Dec. 26, 1939. W. I. GLADFELTER 2,184,493

FILLING AND CROWNING MECHANISM

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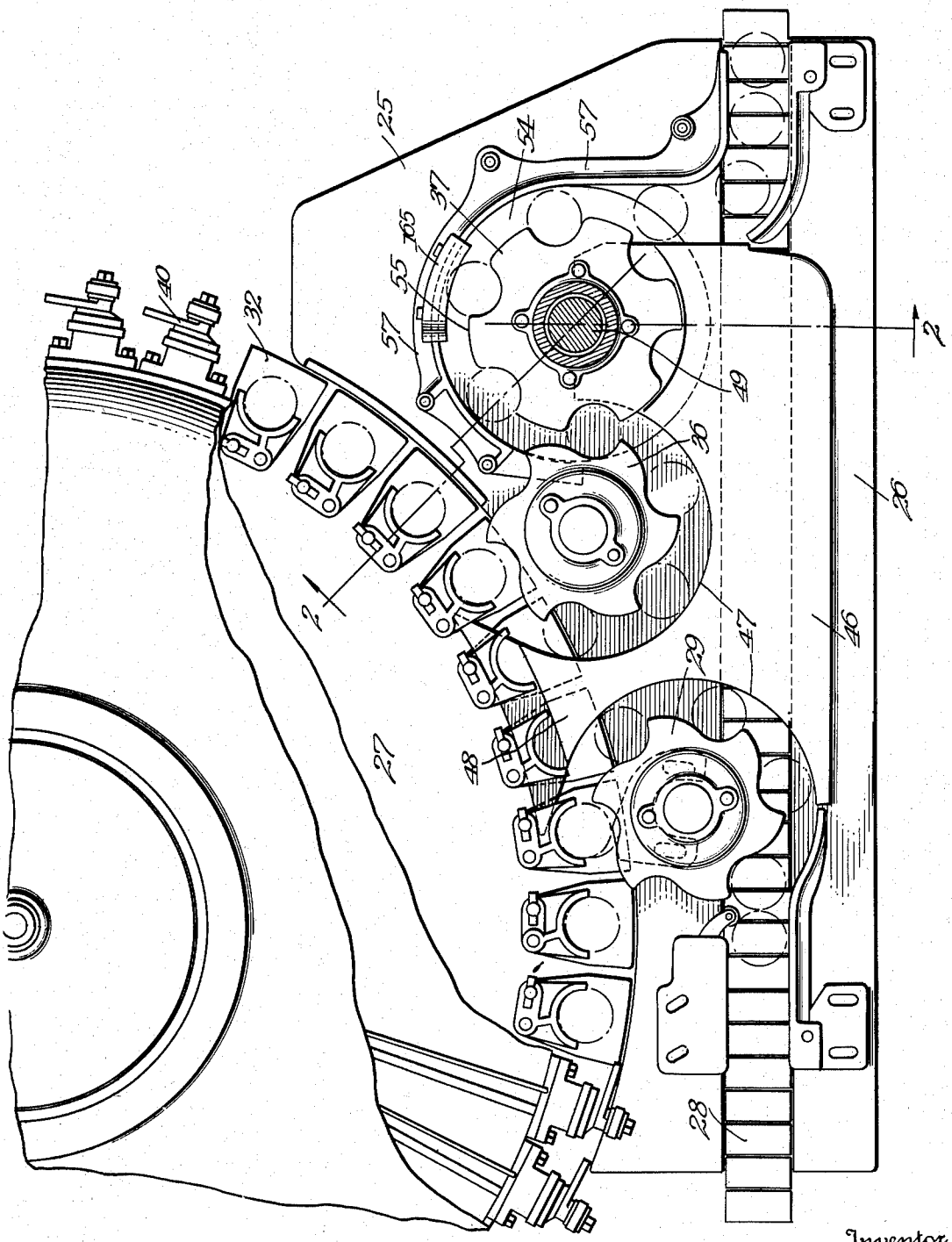

Fig. 1

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FILLING AND CROWNING MECHANISM

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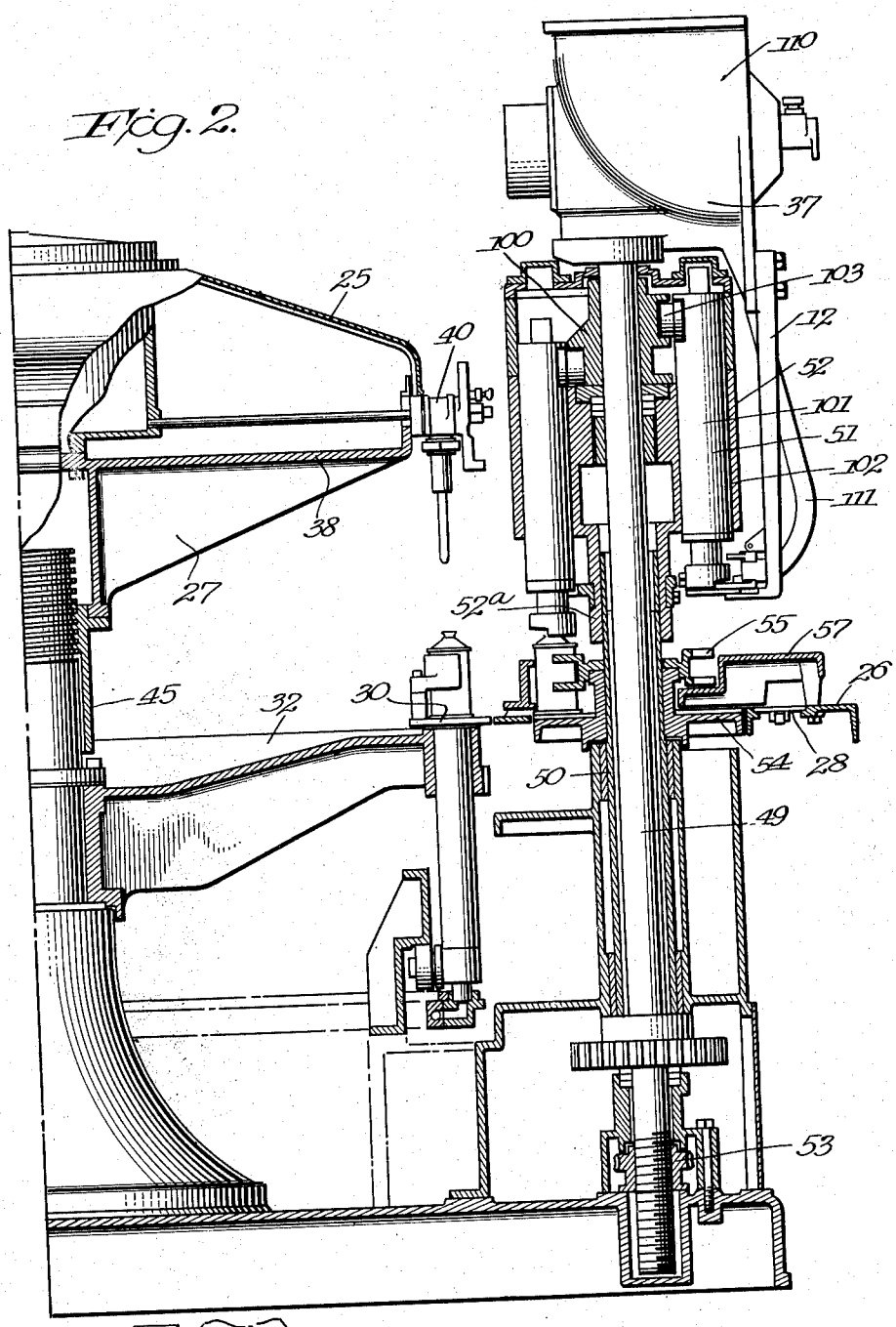
Fig. 2.



