

May 29, 1962

A. M. DONOFRIO
MACHINE FOR FILLING OPEN TOPPED CONTAINERS
WITH MEASURED CHARGES

3,036,604

Filed Sept. 11, 1959

8 Sheets-Sheet 1

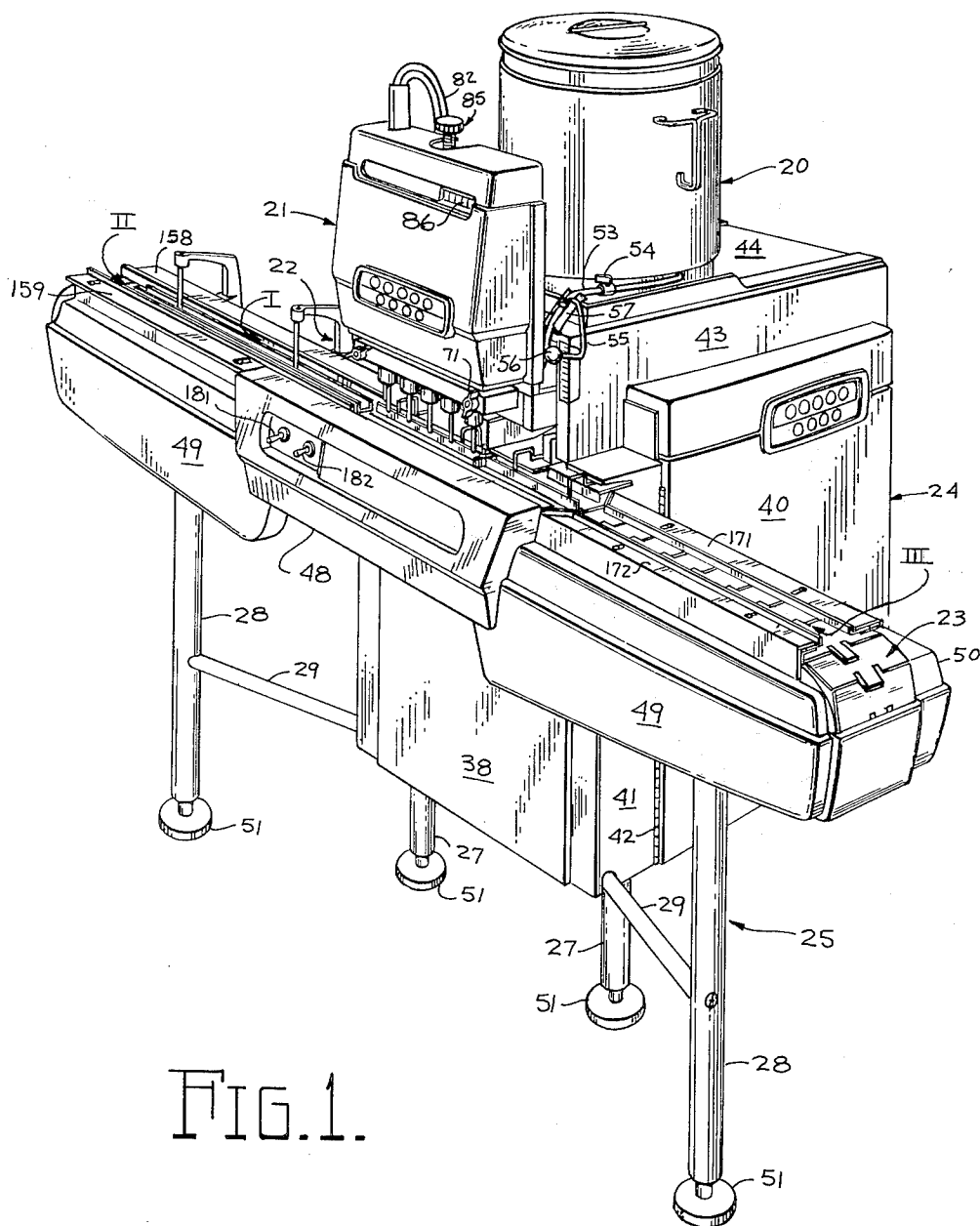


FIG.1.

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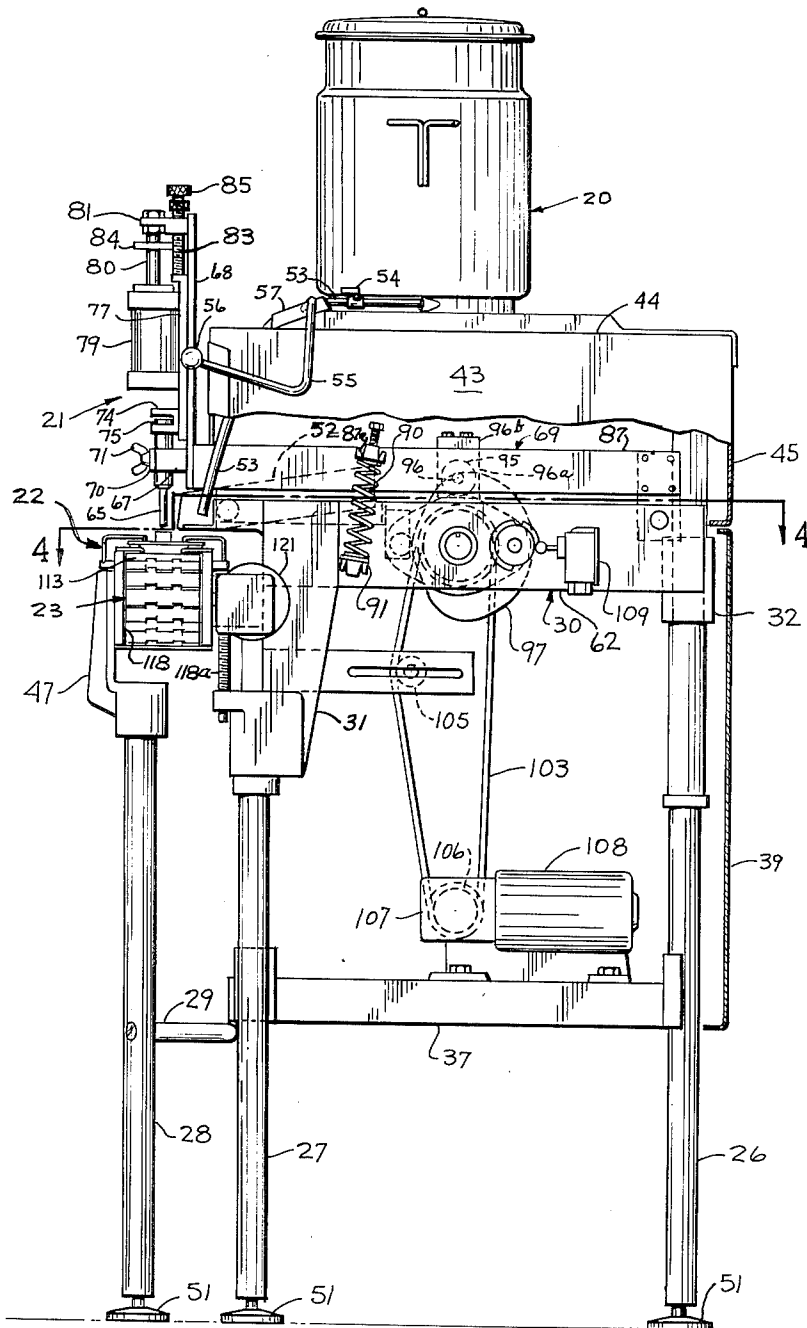


FIG. 3.

