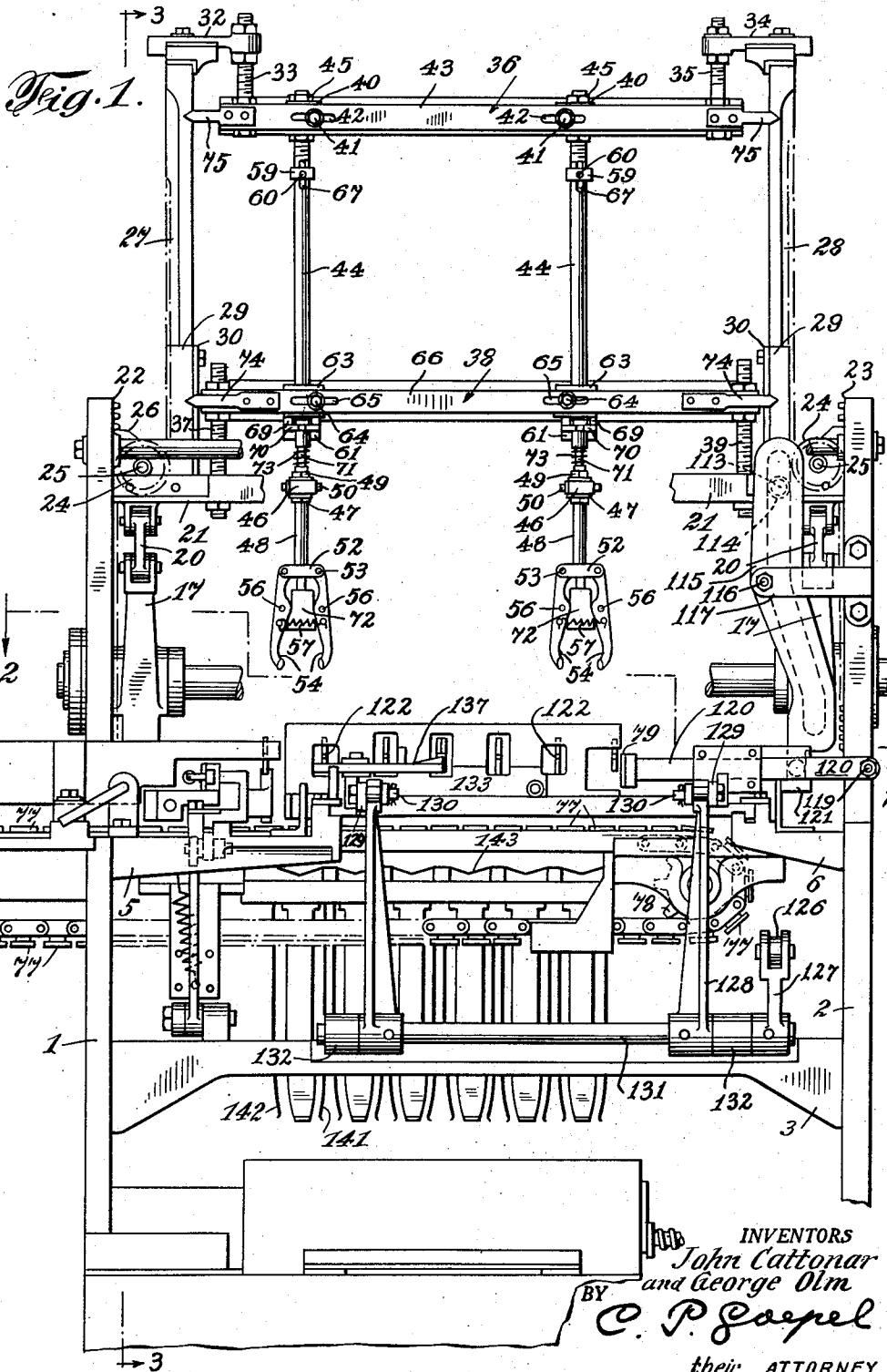
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2,371,027

BOTTLE PACKAGING MACHINE

Original Filed March 26, 1941

4 Sheets-Sheet 1



March 6, 1945.