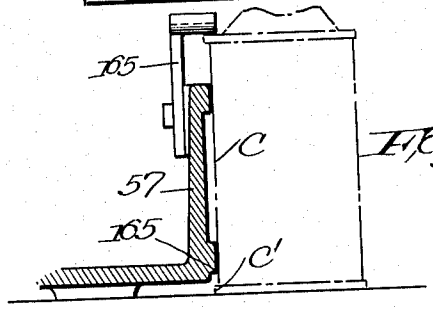


Fig. 2a

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FILLING AND CROWNING MECHANISM

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Fig. 3.

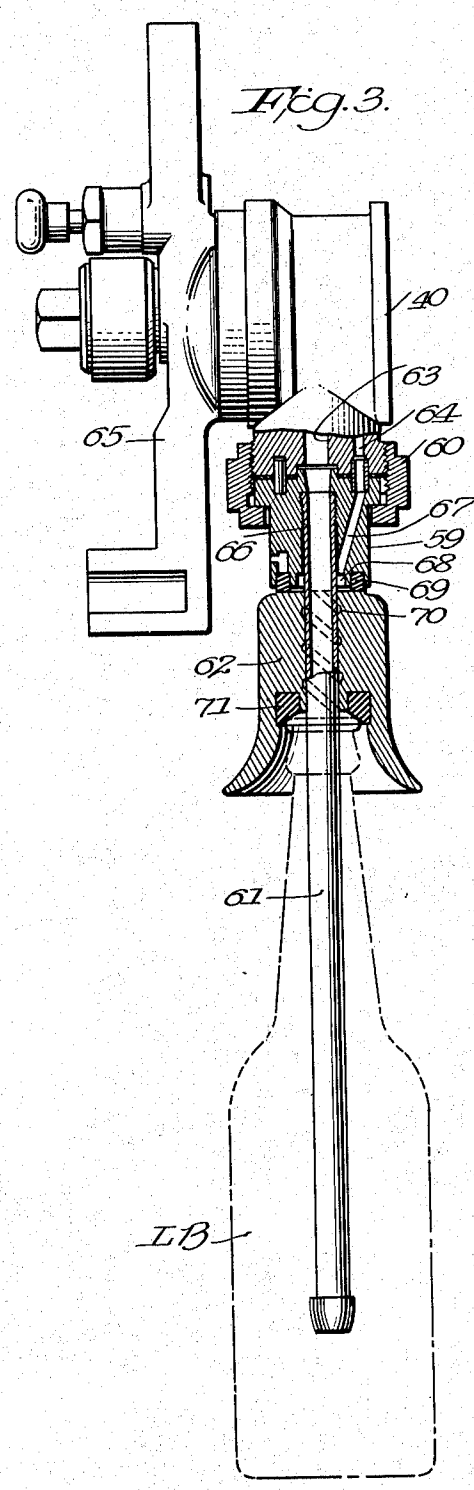


Fig. 4.

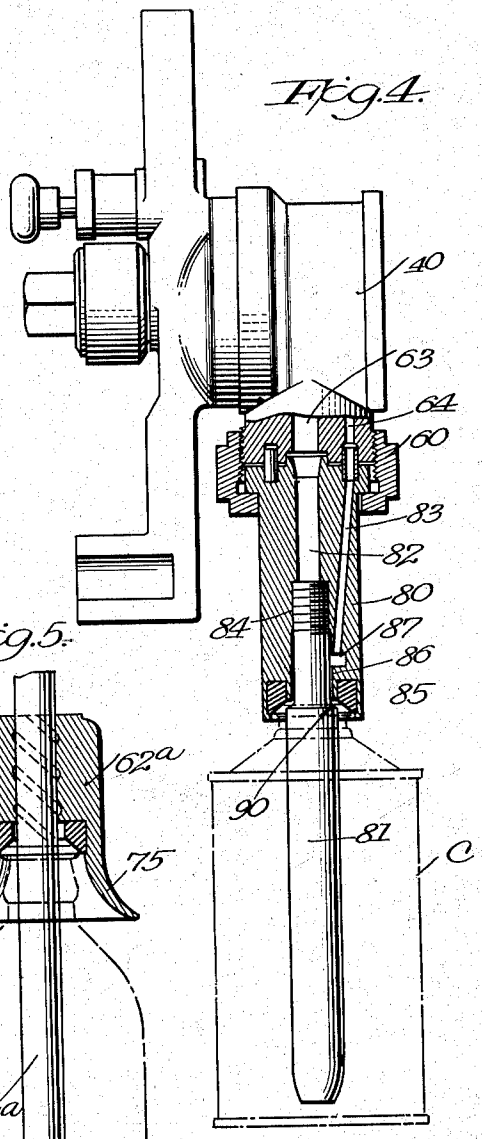
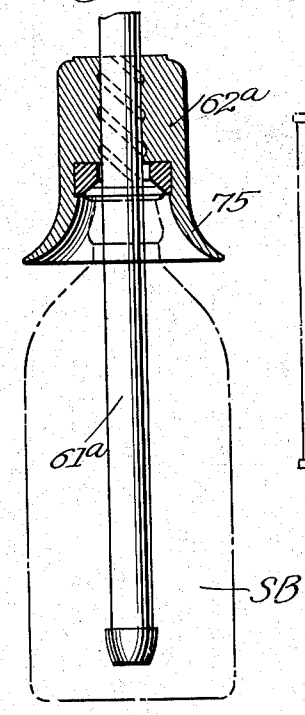


Fig. 5.