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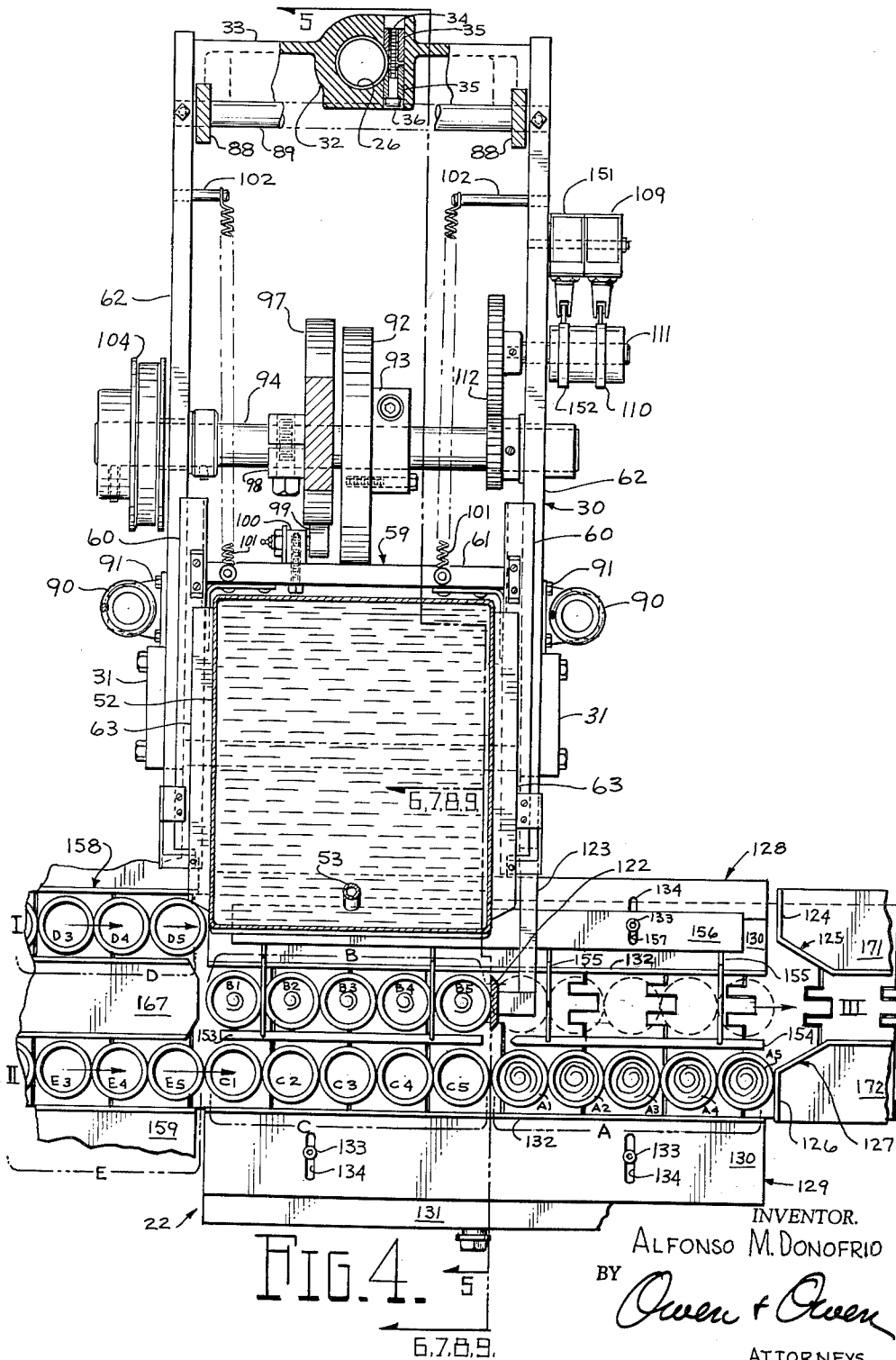
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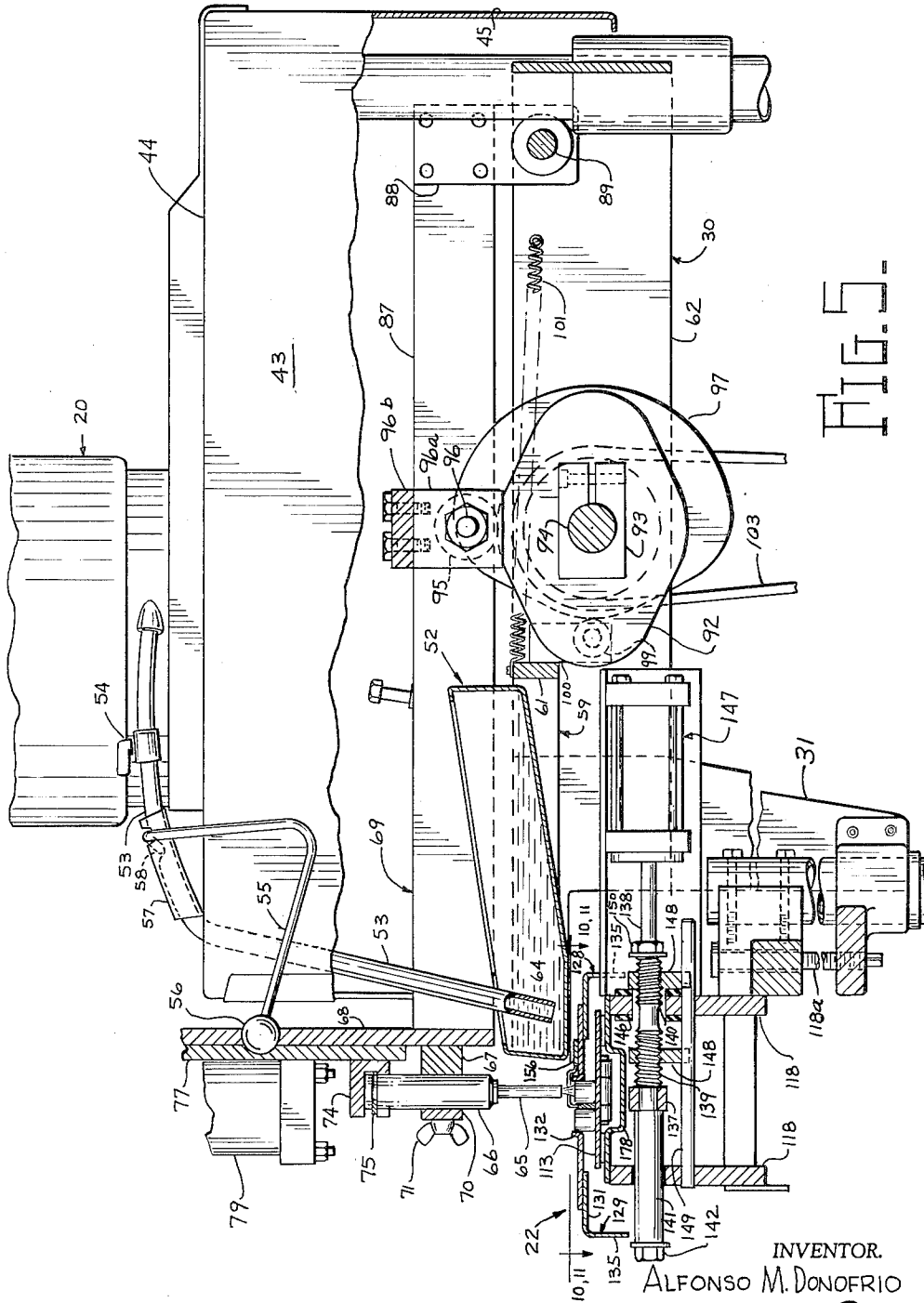
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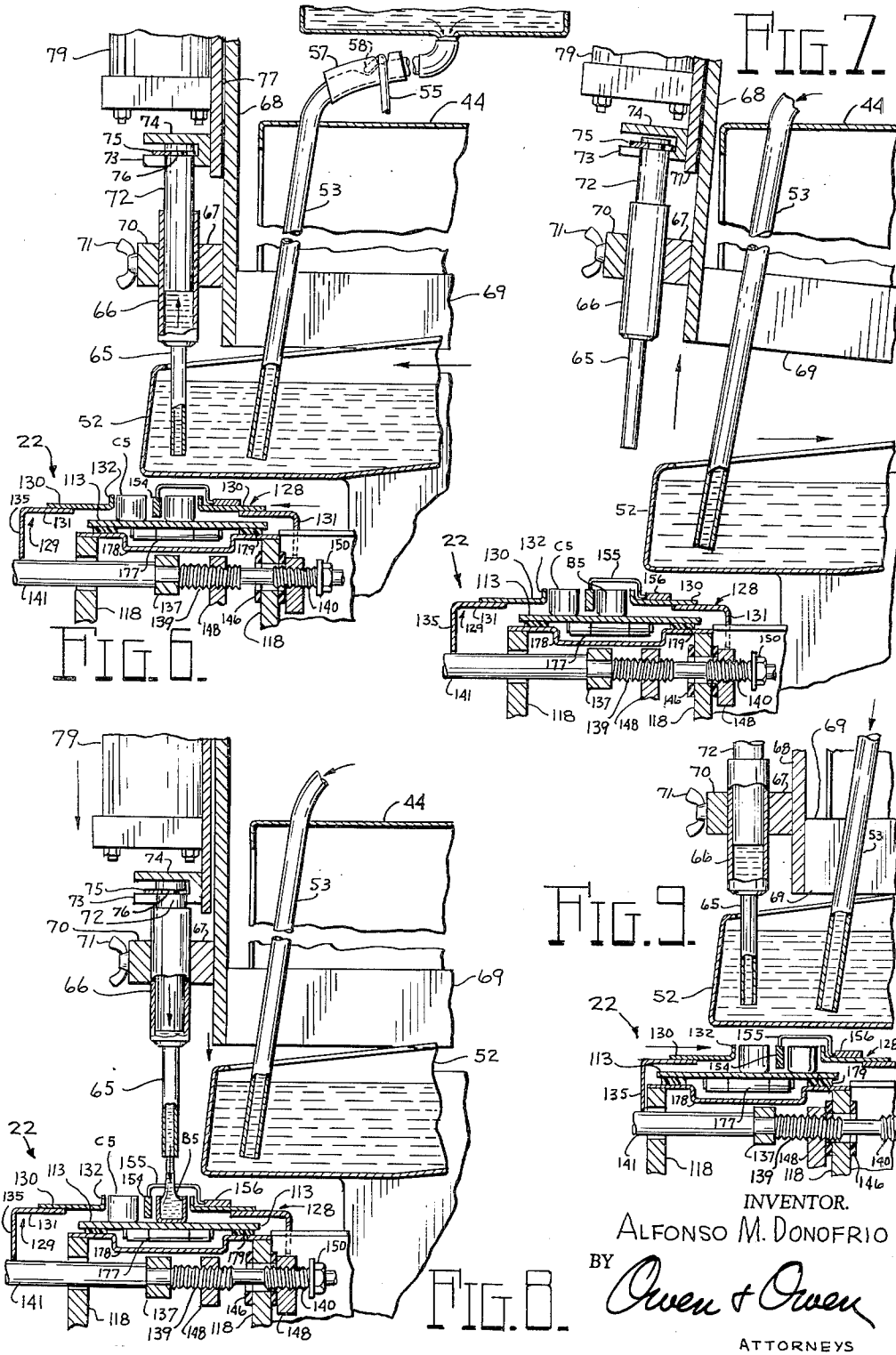
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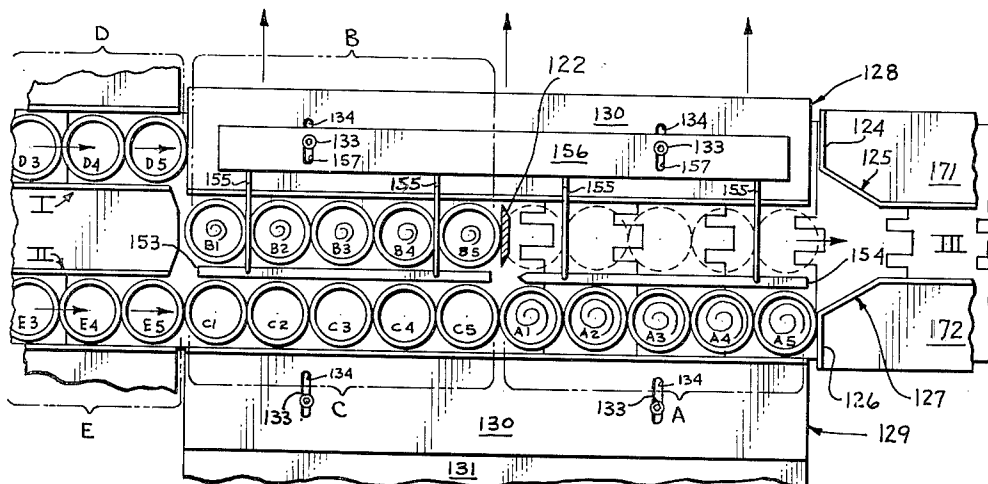