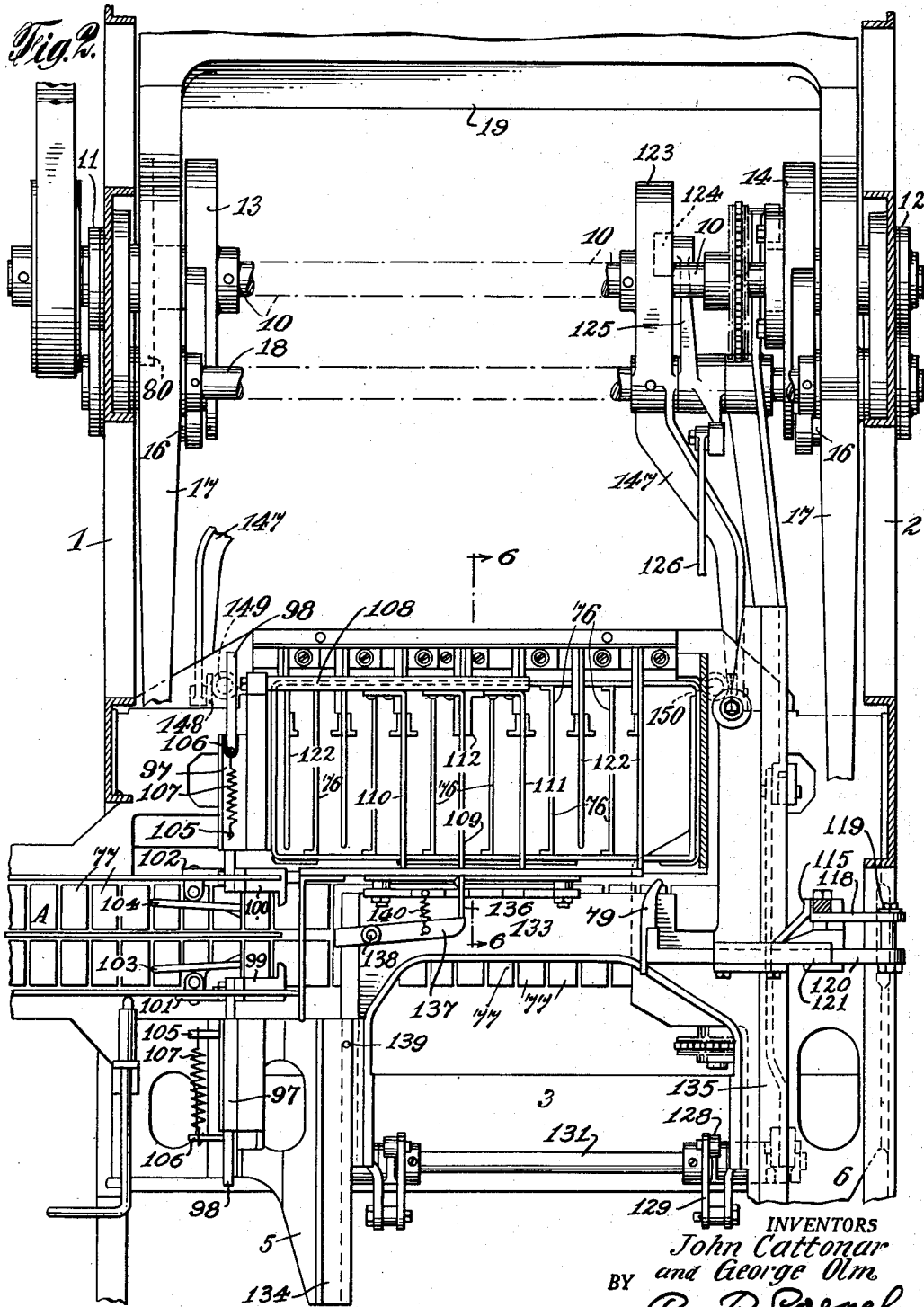
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Fig. 3.