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FILLING AND CROWNING MECHANISM

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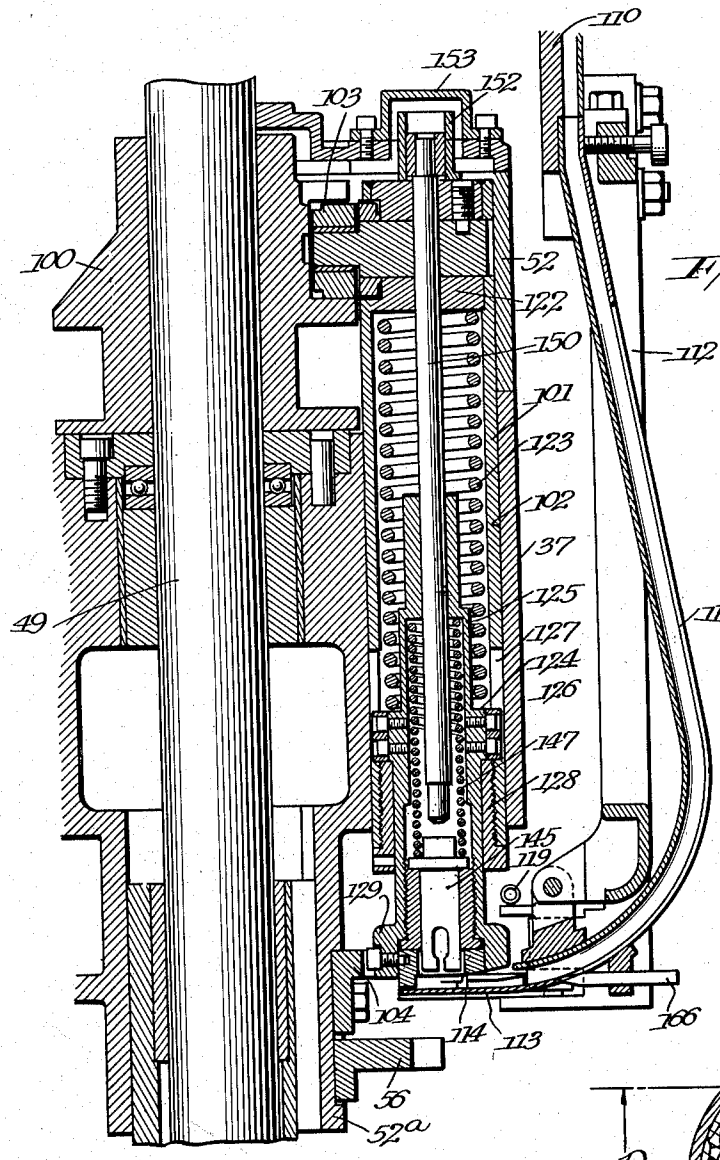


Fig. 6.

Fig. 7.

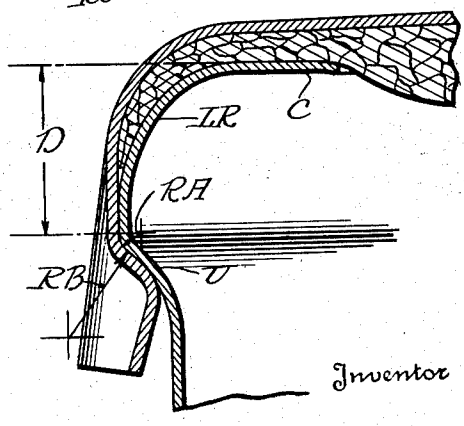
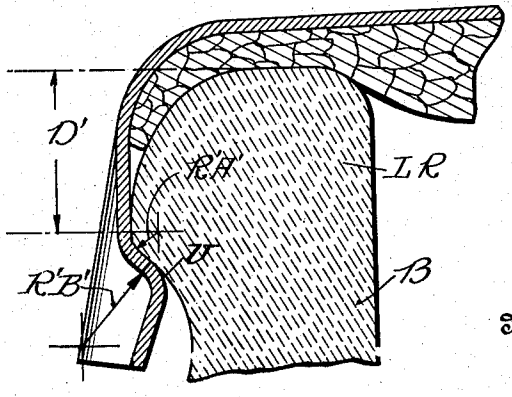


Fig. 8.



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FILLING AND CROWNING MECHANISM

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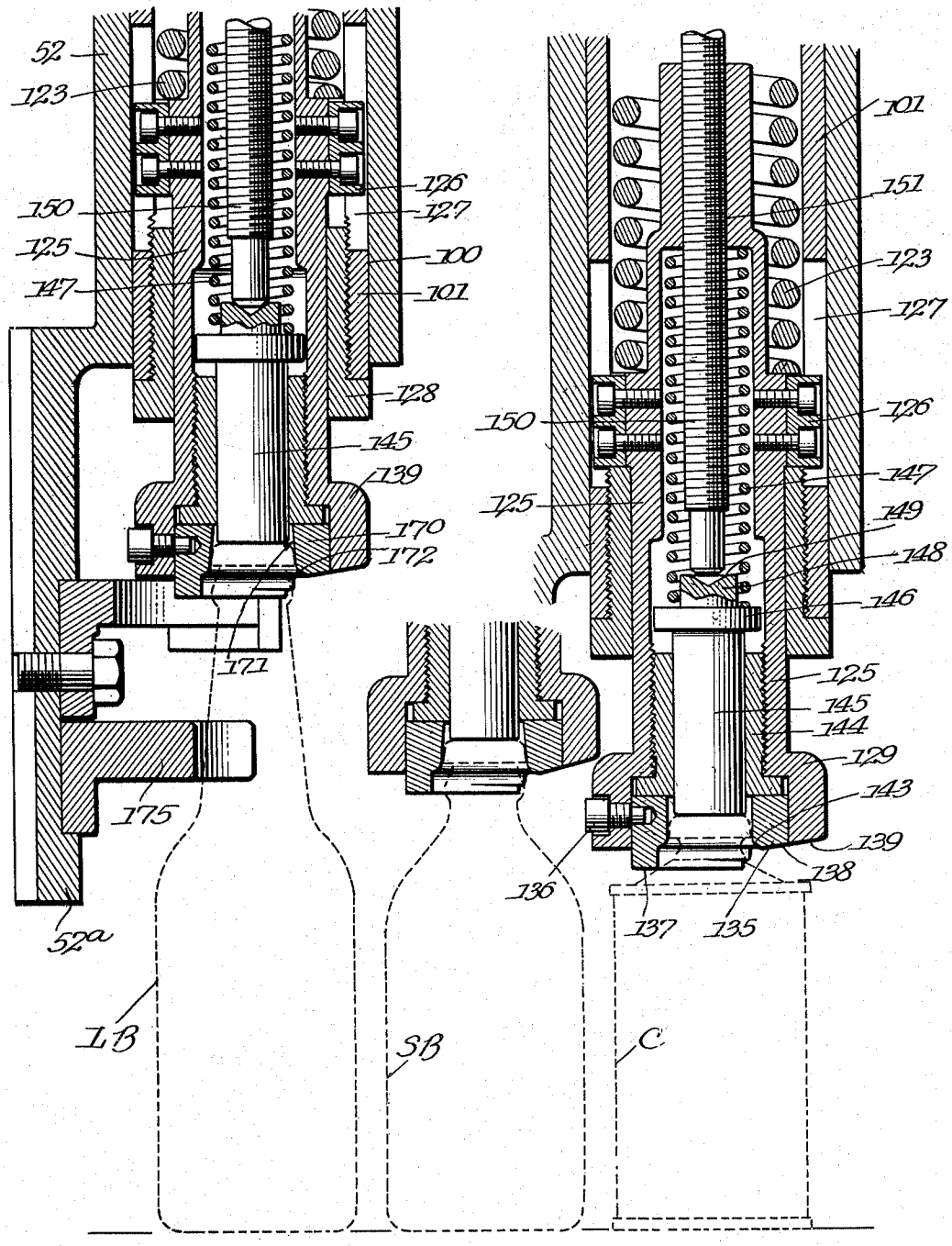