FIG. 10.

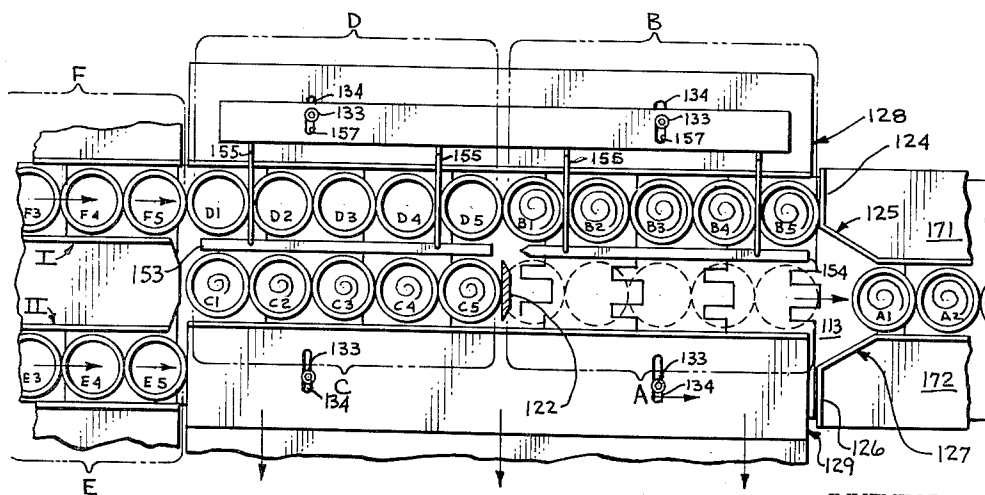


FIG. 11.