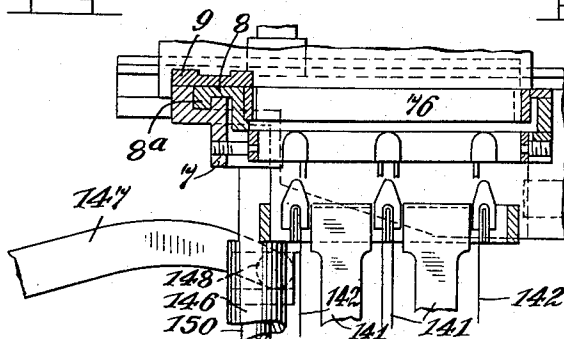
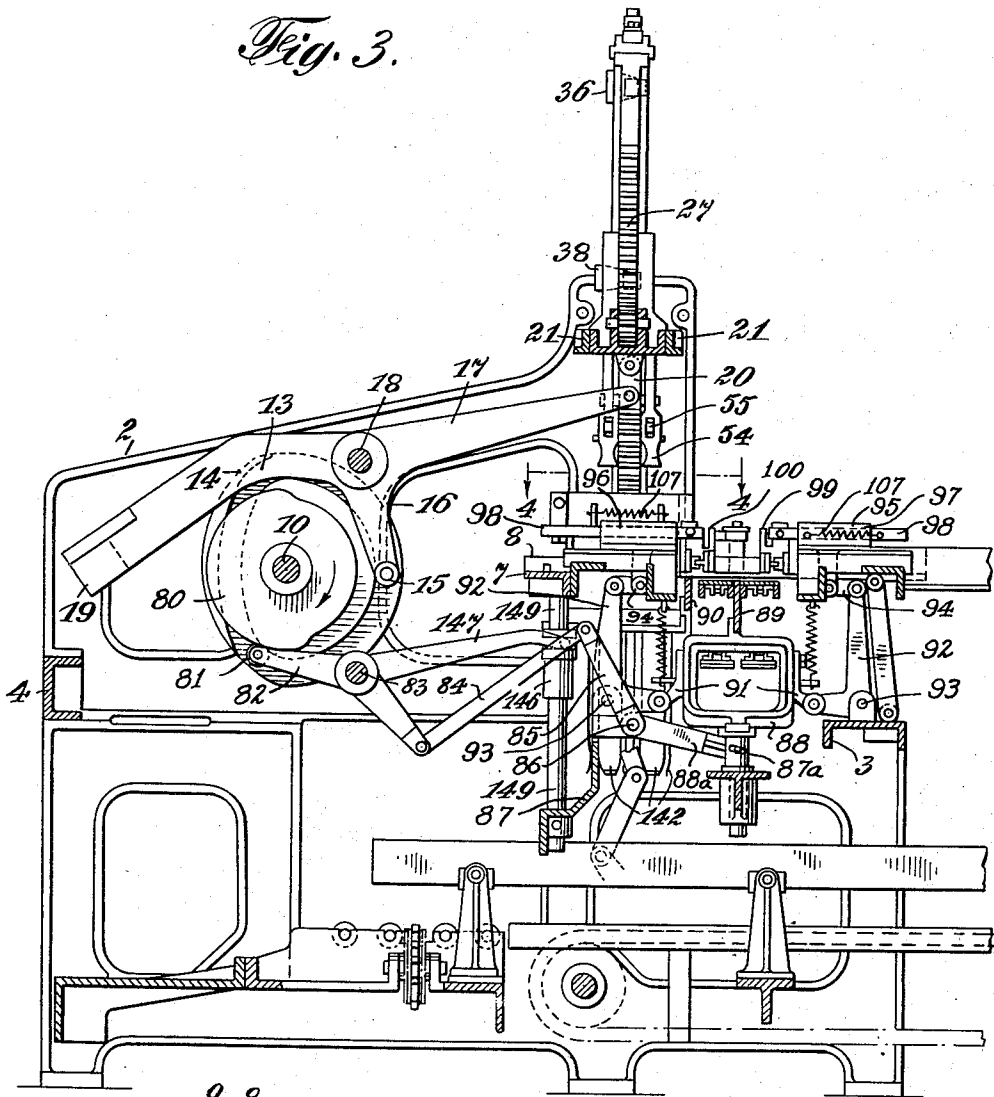


Fig. 6.

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Fig. 4.