Fig. 9. Fig. 10. Fig. 11.

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Fig. 12.

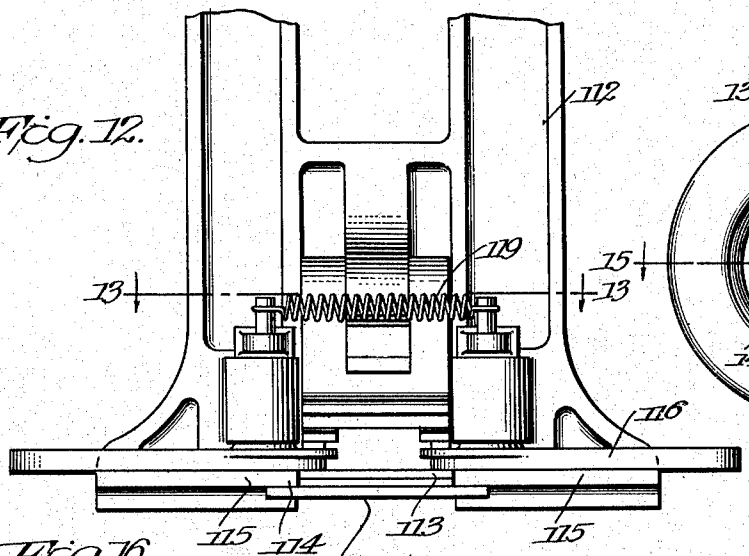


Fig. 14.

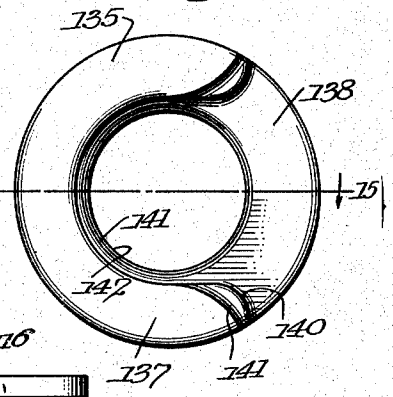


Fig. 16.

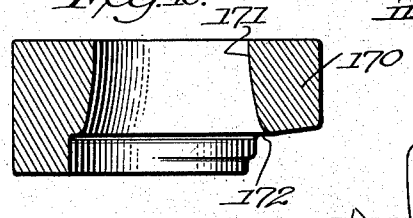


Fig. 15.

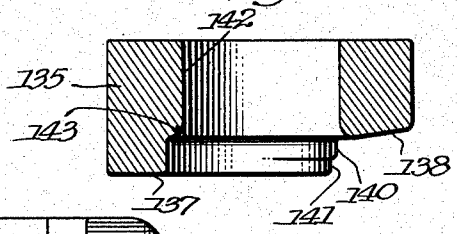
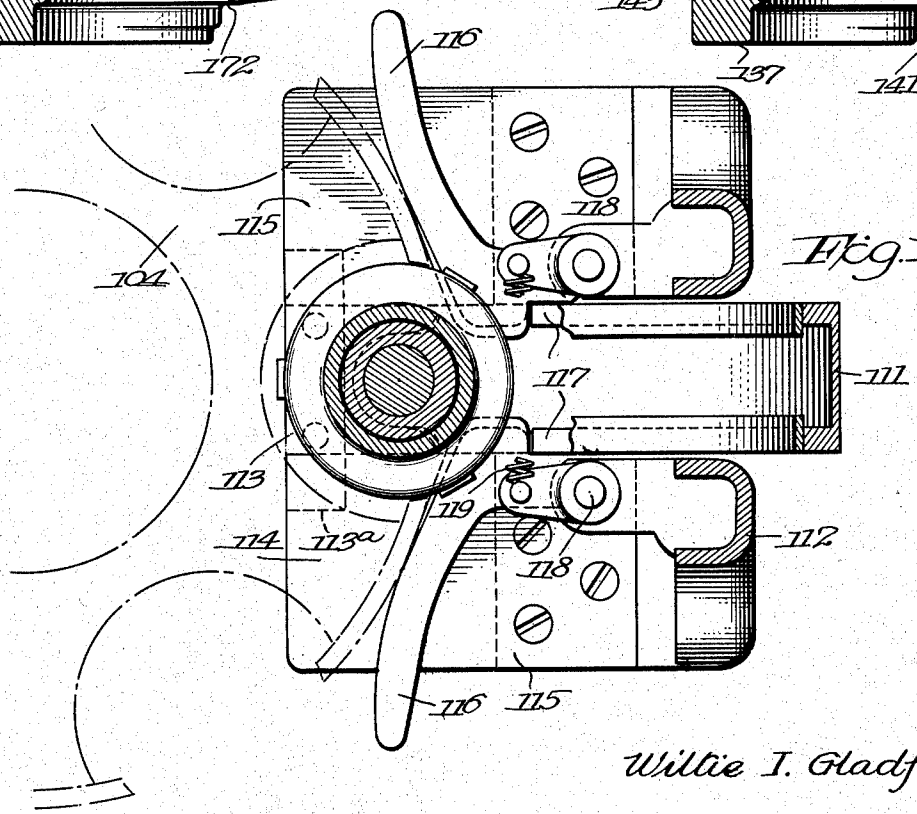


Fig. 13.