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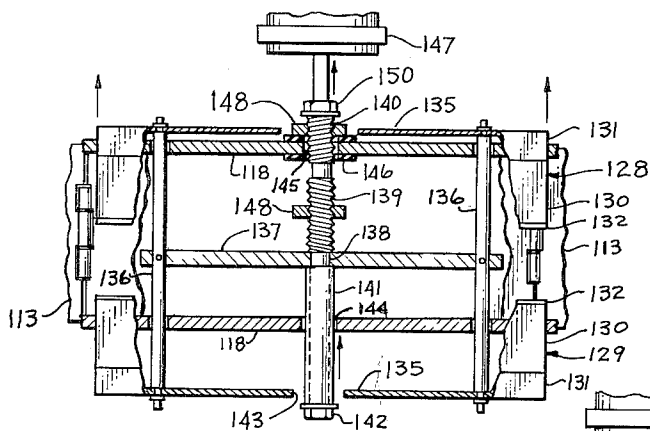


FIG. 12

FIG. 13

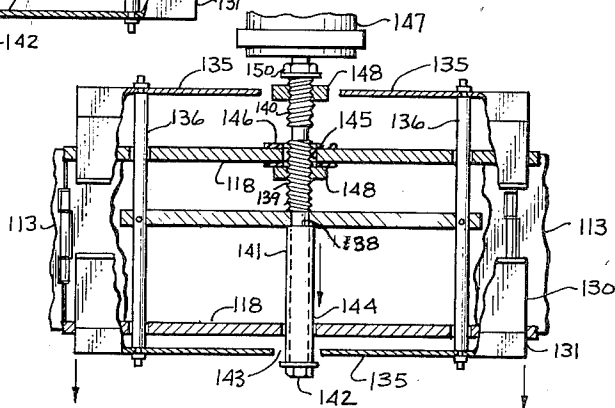


FIG. 14

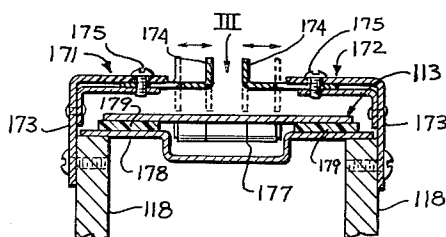
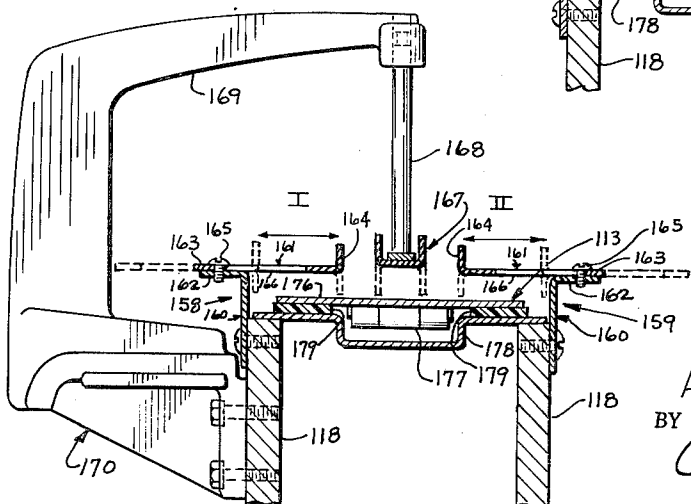


FIG. 15

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3,036,604

MACHINE FOR FILLING OPEN TOPPED CONTAINERS WITH MEASURED CHARGES

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Filed Sept. 11, 1959, Ser. No. 839,523
2 Claims. (Cl. 141-169)

This application is a continuation-in-part of my co-pending application Serial No. 658,048, filed May 9, 1957, now Patent No. 2,932,330.

This invention relates to a machine for filling open topped containers such as small bottles, tubes and jars with repetitive measured charges of liquid or liquid-like materials, such as pastes, etc.

A machine embodying the invention is particularly designed for the high speed filling of open topped containers of the same size and shape and the same volume, at any one time. The machine also comprises means by which it may be modified to handle containers of different sizes and different volumes within relatively wide ranges as desired. In describing a machine embodying the invention it will be illustrated as embodied in a machine particularly designed for the filling of round, open topped bottles, in groups of five at a time, continuously supplied to the machine from one or more files of bottles and continuously discharged from the machine as they are filled.

The principal object of the invention is, therefore, to provide a high speed, automatic machine for the filling of open topped containers with repetitive measured charges of liquid or similar material and it includes the provision of structures and subassemblies which maintain a supply of liquid to be filled, withdraw measured quantities thereof, feed the containers to a filling station in repetitive groups, deliver the material to the filling station and discharge the material into the containers, the entire sequence of operations including the feeding of the bottles being automatic and taking place at high speed.

Other and more specific objects and advantages of the invention will be more fully understood from the specification which follows and from the drawings, in which:

FIG. 1 is a view in perspective of a machine embodying the invention.

FIG. 2 is a fragmentary view in perspective on an enlarged scale of the machine shown in FIG. 1 but with certain parts broken away and with certain covers and decorative panels removed to more clearly show the operative mechanisms.

FIG. 3 is a view in end elevation taken from the right side of FIG. 1 and showing the machine, but with some of its covers broken away.

FIG. 4 is a horizontal sectional view taken along the line 4-4 of FIG. 3 and shown on an enlarged scale.

FIG. 5 is a fragmentary vertical sectional view taken along the line 5-5 of FIG. 4.

FIGS. 6, 7, 8 and 9 are fragmentary vertical sectional views taken along the line 6, 7, 8, 9-6, 7, 8, 9 of FIG. 4, the four figures illustrating certain operative mechanisms in successive positions.

FIGS. 10 and 11 are fragmentary plan views taken from the position indicated by the line 10, 11-10, 11 of FIG. 5 and shown on an enlarged scale.

FIGS. 12 and 13 are fragmentary horizontal views partly in plan and partly in section taken along the line 12, 13-12, 13 of FIG. 2, and shown on an enlarged scale.

FIG. 14 is a transverse vertical sectional view taken along the line 14-14 of FIG. 2, and shown on an enlarged scale.

FIG. 15 is a fragmentary vertical sectional view taken along the line 15-15 of FIG. 2 and shown on an enlarged scale.

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A machine embodying the invention comprises a number of major subassemblies which include a material supply tank 20, a measured charge feeding apparatus 21, a container shifting apparatus 22, a container conveyor 23, a main housing 24 and a support frame 25.

Support Frame and Housing

The support frame 25 in the embodiment of the invention illustrated in the drawings includes five vertical legs, a rear leg 26, two front legs 27 and two wing legs 28. The two wing legs 28 are connected by a horizontal bar 29 to the front legs 27. The three main legs 26 and 27 are all connected to an open, horizontal, main frame 30 (FIGS. 3 and 4). The legs 27 extend through split clamps in side brackets 31 which depend from the horizontal frame 30. The rear leg 26 extends upwardly through an enlarged boss 32 formed in a rear cross member 33 of the frame 30. The legs 26 and 27 are adjustable relative to the frame 30 in order to align the horizontal level of the machine with the height of auxiliary equipment such as bottle feeders, capping devices, etc. A locking wedge 34 which extends through the boss 32 and comprises a pair of threaded sleeves 35 and a tightening bolt 36 engaged therein locks the rear leg in position. A motor table 37 is supported by the rear leg 26 and front legs 27 and is located beneath the open frame 30; the table 37 also serving to brace the legs 26 and 27.