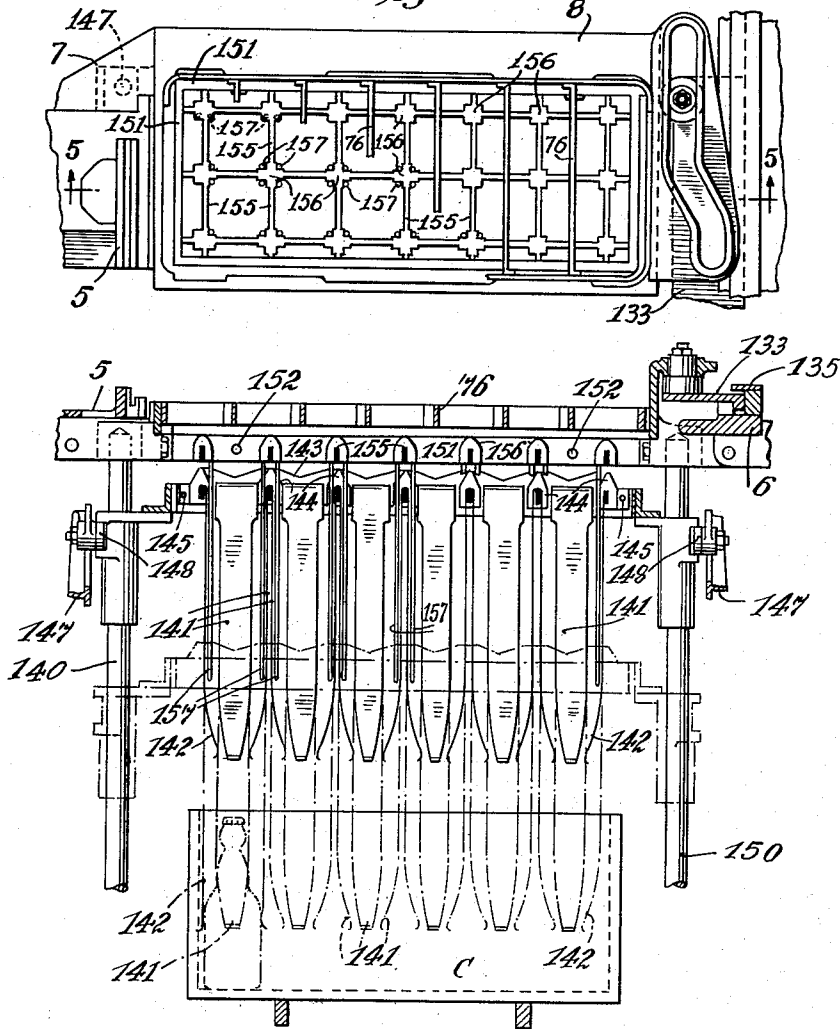


Fig. 5.

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UNITED STATES PATENT OFFICE

2,371,027

BOTTLE PACKAGING MACHINE

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Original application March 26, 1941, Serial No. 385,240. Divided and this application February 6, 1942, Serial No. 429,745

2 Claims. (Cl. 226—14)

This invention relates to improvements in packaging machines. More specifically, the present invention embodies improvements in the packaging machine described in our Patent No. 2,277,688, dated March 31, 1942, which describes the loading of bottles or jars or similar containers into boxes or cases or crates, having compartments to receive the bottles or containers.

This is a division of our application Serial No. 385,240, filed March 26, 1941, issued as U. S. Letters Patent No. 2,332,058 on October 19, 1943.

In packaging bottles, it sometimes happens that a bottle full of warm beer, or other beverage may explode while being handled by the machine. Sometimes a defective bottle having been overlooked by the inspector and having found its way to the machine, cannot be handled properly by the mechanisms of the machine. This invention provides a safe means of disposing of such a bottle and to deposit it in the proper cell assigned to it by the grouping means of the machine in the same manner as if it had not been damaged or broken by the explosion or become defective. It is better to deposit a defective bottle into the case than to have the defective bottle which went that far into the machine interfere with the good operation of the machine and create a breakdown of the bottling operation in the plant.

The invention includes a frame of chutes, located between a trap floor and a spring basket, including the frame of chutes proper and the motion of the spring basket in relation to the trap floor and cells formed by vertical rods. The end of the springs of the spring basket are already into the cells of the box or case at the time the bottle supporting strips of the trap floor are shifted from under the bottles to the spaces between the bottles, by the motion of a bottle slider previous to the gripping operation performed by a series of gripping devices. These gripping devices are designed to grip solidly the necks of a charge of bottles being handled by the machine and lower them through the spaces between the trap floor strips, through the frame of chutes and spring basket into the case to be loaded which is on a lower level. The charge of bottles is grouped by a grouping device which will group one row of bottles or a multiple number of rows of bottles and the number of bottles in any row or the number of rows of bottles corresponds with the number of gripping devices and the number of pockets and rows of pockets, to be loaded with bottles, in the partitioned case. The grouping of the charge of bottles is accomplished by means

of shutters located at one end of the grouping station, to shut off the flow of bottles on the conveyor feeding the machine; pressure building members next to the shutters, exert a desired amount of pressure on the first one or more bottles on the conveyor, thereby holding back the flow of bottles, and actuated by the same mechanism; a retractable bottle stopper at the other end of the grouping station, stops the bottles in the charge after a predetermined number have entered, and after the feed is shut off, to free the bottles in the charge so that the pressure they exert on each other, is eliminated; slidably mounted side guides advance partly into the center of the row of bottles farthest from the bottle slider; and a stopper mounted on the bottle slider advances partly into the centers of the row of bottles nearest to the slider.

The invention will be fully described hereinafter and embodiments shown in the drawings which illustrate a convenient arrangement of the novel features entering into our invention, it being understood that it is permissible to make slight changes of details to suit manufacturing requirements, without departing from the spirit of the present invention, defined within the scope of the appended claims.

In the accompanying drawings, illustrating the embodiment of the invention in a preferred way:

Figure 1 shows a front view of the improved machine with only two double gripping devices shown, although any number of these may be used, so as to suit the number of bottles in the longer or, lengthwise rows of the case to be loaded;

Figure 2 shows a top view taken at about the level of line 2—2 of Figure 1, the position of the bottle slider being in the proper relation to the position of the gripper jaws of Figure 1;

Figure 3 is a side elevation along a section taken on line 3—3 of Figure 1;

Figure 4 is an enlarged sectional view taken from line 4—4 of Figure 3 and shows the relation between the chute and the trap floor above it and the spring basket below it;

Figure 5 is a front elevation of Figure 4 taken at line 5—5 of Figure 4, with the spring basket shown at its upper position in full lines and at its lower position in broken lines; and

Figure 6 is a partial section taken on line 6—6 of Figure 2.