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FILLING AND CROWNING MECHANISM

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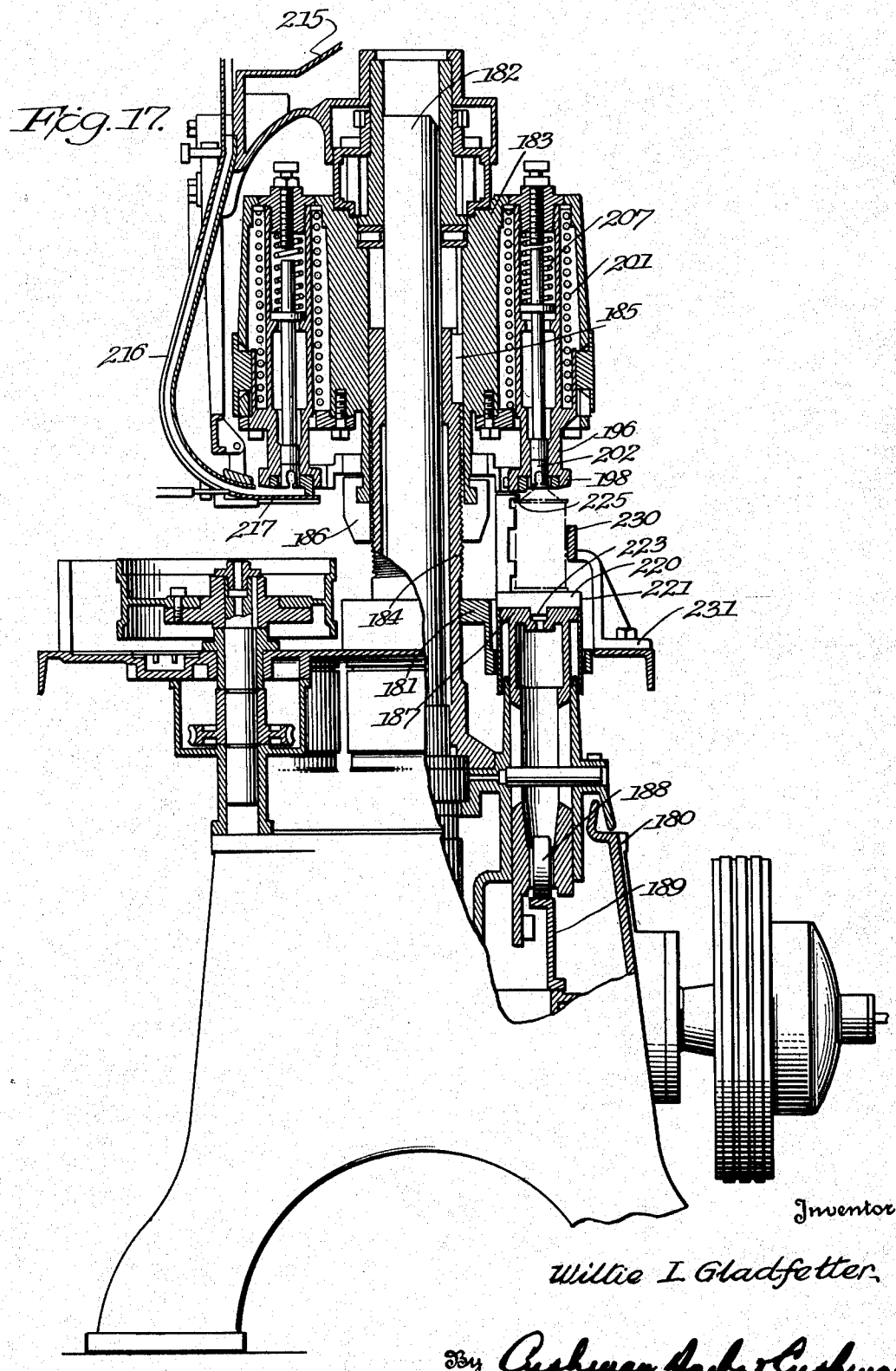
Fig. 17.



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FILLING AND CROWNING MECHANISM

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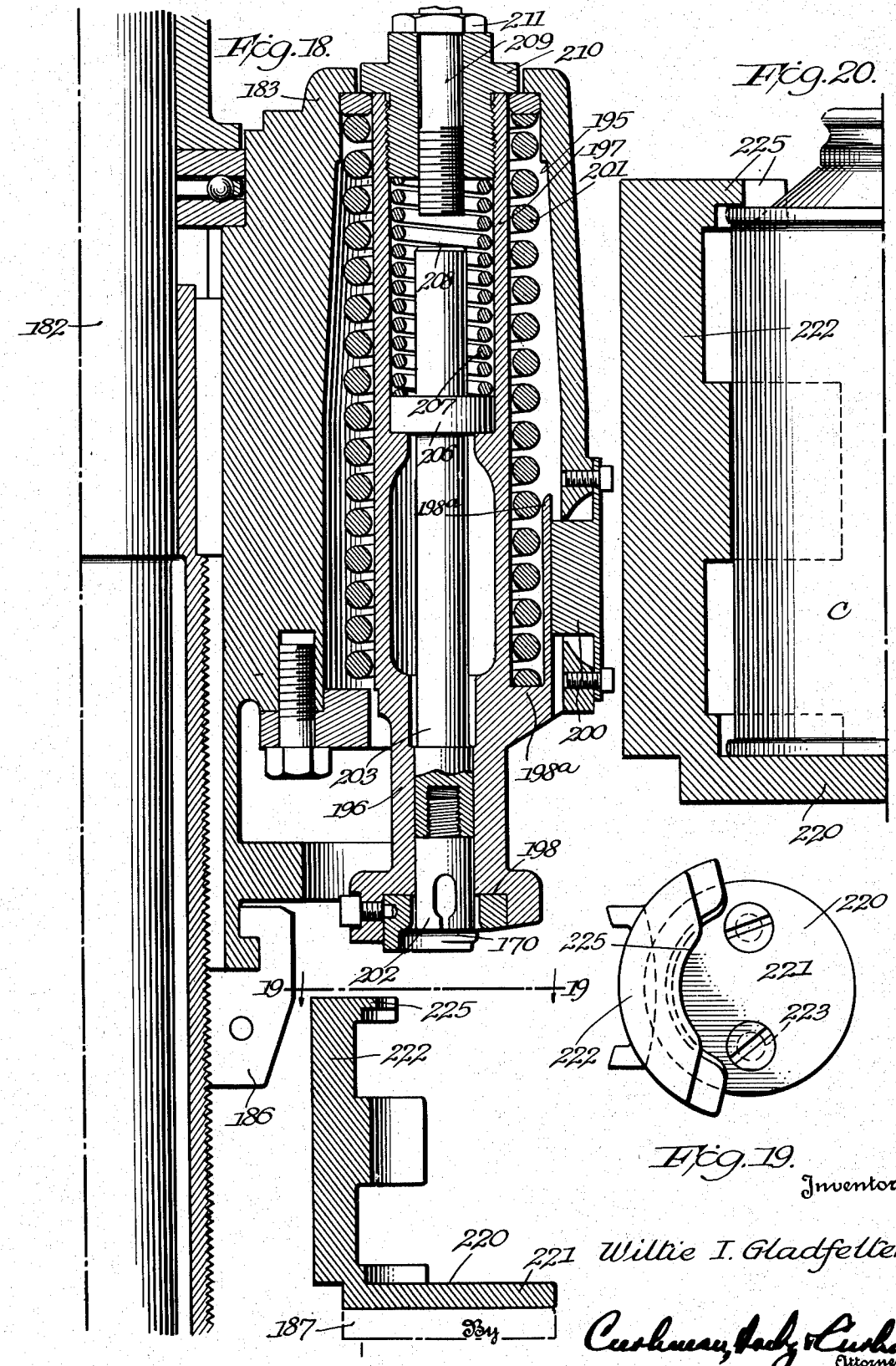

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Patented Dec. 26, 1939 2,184,493

UNITED STATES PATENT OFFICE

2,184,493

FILLING AND CROWNING MECHANISM

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Application November 23, 1935, Serial No. 51,291

7 Claims. (Cl. 226—75)

The present invention relates to filling and crowning mechanisms, and, more particularly, to mechanisms for filling and crowning either bottles or cans.