The upper, approximately one-half of the length of the legs 26 and 27, the frame 30, the motor table 37 and parts mounted upon and supported by these structures, are all enclosed by a front closure panel 38 (FIGS. 1 and 2), a rear panel 39 (FIG. 3) and hinged side panels 40 which form parts of the housing 24. The side panels 40 are pivotally attached to return edges 41 (FIGS. 1 and 2) of the front panel 38 by piano type hinges 42. The side panels 40 may thus be swung outwardly and forwardly to each side to provide access to the mechanisms contained within the housing 24. An upper enclosure comprising side panels 43 and a top 44 is erected above the drive housing 24 serving not only to enclose the upper portions of the mechanism to be described below but also as a support for the material supply tank 20. The upper enclosure comprising the top 44 and side panels 43 is connected by a back panel 45 (FIG. 3) but is open at the front side from approximately the level of the main horizontal frame 30 upwardly. Parts of the operative mechanism of the machine protrude forwardly through this opening indicated at 46 in FIG. 2, for example, and such parts have their own decorative enclosures which will be described below.

The container shifting mechanism 22 and container conveyor 23 extend transversely across the front of the machine, the outboard ends of the conveyor 23 being supported by the two wing legs 28, each of which has a right angle support bracket 47 on its upper end. The container shifting mechanism 22 and the conveyor 23 are decoratively enclosed by removable enclosure parts 48 for the central portion, and 49 and 50 for the front and back, respectively, of the wing portions thereof.

All of the legs 26, 27 and 28 are provided with adjustable pads 51 to compensate for slight irregularities in the floor upon which the apparatus rests.

Material Supply and Feeding Apparatus

A machine embodying the invention is designed to repetitively feed uniform, measured charges of liquid or similar materials into open topped containers. The material feeding apparatus generally indicated at 21 includes means for transferring a supply of the material from the supply tank 20 to a receptacle which furnishes a working

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supply and apparatus for withdrawing measured charges of the material from the working supply and delivering the measured charges to empty containers. This material feeding apparatus (see also FIG. 5) comprises a working supply pan 52 which is open topped. A supply line 53 leads from the supply tank 20 into the open topped, working supply pan 52. The supply line 53 is equipped with a shut off valve 54 and an operator's shut off arm 55. The shut off arm 55 has a knob 56 on its forward end and extends across the top of a downwardly inclined trough 57 through which the supply line 53 also extends. A U 58 in a horizontal portion of the arm 55 extends downwardly between the walls of the trough 57 and into contact with the outer surface of the flexible supply line 53. By swinging the knob 56 downwardly the operator can pinch off the supply line 53 when desired.

The open topped supply pan 52 slides horizontally back and forth with a U-shaped slide 59 comprising a pair of side channels 60 and a cross bar 61. The side channels 60 of the slide 59 slide upon the upper surfaces of fore and aft members 62 of the main rectangular frame 30. The supply pan 52 is removably supported on the U slide 59 by a pair of laterally extending wings 63 which are welded, soldered or otherwise secured to its sides and which rest upon the upper surfaces of the U slide 59. The supply pan 52 (see FIG. 5) is inclined, with its wings 63 extending horizontally along its sides so that a well 64 is formed near the front end of the pan 52 at about the position where the supply line 53 extends downwardly thereinto. The bottom of the well 64 is horizontal with the bottom surface of the pan 52 leading upwardly and rearwardly therefrom, to cause material always to flow to the front portion of the pan 52.

Each measured charge of material to be fed into an open topped container is withdrawn from the supply of material in the pan 52 and discharged into the container by one of a bank of identical nozzles 65. In the embodiment of the invention illustrated in the drawings, five of the nozzles 65 are shown. Of course any number of nozzles could be similarly arranged. Each of the nozzles 65 is connected to the bottom of a vertically extending cylinder 66. All of the cylinders 66 extend parallel to each other and are removably mounted in a horizontally extending block 67 which is secured to the lower front end of a vertical cross plate 68 mounted on front of an open rocking frame 69. The block 67 has a corresponding group of recesses in its front face and the cylinders 66 are clamped therein by a retainer plate 70 which is tightened against the block 67 by a pair of wing nuts 71 threaded onto suitable machine screws (not shown) which protrude from the block 67.

Each of the cylinders 66 has a piston 72 (FIG. 6) reciprocable therein. The upper ends of the pistons 72 extend through slots 73 that are cut in the lower arm of a horizontally turned, U-shaped channel 74. The pistons 72 are retained in the slots 73 by a spring clip 75 inserted around reduced tenons 76 on the pistons 72. The channel 74 is rigidly secured to the lower end of a vertically movable sliding plate 77, the plate 77 being parallel to the plate 68 and vertically slidable thereon in a pair of vertical ways 78 (FIG. 2). An air cylinder 79 is mounted on the plate 77 above the channel 74 and has a piston rod 80, the upper end of which is secured in a bracket 81 which is mounted on and extends horizontally from, the upper end of the plate 68. The opposite ends of the cylinder 79 are connected by air hoses 82 to control valves which energize the cylinder 79 to extend or withdraw its piston 80. A stop rod 83 is threaded through the bracket 81 and has a pad 84 on its lower end which is in line to be engaged by the upper edge of the sliding plate 77. A pair of knurled knobs 85 are threaded on the stop rod 83 for varying the upward movement of the slidable plate 77 when the piston rod 80 is pulled into the cylinder 79.

When the cylinder 79 is energized to pull its piston rod 80 inwardly, the cylinder 79 itself, the plate 77, the chan-

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nel 74 and the bank of piston rods 72 are all lifted. As can be seen in FIG. 6, if the ends of the nozzles 65 are beneath the surface of the supply of liquid in the pan 52 at this point, measured charges of the liquid are drawn into the nozzles 65 and cylinders 66.

The cylinders 66 with their piston rods 72 and nozzles 65 may readily be removed for cleaning and/or replacement, or cylinders 66 having different volumes may be placed in the machine, simply by loosening the wing nuts 71, removing the retainer plate 70 and sliding all of them out of the notches in the block 67 and the slot 73. By varying the position of the stop rod 83 the length of the stroke of the piston 72 may be varied so that for any given set of cylinders 66 and nozzles 65, a precise measurement of the charges may be determined.

A counter 86 is positioned adjacent the cylinder 79 to count the strokes of the machine during operation.

The rocking frame 69 (FIG. 5) comprises a pair of horizontally extending bars 87 which are rigidly secured at opposite sides of the bottom of the plate 68 and which extend rearwardly parallel to each other. At their rear ends the bars 87 are secured to vertical arms 88 (see also FIG. 4) which are pivotally mounted upon a cross rod 89 that is secured in and near the rear end of the horizontal frame 30. The rocking frame 69 is counterbalanced by two springs 90 (FIG. 3) which are in compression between ears 87a on the bars 87 and retainers 91 on the outer sides of the horizontal frame 30. A two-lobe cam 92 (FIGS. 4 and 5) is fixed by a retainer 93 on a main drive shaft 94 extending horizontally across and journaled in the horizontal frame 30. A cam riding roller 95 is journaled by a stud 96 which is set into a strut 96a depending from a cross bar 96b. The cross bar 96b extends between the bars 87 of the rocking frame 69. As the cam 92 rotates its two lobes cause the rocking frame 69 to rock up and down, i.e., to reciprocate between an upper position (FIG. 7) and a lower position (FIGS. 6, 8 and 9).