Referring to the drawings, the machine is contained in a frame work composed of walls 1 and 2

and cross members 3 and 4. Two large brackets of convenient shape support most of the mechanism on and about the bottle level, being indicated on the lefthand frame 1 by 5, and on the right hand frame 2 by 6. As seen in Figures 3 and 6, cross member 7 connects 5 and 6 and serves also as a guide into which a suitable projection 8a (Fig. 6) of a trap floor 8 is slidably mounted and covered with a cover 9.

The trap floor consists of a suitably cast frame between the longer sides of which are inserted bottle supporting strips 76.

The shifting of the trap floor, first to place strips 76 in position to support the bottles being slid over onto them by slider 133 and then to place them under the spaces between the bottles to permit lowering of the bottles by the gripping devices, as well as the mechanism operating slider 133, are fully described and illustrated in our Patent No. 2,277,688 of March 31, 1942.

As seen from Figures 1, 2 and 3, cam shaft 10 rotates in its bearings 11 and 12 of frames 1 and 2 respectively and carries cams 13 and 14 of the same contour, which impart the necessary motion to a gripper carriage, through rollers 15, followers 16 and levers 17 which rock on shaft 18, which is fast on frames 1 and 2. To counteract the weight of the gripper carriage and the bottles being handled, a counterweight 19 is bolted to the rear end of levers 17. Levers 17 connect through links 20 to a cross member 21, the two ends of which are guided by the flanged body of a rack 22, which is fast on frame 1 and a rack 23, which is fast on frame 2. On one end of cross member 21 one pinion 24 runs on pin 25, which is fast on bearing 26 which is part of cross member 21 and engages rack 22 and diametrically opposite engages rack 27; at the other end of 21 another pinion 24 similarly mounted engages rack 23 and diametrically opposite engages rack 28. Guides 29 fastened on the cross member 21 together with covers 30 present two vertical guides into which racks 27 and 28 slide during their vertical movement. The upper end of rack 27 through a bracket 32 and adjusting screw 33 connects with one end of a gripper carrier 36, and likewise the rack 28 through bracket 34 and adjusting screw 35 connects with the other end of gripper carrier 36. As best shown in Fig. 1, cross member 21 through adjusting screw 37 connects with one end of the interrupter carrier 38 and through adjusting screw 39 connects with the other end of interrupter carrier 38.

It will be apparent that the interrupter carrier 38 being directly connected with the pinion carrying cross member 21, will travel up and down a distance equal to the motion imparted to 21 by cams 13 and 14, follower 16, levers 17, etc. Again the gripper carrier 36 being directly connected to the free racks 27 and 28 will travel up and down at the same time and in the same direction as interrupter carrier 38, but at a speed equal to twice the speed of interrupter carrier 38. The distance between the gripper and interrupter carriers will decrease during their downward travel and correspondingly increase during their upward travel.

The difference in speed of the two carriers is utilized to operate the jaws 54 of the grippers so that, at a predetermined time they will lock the necks of the bottles of the charge which is being brought under the grippers by the action of the bottle slider 133.

Gripper carrier 36, Fig. 1, is a cast frame with a long slot in which are slidably mounted blocks 40 which can be shifted by means of set screws 41 in slots 42 of cover plate 43 to match perpendicularly the distance between the center of adjacent bottles in the row or rows being assembled on trap floor 8 below. A threaded tube 44 is inserted into each block 40 and fastened rigidly to it by nuts 45 at one (upper) end, while at its lower end, also threaded, is fastened frame 46 carrying blocks 47 into which are inserted and to which are fastened, by means of nuts 49, tubes 48 in the same fashion as tubes 44 are fastened to blocks 40 of gripper carrier 36. Also in the same fashion as blocks 40, blocks 47 with tubes 48 can be shifted by means of set screws 50 in slots of frame 46. The direction at which blocks 47 with tubes 48 are shifted is at 90° to the direction at which blocks 40 are adjusted with tubes 44. The result of this arrangement is that with blocks 40 the desired adjustment is obtained to match the distance between the center of adjacent bottles in the row or rows, while with blocks 47 the desired adjustment is obtained to match the distance between the centers of two adjacent rows of bottles of the charge being assembled previous to the gripping and loading operations. To the lower end of tubes 48 are fastened blocks 52 to which are hinged gripper jaws 54 on pins 53. (Figures 1 and 3.) Tension springs 57 of which each end is attached to one jaw 54, urge continuously the two jaws to lock, but their locking (gripping) and spring (releasing) operations depend entirely on the position on which rollers 55, Fig. 3, carried also by jaws 54 on pins 56 roll on the operative faces of the key 72.