Filling machines now in use are not capable of filling and crowning all of the various types of containers used for beer, viz., long-necked bottles of the well known form, short-necked bottles, and cans, because of the marked differences in the shapes of these various types of containers.

Different problems are presented in the filling and the crowning of each of the types of containers mentioned, both because of the differences in the shapes of the three types, and also because of the fact that they are formed of different materials.

With regard to the different problems presented because of the different materials of which the containers are formed, because a bottle is formed of rigid material, its mouth and lip will not bend or give in any respect so that it will be accommodated to the crowning die or cap. Also, in manufacturing bottles, particularly until recent years, it was impossible to mold a series of bottles of supposedly identical characteristics without there being some irregularity or difference between the heights as well as in the shapes of the mouths of individual bottles. The lack of uniformity at the mouths is a serious factor in the crowning of bottles and necessitates that sufficient pressure must be exerted upon the cap during the application of the same, to insure that the cap will be efficiently sealed to the bottle despite all such irregularities and without breakage.

Another problem ancillary to the fact that bottles are formed of glass is that arising because bottles cannot be molded with their mouths uniformly concentric with the axis of the body portion of the bottle. Therefore, some means must be provided upon the lower portion of a filling or a crowning head for bottles to insure that the mouths of the same will be accurately centered with respect to such heads. Since the mouths of the bottles are not necessarily perfectly concentric with the axis of the body portion, and also because the body portions are not of perfectly uniform diameter, the spider or other member which presents the bottle to the filling or crowning head cannot be of such shape as to have a perfect fit about each bottle and cannot be relied upon, alone, to center the mouth of the bottle with respect to the filling or the crowning head.

All of the above-mentioned irregularities with regard to bottles particularly apply to long-necked beer bottles, some of which were molded perhaps twelve years ago, at which time bottle molding apparatuses had not reached the present degree of perfection. The new short-necked bottles, made with present day improved apparatus, do not lack uniformity to such a substantial degree.

In the filling and crowning of cans, since these are formed of metal, and with present day improved apparatus, they can be produced with substantially uniform dimensions and therefore can be readily centered with respect to the filling or crowning head by spiders or other means having pockets of uniform shape and without the necessity of any centering means upon the filling and crowning heads themselves. Furthermore, since the cans are formed of metal, it has been found that a cap can be efficiently sealed upon the mouth of the container at a comparatively low pressure and with a straight-walled die throat, due to the fact that the mouth of the can will bend to a slight extent to even more efficiently mold itself to the shape of the die and cap. The practical importance of this difference between a can and a bottle will be appreciated when it is understood that a can may be efficiently crowned with a crowning pressure of approximately three hundred pounds, whereas approximately seven hundred and fifty pounds must be exerted in the efficient crowning of a glass container. Since a can may be sealed under a relatively low crowning pressure, cans to be crowned are designed to withstand only pressure approximating that figure and would be distorted if crowned by a head actuated under bottle crowning pressure.

Another consideration which must be borne in mind in the crowning of a can, is the fact that the can has a short neck and unless the die is designed to completely seal the cap to the can by a shorter movement than ordinarily, the die will strike and deform the upper wall of the can body. A straight-wall die throat will obviate this difficulty.

Bottles such as the newly designed, short-necked bottles, that is, of fairly uniform characteristics, may also be crowned by a die including a straight-walled throat, but must be crowned under the same relatively high pressure as has been heretofore used, because of the fact that the bottle will of course not bend to accommodate itself to the die.

Aside from the above-discussed problems aris-

ing because of the different materials of which the containers are formed, other problems arise in the filling of the three types of containers, because of the fact that they are of different shapes. That is to say, the well known type of beer bottle is provided with a long neck, whereas the new type bottle, and also the can, are provided with extremely short necks. This difference in shape is particularly important in connection with the flowing of counterpressure gas to the containers during the filling cycle. Quite frequently during the filling stage of the filling cycle, when the counterpressure gas is being vented from the container to permit liquid to flow into the same, a small amount of liquid will flow upwardly into the counterpressure passage. Such liquid will remain in the passage until a second container is placed beneath the filling head and the filling valve is actuated to cause gas to flow downwardly through the counterpressure passage. When this flow occurs, the liquid will initially flow from the passage. If the counterpressure passage is so designed that the gas and any liquid which may precede the same can drop directly downwardly into the container, the impact of the liquid with the bottom of the container will cause foaming and such foaming may continue after the flow of liquid during the filling stage has started. It is therefore desirable to so form the counterpressure passage that it will direct counterpressure flow outwardly against the side walls of the bottle so that any liquid in the passage may flow quietly downwardly along the walls of the container.

It is usual to have the counterpressure passages provided in the centering bell used for filling beer bottles, but since a centering bell cannot be used with a can, due to the shortness of its neck, it is necessary to provide other arrangements to insure that liquid in the counterpressure passage will be directed against the inner wall of the can mouth.

It will be appreciated from the foregoing that even the above-mentioned differences between the three types of containers now used for beer would make it necessary for a bottling plant desiring to use all three types of containers, or any two of them, to install separate machines or units to handle each type. In view of the present demands of the consuming public, each plant must be able to market beer in containers of at least two, if not all three, of the types referred to, and it is therefore highly desirable that a machine be provided which will be universally applicable.

The principal object of the present invention is to provide filling and crowning mechanisms which will be readily adapted for the filling and crowning of various types of containers, of both glass and metal, and which will also be adjustable to operate upon a wide size range of containers.

Still another object of the invention is to provide a crowning die which is particularly designed for the crowning of metal containers and which may also be used upon bottles of at least fairly uniform characteristics.

Another important object of the invention is to provide a filling head which will be readily adaptable for the filling of either long or short-necked containers.

The crowning heads ordinarily used in the crowning of containers include a cap supporting platform beneath the crowning throat and presser foot and on which the cap may be deposited by the crown feeding mechanism preliminarily to the crowning of the container. Such an arrangement is entirely satisfactory with a long-necked container, but may not be used in the crowning of a short-necked container, because of the small clearances referred to above.