Concurrently with this vertical reciprocatory movement of the rocking frame 69 and thus of the cylinders 66 and their associated mechanism including both plates 68 and 77 and the cylinder 79, the pan 52 is horizontally reciprocated between a rearward position (FIGS. 5 and 8) and a forward position (FIGS. 6 and 9). The pan 52 is reciprocated between these two positions by a single lobe cam 97 fixed on the main shaft 94 by a retainer 98. A cam roller 99 is mounted on a stub shaft set in a block 100 which is in turn secured at the rear of the base of the U slide 59. Two coil springs 101 are connected to the sliding U frame 59 and to a pair of posts 102 studded into the main frame 30 near its rear end. As the drive shaft 94 rotates the cam 97 is also rotated and through contact with the roller 99 thrusts the sliding frame 59 forwardly or allows it to return under the tension of the springs 101.

The phase relationship between the single lobe cam 97 and the two lobes of the cam 92 (see FIG. 5) is such that the rocking frame 69 carrying the nozzles 65 makes a full reciprocation, being lifted and then lowered, while the pan 52 is being moved forwardly and then makes a second full reciprocation, being again lifted and lowered, while the pan 52 is being moved rearwardly. The profiles of the two cams 97 and 92 are so shaped relative to each other that the rocking frame 69 is rapidly lifted from its lower position toward its upper position so as to permit the pan 52 to be moved into or out of position beneath the nozzles 65, and then rapidly lowered either to insert the nozzles 65 into the pan 52 or into container filling position in front of the pan 52, as illustrated in FIG. 5.

The main shaft 94 is driven by a belt 103 that is engaged with a drive sheave 104 secured on the end of the shaft 94 with a belt adjustment idler pulley 105 and with the driven pulley 106 of a transmission 107 powered from a motor 108 that is mounted on the motor table

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The cycle of relative movements of the rocking frames 69 with its associated parts and the working supply pan 52 is illustrated in FIGS. 6-9. In FIG. 6 the pan 52 is shown in a forward position with the nozzles 65 emersed in the liquid in the pan 52, i.e., with the rocking frame 69 in its lower position. In FIG. 7 the rocking frame 69 is shown at the upper end of its stroke and the sliding supply pan 52 is shown as being moved rearwardly. In FIG. 8 the rocking frame 69 is once again illustrated in its lower position but with the supply pan 52 at its rear position. In FIG. 9 the sliding pan 52 is shown in its front position and the frame 69 in its lower position.

Energization of the pump actuating cylinder 79 is controlled by a cam actuated switch 109 which engages a cam 110 mounted on a stub shaft 111 that is journaled in one side member 62 of the main frame 30. The shaft 111 is driven from the drive shaft 94 through a pair of meshing gears 112. Closure of the switch 109 is thus timed with respect to the upper and lower positions of the rocking frame 69 and the fore and aft positions of the sliding supply pan 52. As is illustrated in FIG. 6 when the supply pan 52 is in its forward position and the rocking frame 69 in its lower position, with the nozzle 65 emersed in the supply of liquid in the pan 52, the switch 109 is closed to energize the cylinder 79 for pulling the pistons 72 of the charge measuring cylinders 66 upwardly to withdraw measured charges of liquid from the pan 52.

After the rocking frame 69 has been lifted and the pan 52 withdrawn (FIG. 7) and after the rocking frame 69 returns to its lower position (FIG. 8) the switch 109 is actuated to cause the cylinder 79 to extend its piston rod 80, thrusting the pistons 72 of the charge measuring cylinders 66 downwardly to discharge a measured charge of liquid from each of the nozzles 65. At this point, as will be explained below, a group of empty containers to be filled with the measured charges, is positioned beneath the lower ends of the nozzles 65 and receives the measured charges as illustrated in FIG. 8.

Container Shifting Mechanism

The container shifting mechanism 22 and the container conveyor 23 function to deliver open topped containers to the filling station that is located vertically beneath the five nozzles 65, and to discharge filled containers from that station. The containers are moved horizontally by a constantly running, link-type, conveyor belt 113. The belt 113 is engaged with a drum 114 and a heavy drive sprocket 115. The drum 114 is journaled on a horizontal rod 116 supported by brackets 117 at the left end of a pair of laterally extending, parallel, vertical plates 118 supported by the support brackets 47 and the wing legs 28. The sprocket 115 is mounted on a shaft 119 which is journaled at the right end of the plates 118 and driven from a reducing gearbox 120 by a conveyor motor 121. The conveyor belt 113 runs constantly during operation of the machine but the movement of the files of containers is controlled by container shifting mechanism now to be described.

The plates 118 are the main structural elements of the conveyor mechanism being supported at their outboard ends by the brackets 47 on the legs 28 and adjustably connected to the side brackets 31 (FIG. 5) by vertical adjustment studs 118a. By adjusting the studs 118a the horizontal level of the conveyor belt 113 may be varied relative to the frame 30 and thus the nozzles 65 to accommodate containers of different heights.

Containers to be filled are moved in two parallel files indicated by the numerals "I" and "II," respectively, in FIGS. 1, 2, 4, 10, 11 and 14. Filled containers are discharged from the filling station in a single, median, file indicated at "III" in these figures. As can be seen most readily in FIGS. 4, 10 and 11, files I and II are spaced from each other and extend parallel to each other from the "On" side (left end) of the conveyor belt 113 to

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the filling station. File III, i.e., the discharge file, is parallel to the feeding files I and II but leads from the far side of the filling station to the "Off" side (right end) of the conveyor belt 113, file III extending along a line intermediate the paths of files I and II.

At the central or filling station portion of the apparatus embodying the invention, there is a shiftable carriage which shifts groups of containers to be filled, laterally from files I and II to a position intermediate those files, thence to positions aligned with those files and eventually back to the center again for discharge along file III. In the embodiment of the invention shown in the drawings five containers are shifted as a unit, the group of five being alternately selected from files I and II.

Referring now to FIGS. 4, 10 and 11, the movement of the groups of containers will be described followed by the description of the structure whereby they are thus moved. In FIGS. 4 and 10 a group of containers designated "A" with the individual containers designated as A1, A2, A3, A4 and A5, is shown at the right front side of the filling station. The containers in the group "A" have been just previously filled. Group "B" of containers, the individual containers being designated B1, B2, B3, B4 and B5, is shown in filling position beneath the nozzles 65. A third group "C" of containers, indicated C1, C2, C3, C4 and C5, respectively, is shown in position aligned with, and as having just been moved inwardly from, file II, into position to be filled after group "B" is filled. Part of a fourth group of containers, group "D" with individual containers D3, D4 and D5, is shown at the end of file I, just ready to be next received within the container shifting mechanism preparatory to be shifted to filling station position after the containers in group "C" have been discharged.