So far, a rigid and direct connection has been described to exist all the way from gripper carrier 36 to gripper jaws 54 and rollers 55. Inside of tubes 44 and along all their length are slidably inserted round bars which connect with collars 59, slidably set around tubes 44, by means of screws 60 at a point near their upper end, while at their lower end they connect in the same fashion with threaded collars 61 also by means of screws, not shown.

The interrupter carrier 38, similar in construction to gripper carrier 36, carries blocks 63 which also can be shifted by means of set screws 64 in slots 65 of cover plate 66 to match blocks 40 thereabove. Tubes 44 are free to slide in blocks 63 of carrier 38 and also in threaded collars 61. Screws 60 of collars 59 and the screws of threaded collars 61 of the round bars inside of tubes 44 are free to run in the wall of tubes 44 along slots 67 above blocks 63 and along other slots, not shown, below collars 61 respectively. Between the shoulder of threaded collar 61 and nut 69 there is a loosely locked yoke 70 at each end of which is inserted a round bar 71 which slides in tube 48 and which at its lower end carries key 72 to operate the jaws 54 of the grippers. It will be observed from Fig. 1, that key 72 presents to each roller 55 to run on, two vertically straight faces and one sloped one between them.

The operation of the gripper jaws is now apparent. In their upward travel at the high rate of speed, racks 27 and 28 will take along gripper carrier 36, tubes 44 and 48 and their respective inner bars, jaws 54, keys 72 etc. to a point near the end of their upward travel at which the top face of nuts 69 will hit the lower face of blocks 63 on carrier 38 which travels at the lower rate of speed. This will cause the rate

of speed at which the bars inside of tubes 44 and 48, their relative screws and collars, key 72 etc. travel, to be retarded, while jaws 54, tubes 44 and 48 and all parts connected therewith continue at the same high rate of speed for the rest of their upward travel. Rollers 55 will therefor run off the lower (opening) face of key 72, over the slope to the upper (locking) straight face whereby, by action of spring 57, jaws 54 will lock the neck of the bottle therebetween. At this time the upward travel will cease, trap floor 8 will shift and with it the bottle supporting strips 76 from under the bottles and the gripping devices with the bottles locked will start their downward travel toward the case below.

In their downward travel again, all parts and the bottles will travel at the high rate of speed with racks 27 and 28, until the lower face of collars 59 will hit the upper face of blocks 63 of carrier 38 which travels at low speed; this will again retard the speed of the bars inside of the tubes, their relative screws, collars and key 72, while the tubes 44 and 48, jaws 54 and all parts connected therewith will continue at the high rate of speed for the rest of their downward travel; rollers 55 will run off the upper (locking) face of keys 72 up the slope to the lower (opening) face, and jaws 54 will be so spread apart and the bottles will be released.

Compression spring 73 on bars 71 act as shock absorber for the bottles; indicators 74 and 75 point to marks on guides 29 and racks 27 and 28, respectively, and indicate the different heights at which the carriers 36 and 38 should be set in order to grip and release at the proper time bottles of different heights.

To conveniently group a charge consisting of one or more rows of bottles, previous to the pushing, or sliding, gripping and lowering operations, a bottle feed conveyor A equipped with endless chains 77 of the conventional flat top style is shown in Figure 1. Chains 77 wind around driver sprockets 78 at one end and around idler sprockets at the other end, not shown, as well known. Sprockets 78 are driven in the conventional way, not shown, with roller chains and sprockets. Bottles are fed by the conveyor line coming from the labeling or other machine in the production line of the plant, to our conveyor A in one or more rows, two rows will be handled by the arrangement shown by the drawings, and chains 77 will convey them until the first bottle in the rows will stop at bottle stopper 79 (Figure 1).

At this point the flow of bottles on the conveyor is shut off and out as follows:

Cam 80 on camshaft 10 through roller 81 (Figure 3), follower lever 82 which rocks on shaft 83, link 84, arm 85 of which the other end is fastened on shaft 86 rocking on bracket 87 bolted on frame 1, and arm 88a which is also fastened on shaft 86 and of which the other end with roller 87a, enters a recess of yoke 88 will transmit motion to yoke 88. At the upper part of yoke 88 are fastened longitudinal guiding strips 89 and 90 which serve to guide the bottles in straight lines when they are up with yoke 88 and bottles are fed in front of slider 133 previous to the grouping and pushing operations.

Fastened at each side of yoke 88 are bearing brackets 91 to which are attached the end of the short arm of levers 92 which are pivoted on pins 93 rocking also one in bracket 87 and the other on member 3 of the framework (Figure 3). The end of the long arm of levers 92 through

links 94 connect to an extension, through bracket 5, of shutters 95 and 96.