Another important object of the present invention is to provide a means for supporting the cap upon the crowning head preliminarily to the crowning operation, so that the crowning head may be used for crowning either long-necked or short-necked containers.

A preferred embodiment of the above invention comprises the use of a magnetic element in the crowning head and to which the cap will adhere after it has been delivered to the crowning head by the usual cap chute. One difficulty arises from the use of such an arrangement with metal containers such as cans, because of the fact that, at intervals, the filling mechanism may entirely fail to fill a can presented thereto. When the unfilled can subsequently reaches the crowning mechanism, it will adhere to the magnetic element of the crowning head and difficulties will arise in the endeavour of the outfeed mechanism to remove the same from the crowning mechanism.

A further object of the invention is to provide a means to prevent a can from adhering to the crowning head and to cause it to remain on the container supporting platform, regardless of whether it is filled or empty.

Other objects and advantages of the present invention will be apparent from the following specification and drawings, wherein:

Figure 1 is a plan view of a filling machine, with portions broken away;

Figure 2 is a vertical sectional view on the line 2—2 of Figure 1;

Figure 2*a* is a vertical sectional view through the stationary guide member of the crowning mechanism;

Figure 3 is a side view, partly in section, showing the elements used for filling a long-necked bottle;

Figure 4 is a view similar to Figure 3 showing the elements used for filling a can;

Figure 5 is a view similar to Figure 3 showing the elements used in filling a short-necked bottle;

Figure 6 is a vertical sectional view through a portion of the crowning mechanism;

Figure 7 is a vertical sectional view of the mouth of a crowned can;

Figure 8 is a vertical sectional view of the mouth of a crowned bottle;

Figure 9 is a vertical sectional view of a crowning head for bottles operating to crown a long-necked bottle;

Figure 10 is a fragmentary view showing the crowning head of Figure 9 operating to crown a short-necked bottle;

Figure 11 is a vertical sectional view of a crowning head for cans operating to crown a can;

Figure 12 is a vertical sectional view taken on the line 12—12 of Figure 13;

Figure 13 is a horizontal sectional view taken on a line substantially corresponding to line 13—13 of Figure 12;

Figure 14 is a bottom plan view of a crowning throat for metal containers;

Figure 15 is a vertical sectional view on the line 15—15 of Figure 14;

Figure 16 is a vertical sectional view of a crowning throat for bottles;

Figure 17 is a view, partly in vertical section, of a modified form of crowning mechanism;

Figure 18 is a vertical sectional view, on a larger scale, of a crowning head used in the Figure 17 construction;

Figure 19 is a horizontal sectional view on the line 19—19 of Figure 18, showing a can supporting element, and

Figure 20 is an enlarged vertical sectional view of the can supporting element illustrated in Figure 19, showing a can supported thereon.

Referring to Figures 1 to 16, inclusive, the numeral 25 generally designates the filling and crowning mechanism illustrated in these figures and, as shown in Figures 1 and 2, the machine comprises a worktable or stationary table 26 having a filling mechanism 27 positioned at its rear edge. The stationary table may be generally described as including the usual straight line conveyor 28 which moves containers to be filled to an infeed spider 29, which spider positions the containers upon the container supporting platforms 30 of the filling table 32 of the filling mechanism. After being filled, the containers are removed from the filling table by a spider 36 which moves the containers to the crowning mechanism 37. From the crowning mechanism the containers move back upon the straight line conveyor 28 which then conducts them from the machine.

The upper portion 38 of the filling mechanism, which carries the filling reservoir and the filling heads 40, is vertically adjustable with respect to the filling table 32, which carries the container supporting platforms 30, in substantially the same manner as in the structure described in the application for a Filling machine of Robert J. Stewart and Wiltie I. Gladfelter, Serial No. 739,818, filed August 14, 1934. This adjusting structure may be generally described as comprising a threaded standard 45 fixed to the filling table 32 and upon which standard the upper portion 38 is supported. Rotation of the upper portion relative to the threaded standard 45 in the desired direction will cause the filling heads 40 to be moved either up or down with respect to the container supporting platforms 30.

The arrangement of the infeed conveyor, infeed spider and the spider for moving containers from the filling table to the crowning mechanism is substantially the same as that disclosed in the above mentioned Stewart and Gladfelter application and includes a plate 46 secured to the stationary table and having its inner edges formed as indicated at 47 to so cooperate with the spiders 29 and 36 that containers will be moved in the proper arcuate paths about the spiders. A portion 48 projects from the plate 46 and over the container supporting platforms 30 to guide the containers from the container supporting platforms and into the path of movement of the spider 36.

The crowning mechanism 37 is generally similar to that disclosed in the above mentioned Stewart and Gladfelter application and comprises a non-rotatable post 49 upon which the mechanism is supported, and a hollow shaft 50 rotatable about the post by suitable driving mechanism. The crowning heads, generally indicated by the numeral 51, are mounted for reciprocation in a body portion or casting 52 supported upon the post, the lower or sleeve portion 52a of the casting 52 being keyed to but vertically slidably with respect to the hollow shaft 50 to permit adjustment of the casting and the crowning heads with regard to the shaft and container supporting dial 54 by proper vertical movement of the post. The post 49 is vertically adjusted by actuation of a worm shaft, not shown in the present application, which engages a worm wheel 53 keyed to the extreme lower end of the post, as best shown in Figure 2. The table or dial 54 of the capping mechanism rotates with the hollow shaft 50 and a container body engaging spider 55, hereinafter described, is removably secured to the table 54 in a manner hereinafter set forth, so that the spider may be changed to accommodate containers of different sizes and conformations. A container neck engaging spider 56 may also be removably secured to the lower sleeve 52a of the crowner casting as hereinafter described.

Guide brackets 57 are secured to the surface of the stationary table 26 adjacent the rotating dial of the crowning mechanism 37 to hold containers properly positioned within the pockets of the spider 55. The brackets 57 are adjustably secured to the stationary table so that they may be moved either inwardly or outwardly with respect to the axis of the crowning mechanism, according to the diameter of the containers being crowned.

Except as hereinafter described, the machine of the present invention is constructed and operates in the same manner as the machine disclosed in the above mentioned Stewart and Gladfelter application.

It will be understood that throughout the present description of the invention, the operation is described for a long-necked bottle, short-necked bottle and can, each of like capacity, and that the sizes of the various elements may be suitably changed, and the machine likewise adjusted to accommodate a series of long-necked bottles, short-necked bottles and cans of other capacities.