FIG. 11 illustrates a subsequent step. The containers in all four of the groups "A," "B," "C" and "D" have shifted to the next subsequent positions. It will be observed in FIGS. 10 and 11 that a stop 122 extends vertically downwardly in line with file III and in position to hold up a group of containers which are in filling position. The stop 122 (FIG. 4) is mounted on an arm 123 rigidly connected to the main frame 30 and the stop 122 does not move during the container shifting operations.

When the group "A" of containers is shifted from the position shown in FIG. 10 to the center of the conveyor belt 113, aligned with file III, the conveyor belt delivers these containers out of this position and into file III as shown in FIG. 11. At the same time the containers in group "B" are shifted from the central filling position of FIG. 10 upwardly and into line with file I. This shifts the group "B" out from behind the stop 122, so that the conveyor belt 113 runs the group "B" to the right into the position indicated in FIG. 11 where they come up against a shoulder 124 on a guide flange 125 at the beginning of file III. During this same shift, the empty containers in group "C" are moved from the position of FIG. 10, to the filling position of FIG. 11. In FIG. 10 the containers in group "C" are urged against container A1 of group "A," with group "A" being held back by a shoulder 126 of a guide flange 127. When groups "A" and "C" are shifted to the positions shown in FIG. 11, with group "C" in filling position, the stop 122 separates groups "A" and "C," group "C" being held in filling position and as explained, group "A" being allowed to run out along file III. At the same time, during the shift between the positions of FIGS. 10 and 11, group "B" has been shifted backwardly out from behind the stop 122 and runs up against the shoulder 124. Therefore, the containers in group "D" are free to move into the space aligned with file I and back of the filling position, being stopped there by engagement of container D5 with container B1. There are two positions of the container shifting mechanism so that, alternately, groups of five are admitted from each of the files I and II

in the respective aligned positions and the admitted groups are alternately shifted into the center filling position then re-shifted to the extreme positions and fed to the right (the positions of group "A" in FIG. 10 or group "B" in FIG. 11) and then returned to the central position and fed out of shifting mechanism along file III.

The movement of the containers just described is controlled by mechanism illustrated in FIGS. 5-13. The central portion of the conveyor belt 113 serves as a table upon which the groups of containers are shifted transversely back and forth between the positions illustrated in FIGS. 10 and 11, which correspond, respectively, to the positions indicated in FIGS. 6 and 9 and to the positions indicated in FIGS. 12 and 13.

The containers are shifted back and forth by the engagement with the groups of side guides 128, at the rear, and 129 at the front. The side guides 128 and 129 are approximately ten container diameters in length. Each of the two side guides 128 and 129 comprises a pair of sheetmetal channels 130 and 131. The two channels 130 are oppositely directed having flat major faces and up-turned inner lips 132 which actually contact the containers. The flat major faces of the channels 130 overlie inwardly turned lips on the channels 131 and the channels 130 may be adjusted on the channels 131 to widen and narrow the lateral space between the lips 132 in order to accommodate groups of containers of different diameters. The channels 130 and 131 are secured to each other by screws 133 (see FIG. 4) which extend through transverse slots 134 in the flat portions of the channels 130 and holes (not shown) in the underlying horizontal portions of the channels 131.

Downwardly turned arms 135 of the channels 131 (FIGS. 12 and 13) are secured on the front and back ends respectively of a pair of struts 136 extending across beneath the conveyor belt 113. The struts 136 are pinned in opposite ends of a bar 137 that extends parallelly to the line of movement of the conveyor belt 113. The bar 137 is mounted on a thrust rod 138. The rod 138 has two threaded sections 139 and 140, one of which is right hand threaded and the other is left hand threaded. The section of the rod 138 extending forwardly beyond the bar 137 is enclosed in a spacer sleeve 141 and the rod 138 has a hexagonal head 142 on its front end. The rod 138 and the head 142 protrude through an opening 143 in the web 135 of the front channel 131. The sleeve 141 extends through an opening 144 in the front one of the plates 118 and through a similar opening 145 in the rear one of the plates 118. The opening 145 is cushioned on both sides of the plate 118 by shock absorber bumpers 146. At its rear or inner end, the rod 138 becomes a piston rod for an air cylinder 147 (see also FIG. 5). Two stop plates 148 are threaded onto the right and left hand threaded sections 139 and 140 of the rod 138 on opposite sides of the rear one of the plates 118. At their lower ends (FIG. 5) the stop plates 148 are grooved and in sliding engagement with a guide rod 149 that is set into the front and back plates 118, in order to prevent rotation of the stop plates 148 when the rod 138 is rotated. A spacer nut 150 is threaded on the rear of the threaded section 140 of the rod 138 behind the rear one of the spacer plates 148.

Rotating the rod 138 threads the rod 138 through the stop plates 148 causing them to move farther apart or closer together depending upon the direction of rotation of the rod 138. This varies the distance of movement of the rod 138 between alternate engagements of the stop plates 148 with the bumpers 146 on the rear main plate 118.

Admission of air to opposite ends of the cylinder 147 alternately shifts the bottle shifting mechanism including the guides 128 and 129, between its rear and front positions. The admission of air into the cylinder 147 is controlled by a switch 151 (FIG. 4) mounted adjacent the switch 109 and controlled by a second cam 152 on the

cylinder 111. The timing of the closures of the switch 151 by the cam 152 is thus synchronized with the rocking movements of the rocking frame 69, i.e., the lifting and lowering of the nozzles 65, and the reciprocation of the supply pan 52. After each group of containers is filled, for examples, groups "B" in FIG. 10 and group "C" in FIG. 11, the air cylinder 147 is energized to shift the container groups in such manner as to return the filled group to alignment with its respective file I or II, so that it can move to the right (FIGS. 10 or 11) beyond the stop 122 and, upon a second movement, to shift that group to the center (FIG. 11) so that it can be carried out of the filling station along file III.

A pair of center guides 153 and 154 extends between that group of containers being filled and the next group, and between that group of containers previously filled and the next preceding group, as the groups are shifted laterally by the mechanism just described. The guides 153 and 154 are supported by overhead arms 155 which are in turn mounted by a bar 156 lying on the flat upper surface of the rear one of the channels 130. The bar 156 is retained in place on the channel 130 by the screws 133 which adjustably connect the parts of the channel 128, and extend through lateral slots 157 in the bar 156.

Container Guides

Movement of the containers en route to the filling station takes place in two parallel files which are indicated by the reference numbers I and II. The containers to be filled are fed onto the left or "On" end of the conveyor belt 113 by suitable mechanism, not constituting a part of the instant invention and not shown in the drawings.

The containers are guided along files I and II by side guides 158 and 159 (FIG. 14), which are parallel to each other and which are supported by the main front and back plates 118. Each of the guides 158 and 159 comprises two angle members 160 and 161. The angle members 160 are secured at the upper sides of the front and back plates 118 and have outwardly directed short lips 162. The two angles 161 have wide main webs 163 and relatively short right angle lips 164. The two angles 160 and 161 are adjustably secured to each other by a plurality of screws 165 which extend through transverse slots 166 and are screwed into the lips 162 of the angles 160.

A center guide 167 is U-shaped in cross section and forms the central spacing member between the guides 158 and 159 to act as the inner sides of the two files I and II. The center guide 167 is removably secured on the lower ends of a pair of posts 168 which are dependently mounted by overhead arms 169 that are supported by rear brackets 170 rigidly attached to the rear one of the main plates 118.

The side guides 158 and 159 and the center guide 167 extend along above the container conveyor belt 113 from the "On" side to the left side of the filling station (see FIG. 4).