Shutters 95 and 96 each consist of a casting slidably mounted on 5 and carry a box shaped member 97 into which slides bar 98 at the end of which are on one, gate 99 and on the other, gate 100 above chains 77 of conveyor A (Figure 3). At the same end of bars 98 are fastened bars 101 and 102 on which swiveling shoes 103 and 104 are set in (Figure 2). On the side of box shaped members 97 are fastened pins 105, and on bars 98 are fastened pins 106, tension springs 107 being hooked on the two pins so that bars 98 will be urged continuously forward until pins 106 abut against boxes 97, with the result that when shutters 95 and 96 move towards each other to shut off the flow of bottles, during part of their motion, gates 99, 100 shut the flow and shoes 103, 104 reach the side of the bottles. During the rest of the motion, shutters 95, 96 and boxes 97 continue their closing motion along bars 98 (Figures 1 and 2), extending springs 107 and causing them to exert a certain desired amount of pressure, on one or more bottles between them, through pins 106, bars 98, 101, 102, etc.

At the far end of the shutter 95 (Figure 2), a cross bar 108 is fastened, which carries three side guides 109, 110, 111, of which the central one 109 slides on guide 112 fastened on trap floor cover 9. These side guides will move forward against the bottles, with shutter casting 95 and will then stop with their forward ends in the spaces between the four central bottles.

Slightly before this point of the machine cycle, the bottles, being yet in two closed lines, will have to be freed from exerting any pressure on each other and at the same time they will have to be aligned as a single charge unit with the gripping devices before being pushed by slider 133 to trap floor 8 previous to the loading operation. This is accomplished by retracting bottle stopper 79 (Figure 1) in the following manner: Cross member 21 carries stud 113 with roller 114 which runs in track of vertical cam 115 which cam swings on stud 116 of bracket 117 fastened on frame 2. To the lower end of vertical cam 115 is attached link 118 which through stud 119 connects the cam to bar 120 of bottle stopper 79 which is slidably mounted in bracket 121 bolted on top of 6. In the upward travel of member 21, roller 114 in cam 115 will at the determined time swing the cam which will retract bottle stopper 79 of a necessary amount to line up the charge of bottles with the gripping devices. Other side guides 122 are provided, which are stationary and fastened on cover 9, which will partition the bottles when on the trap floor 8. These are shown and described in our Patent No. 2,277,638, to which reference is made.

The charge of bottles will now be handled by slider 133. In Figure 2, cam 123 on shaft 10 imparts motion to slider 133 through roller 124, follower 125 rocking on shaft 83, link 126, arm 127, levers 128, links 129 and studs 130. Arm 127 and levers 128 are fastened on shaft 131 which oscillates in bearings 132 fastened on cross member 3 of the framework. At the beginning of the forward travel of bottle slider 133, which is slidably mounted on top of bracket 5 with cover 134, and on bracket 6 with cover 135, stopper 136 on the end of the long arm of lever 137 goes also in action in the center of the row of bottles nearest to slider 133 to separate the half row near gate 99 from the half row near stopper 79.

At the time that bottles are grouped for the charge in front of slider 133, the short arm of lever 137, which swings on stud 138 fast on body of slider 133, rests on pin 139 fast on cover 134 and so the long arm of lever 137 retracts stopper 136 out of the path of the bottles traveling in front of slider 133. However, when the charge is grouped and the slider starts forward with it, the short arm of lever 137 leaves pin 139 and by action of tension spring 140, the long arm of lever 137 advances stopper 136 by a short distance into the center of the charge as already described. This will prevent the half of the row of bottles at the left from advancing too far to the right with chain 77 for a perfect pushing operation.

The progressive order at which the several operations, from grouping to gripping, are performed, may now be followed:

Bottles in two rows are fed to conveyor A between gates 99, 100 and stopper 79, gates 99, 100 shut off the flow of bottles, shoes 103, 104 hold with spring pressure the head of the bottle flow out of the charge, longitudinal guiding strips 89 and 90 are lowered, side guides 109, 110, 111 advance partly into the row of bottles farthest from slider 133, stopper 79 is retracted to free the bottles and line up the charge, stopper 136 advances partly into the center of the row of bottles nearest to slider 133, the charge of bottles being pushed over to trap floor 8 while the gripping devices still on their way up will pause temporarily before locking the neck of all the bottles in the charge.