The container shifting mechanism illustrated in FIGS. 10 and 11 functions to close and open the ends of the files I and II in order that the container conveyor 113 can feed groups of containers alternately from files I and II. As can be seen in FIG. 10, when the container shifting mechanism is in its forward position, the end of the side guide 128 engages the side of the first one of the containers waiting in file I. At this point, because the side guide 129 has been shifted to the front out of the way of the containers in file II, the conveyor belt 113 feeds containers from file II until the leading one engages the rear one of the containers of group "A," the first one of which is abutting the shoulder 126. Similarly, when the container shifting means, including the side guides 128 and 129, is moved to its rear position, as shown in FIG. 11, the edge of the front side guide 129 engages the first container waiting to move out of file II and the rear side guide 129 moves out of the way so

that the group of five containers from file I moves into the position indicated by the letter "D" in FIG. 11 being stopped therein by contact with the last of the group of containers in group "B," the first of which is held back by the shoulder 124. Thus, by the alternate positioning of the container shifting mechanism illustrated in FIGS. 10 and 11, groups of five each of the containers are fed out of the files I and II, alternately, in one position of this mechanism and then shifted to filling position in the second position of this mechanism.

The container guides 158 and 159 and 167 are adjustable for guiding files of containers of different diameters and heights. As can be seen by reference by FIG. 14, the center U-shaped guide 167 can be inverted if desired so that its parallel wings extend above the conveyor 113 to a higher level. Similarly, the angles 161 of the side guides 158 and 159 may be removed and turned over so that their short lips 164 extend upwardly or downwardly as desired to similarly engage shorter or taller containers. In addition, the side guides 158 and 159 may be slid inwardly and outwardly between the solid and dotted line positions in FIG. 14 to accommodate containers of different diameters.

Container guide means forming file III, i.e., the bear-off file, are similar to general construction to those forming files I and II and are similarly adjustable for both width and height of containers being filled. The guides for file III comprise the guide flanges 125 and 127 shown in FIGS. 10 and 11 which are formed on a pair of guide members 171 and 172 (see also FIG. 15). The two guide members 171 and 172 are supported by angles 173 secured to the front and back main plates 118. The guides 171 and 172 may be adjusted inwardly and outwardly and inverted in a manner similar to the guides 158 and 159 with the lips 174 turned upwardly or downwardly and spaced closer and farther apart to accommodate containers of different heights and diameters. The lips 174 are parts of angles which are slotted transversely and adjustably held on the angle brackets 173 by screws 175.

Conveyor Belt

The conveyor belt 113 comprises a plurality of generally rectangular plates 176 (FIG. 2) each of which is hingedly connected to its neighbor by overlapping ears, generally indicated at 177, which are connected by laterally extending hinges pins (not shown). The ears 177 are located on the inner sides of the plates 176 so that the upper surface of the conveyor belt 113 which runs through the container guides and the filling station is flat and substantially continuous.

A conveyor belt guide plate 178 (FIGS. 14 and 15) is secured to and extends along above and between the main side plates 118 and beneath the top span of the conveyor belt 113. The plate 178 is recessed in its median portion to accommodate the ears 177. The lateral edges of the conveyor plates 176 slide on two strips 179 which are carried by the sides of the plate 178 and extend along the full length of the upper span of the conveyor belt 113.

The lower span of the conveyor belt 113 (FIG. 2) is held upwardly at the center of the machine, beneath the location of the filling station, and at the operator's position, by a shelf 180 in order to prevent its dipping down where it would obstruct clearance for the operator's knees.

Controls

As described earlier, an apparatus embodying the invention as illustrated in the drawings has controls for adjusting the volume of the charges deposited in each container, this control being the knurled knobs generally indicated at 85 by which the length of stroke of the pistons 72 in the measuring cylinders 66 is adjusted. The apparatus also has an operator's control comprising the lever 55, already described by which the material supply line 53 can be pinched off, as well as the valve 54 by which the

supply line 53 can be shut off. In addition, the apparatus has finger switches 181 and 182 conveniently located at the front of the central portion of the machine, being accessible through an opening in the enclosure part 48. The switches 181 and 182, respectively, energize motor 121 for the container conveyor belt 113, and the main drive motor 108 which rotates the main shaft 94 for lifting the feeding heads and reciprocating the working supply pan 52, as well as controlling the timing of the strokes of the piston 72 of the filling cylinders 66 and the cylinder 147, which moves the container shifting means at the filling station.

I claim:

1. In a machine for filling open topped containers oriented in geometrical groups of uniform number at a filling station with measured charges of liquid material from a liquid supply holder through a bank of reciprocating feeders mounted in a geometrical group similar to the oriented containers for movement into a withdrawing position overlying the holder and a discharge position overlying a group of containers at the filling station, the improvement comprising a constantly running conveyor belt extending across the machine beneath and parallel to the bank of feeders for engaging the containers, said belt being movable along a path extending through the filling station for supplying empty containers thereto and removing filled containers therefrom, guide means overlying said conveyor belt and including a center guide and two parallel side guides spaced equidistantly therefrom and on opposite sides thereof a distance equal to the lateral dimension of a container group, said guide means forming two open ended, parallel container group ways, reciprocating means for laterally shifting said guide means between positions with said ways alternately centered beneath the feeders, a stationary stop extending across and above said conveyor belt and positioned to obstruct movement of a container group out of each of said container group ways from the filling station, first cam means for relatively moving the bank of feeders and the holder between the withdrawing position and the discharge position, second cam means for actuating said reciprocating means, and means operatively connecting said first and second cam means for synchronous rotation whereby said feeders and said holder are moved in timed relationship with said lateral shifting of said guide means.

2. In a machine for filling groups of containers at a filling station with a liquid material from an open topped supply pan through a bank of material feeders; the improvement comprising a frame for mounting the feeders for vertical reciprocation above the filling station, a conveyor belt extending across the machine beneath the feeders for engaging the containers, said belt being movable along a path extending through the filling station for supplying empty containers thereto and removing filled containers therefrom, a center guide and two parallel side guides overlying said conveyor belt, said side guides being spaced equidistantly from said center guide on opposite sides thereof a distance equal to the lateral dimension of a container group thereby forming two open ended, parallel container group ways, reciprocating means for laterally shifting said side and center guides between positions with said ways alternately centered beneath the feeders, a stationary stop above said conveyor belt at the filling station to obstruct movement of containers therefrom, means for serially feeding container groups alternately into the container group ways, a slide for mounting said supply pan for horizontal reciprocation between a withdrawing position immediately overlying said belt at the filling station and a horizontally remote position, a driven shaft, a single lobe cam on said shaft for engaging said slide to move said pan to said withdrawing position, spring means for urging said slide toward said remote position, a two-lobe cam on said shaft for engaging said frame to move said feeders into and out of said pan while said pan is at said withdrawing position and into

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and out of a discharge position at the filling station when said pan is at said remote position, and a trip cam operably connected to said shaft for actuating said guide reciprocation means in timed relationship with the movement of said slide and frame.

744,048
1,442,405
2,146,072
2,566,677
5 2,762,180

References Cited in the file of this patent

UNITED STATES PATENTS

376,403 Wright Jan. 10, 1888

12

Cerruti Nov. 17, 1903
Hawthorne Jan. 16, 1923
Howard Feb. 7, 1939
Rapp Sept. 4, 1951
Hall Sept. 11, 1956