To dispose safely of a bottle damaged or defective for reasons not controllable by the machine, the timing of the different motion imparting mechanism have been so arranged as to have a spring basket, which is designed to guide each bottle of the charge into its own cell in the case and to straighten the partition thereof if necessary, enter the cells at the time that bottle supporting strips 76 are shifted from under the bottles. This would leave a considerable open space between the bottom of the trap floor and top of the spring basket at an unwanted time, and if this space were left open, not only the damaged bottle would be liable to fall, hit the top of the springs and bars of the basket and rest there, but also all the bottles in the charge being lowered, by the gripping devices would likely hit the top of the walls of their assigned place in the spring basket. Breakage would result and the value of such a machine impaired. To eliminate such happenings, a stationary frame of chutes is provided which offers a vertical, direct, and complete communication between the bottom of trap floor strips 76 and the inside of the spring basket sections leaving at the same time the spring basket free in its up and down travel.

The spring basket as shown in Figures 4 and 5 is a frame of bars forming a number of squares equal to the number of bottles in the charge being handled, and over the bars forming the squares, leaf springs are folded which are double as indicated by 141 if they are mounted between two adjacent squares, and single as indicated by 142 if they are mounted on the external walls of the basket. A locking device is provided to hold these springs in their proper place, consisting of cast bars 143 with blocks 144, so cross slotted that they fit over the edges of the springs and over the corners of four adjacent squares, the ends of the bars near brackets 5 and 6 are locked with a pin

145 which goes across them and through the outer frame of the spring basket. The entire basket rests and is fastened on brackets 146. A cam on camshaft 10, by means of roller, follower lever, not shown, fast on shaft 83, levers 147 also fast on shaft 83 and rollers 148 in track of brackets 146 impart motion to brackets 146, which will travel up and down on vertical shafts 149 and 150, fast on cross member 7 at the top and on other brackets, not shown at the bottom, carrying the spring basket.

As seen also in Figures 4, 5 and 6, the frame of the chutes consists of an outer frame 151 fastened with pins 152 to cross member 7 on the rear and below trap floor 8. Across the long sides of the frame 151, and connecting them, are cast bars 155 with blocks 156 which occupy a position above the four corners of four adjacent squares of the spring basket, or the two corners of two adjacent squares of the spring basket according to their location in respect to it. Blocks 156 carry fastened to them vertical bars 157 of which one fits into every corner of the spring basket. Their length is sufficient to reach inside of the spring basket when the spring basket is at its lowest position of travel, the distance between each other, along the wall of the basket square, is less than the diameter of the bottle being handled, and their location is such that it permits free movement to the spring basket. The result is that free and continuous passages or cells are provided between the trap floor and the spring basket for the bottles being lowered and at the same time no bottle can fall out between bars 157. The motion of the spring basket is not interfered with and any damaged or defective bottle will have its way open and will be guided to the cell assigned to it in the case by the stationary chute and by the springs of the spring basket which at this time will already have entered the partitioned cells of the case.

The improvements hereinabove set forth describe a frame of chutes located between a trap floor and a spring basket, including the frame of chutes proper and the motion of the spring basket in relation to the trap floor. The end of the springs in the spring basket are lowered into the cells of the box or case to be loaded at the time the bottle supporting strips of the trap floor are shifted from under the bottles, previous to the lowering operation performed by a series of bottle engaging grippers located above said trap floor.

From the foregoing it is believed that the construction and advantages of the invention may be readily understood by those skilled in the art without further description, it being borne in mind that numerous changes may be made in the details disclosed without departing from the spirit of the invention as set out in the following claims.

What is claimed is:

1. In a bottle packaging machine, a bottle guiding device, comprising a slidable trap floor, a spring basket, a stationary frame of chutes located between said trap floor and said spring basket, means actuating the trap floor to permit the bottles thereon to be lowered into the spring basket, vertically disposed guide rods one at each corner of the frame of chute sections and extending downward into each corner of the spring basket sections and forming a cell, with means for moving the lower ends of the spring baskets into the partitioned compartments of a case, prior to the release of the bottles from the trap floor,

whereby the bottles are guided downwardly by the frame of chutes and spring basket into the case.

2. In a bottle packaging machine, a bottle guiding device comprising a slidable trap floor, a spring basket, a stationary frame of chutes located between said trap floor and said spring basket, means actuating the trap floor to permit the bottles thereon to be lowered into the spring basket, vertically disposed guide rods one at each corner of the frame of chute sections and extending downward one into each corner of the spring basket sections, the set distance between said rods being less than the diameter of the bottle or articles being handled and forming a cell, with means for moving the lower ends of

the spring basket into the partitioned compartments of the case prior to the release of the bottles from the trap floor, and gripping devices to grip the necks of the bottles and release the same whereby the bottles are guided downwardly by the frame of chutes and spring baskets into the case, upon removal of the bottle supporting means at the shifting of the trap floor to allow the bottles to descend, and upon the release of the bottles by the gripping devices to drop into the respective compartments of the case guided thereto by the rods of the frame of chutes and by the spring basket.

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