Filling nozzle for long-necked bottles

The filling heads 40 are generally similar to those disclosed in the above mentioned Stewart and Gladfelter application, and when a long-necked beer bottle LB of the well known type is to be filled, the filling head 40 is fitted with a nozzle supporting collar 59 shown in Figure 3 and secured to the lower surface of the head by a ring-nut 60. The collar 59 carries a filling nozzle 61 with a centering bell 62 slidable thereon, all of these elements being identical with those disclosed in the above mentioned application, and, as explained in that application, the filling head is provided with a liquid passage 63 and a counter-pressure passage 64, flow through which is controlled by a filling valve 65. The collar 59 is provided with a bore 66 into which the upper end of the filling nozzle 61 is threaded, this bore and the filling nozzle being aligned with the liquid passage 63 of the filling head body. The collar 59 is also provided with a passage 67 having its upper end aligned with the lower end of the counterpressure passage 64 of the filling head body, the lower end of the passage 67 opening to a counterbore 68 concentric with the bore 66.

As is shown in Figure 3, when the centering bell 62 is in upward position with its upper end bearing upon the resilient packing member provided on the underside of the collar 59 concentric with the counterbore 68, the counterbore 68 comprises a chamber into which opens the upper end of a spiral passage 70 extending through the centering bell around the outer wall of the filling nozzle 61. By the above arrangement, when a

long-necked bottle LB is positioned upon a container supporting platform 39, it will be moved upwardly about the filling nozzle 61 in the usual manner by the rise of the container supporting platform as the latter is rotated away from the stationary table, and the contact of the mouth of the bottle with the underside of the centering bell will cause the centering bell to properly center the bottle with regard to the filling nozzle 61. The continuing upward movement of the bottle about the centering nozzle will result in contact of the centering nozzle against the packing 69 of collar 59 and the sealing of the mouth of the bottle against the resilient insert 71 in the bell.

When the filling valve 65 is actuated to cause counterpressure gas to flow into the bottle through the passages 64, 67 and spiral passage 70, the conformation of the latter passage will cause this gas to flow tangentially outwardly and downwardly from the centering bell and against the inner wall of the neck of the bottle. The provision of the spiral passage 70 is important because during the filling of a bottle, beer may flow upwardly from the bottle into the lower portion of the counterpressure passage and such beer will be retained in this passage until the filling valve is actuated to flow counterpressure gas into the next succeeding container. If such liquid were free to drop straight downwardly into a bottle, some foaming might occur and foaming of the beer flowed into the bottle during the subsequent filling stage might be initiated. The provision of a spiral outlet passage for the counterpressure gas to direct such gas or any liquid which may be in the passage outwardly against the inner wall of the container will obviate the possibility of the foaming referred to.

Filling nozzle for short-necked bottles

As shown in Figure 5, in the filling of a short-necked bottle SB, the filling nozzle 61 and centering bell 62 shown in Figure 3 for filling a long-necked bottle would be replaced by a filling nozzle 61*a* and centering bell 62*a*. The filling nozzle 61*a* is identical in construction with the filling nozzle 61 but is somewhat shorter than the latter, though of sufficient length to permit the beer to flow into the bottle from a point closely adjacent the bottom of the bottle to prevent foaming. The nozzle is also of such diameter as to displace a predetermined quantity of beer so that when the nozzle is drawn from the entirely filled bottle, the level of the beer will be at the proper point. The centering bell 62*a* is exactly similar to the centering bell 62 except that its skirt 75 is shorter than the skirt of the bell 62 and flared to a slightly greater extent, this construction permitting the bell to properly accommodate the short-necked bottle without contacting with the upper shoulder of the body portion of the bottle.

Filling nozzle for cans

In the filling of cans C as shown in Figure 4, the filling nozzle supporting collar 59 and the filling nozzles and centering bells illustrated in Figures 3 and 5 would be replaced by the filling nozzle supporting collar 80 and filling nozzle 81 illustrated in Figure 4. As is shown in the latter figure, the collar 80 is secured to the lower portion of the filling head 40 by the ring-nut 60 so that a central bore 82 and an inclined bore 83, both in the collar, will have their upper ends aligned with the liquid flow passage 63 and counterpressure gas pasage 64, respectively, of the filling head body portion. The center pasage 82 of the collar 80 is counterbored as indicated at 84 to a point substantially midway of the latter and the upper end of the filling nozzle 81 is threaded into this counterbore, as shown. A packing or sealing ring 85 is secured in the lower end of the collar 80 so that when a container is in filling position, its mouth will be sealed to the collar as shown in Figures 4 and 5. A counterbore 86 extends upwardly from the lower end of the collar, within the packing ring 85, and opens to the lower end 87 of the counterpressure passage 83.

When the filling nozzle 81 is threaded into the counterbore 84, the provision of the counterbore 86 will provide a relatively narrow annular passage 86 about the exterior of the filling nozzle within the collar 80 and concentric with the nozzle. The provision of this narrow passage will enable counterpressure gas to flow downwardly from the collar 80. In order that such gas, and also any liquid which may be present in the passage, will be directed outwardly and against the inner wall of the mouth of the can C, a shoulder 90, preferably concavely arcuate in vertical cross-section, as shown in Figure 4, is provided upon the filling nozzle 81. Gas or liquid flowing downwardly from the passage 86 will abut against the shoulder 90 and be deflected outwardly so that liquid will flow quietly down the inner wall of the container. It is of course important that the shoulder 90 be properly positioned with respect to the mouth of the can, but the provision of the counterbore 84 in the collar 80 provides a shoulder against which the upper end of the filling nozzle may abut when it is threaded into the collar, thereby fixing the position of the shoulder 90 with respect to the lower end of the collar 80.

The filling nozzle 81 is of shorter length than the filling nozzle 61*a*, but is of sufficiently large diameter to displace enough liquid that, when the filling is completed, a space will be left about the level of the beer in the can to allow for expansion of the beer during subsequent pasteurization.

Features of the filling structures of Figures 3, 4 and 5 not claimed herein are described and claimed in my divisional application for Filling mechanisms Serial No. 274,645, filed May 19, 1939.

Operation of filling nozzles

For filling long-necked bottles LB, the upper portion of the filling mechanism would be adjusted to the proper height with respect to the filling table 32 and each filling head 40 fitted with a collar 59, filling tube 61 and centering bell 62 as illustrated in Figure 3. As the filling mechanism rotates, each bottle will be filled with counterpressure gas through the passages 64, 67 and 70 and liquid will be subsequently flowed into the bottles through the nozzle 61.

In order to fill short-necked bottles, as shown in Figure 5, each collar 59 would have the filling nozzle 61 and centering bell 62 removed therefrom and replaced with a nozzle 61*a* and centering bell 62*a*. The upper portion 38 of the filling mechanism would be lowered to the proper height for the shorter bottles and the mechanism would then be ready for operation. As the bottles move about the table, counterpressure gas would flow downwardly into each bottle through the passages 64, 67 and 70 and against the inner wall of the neck of the bottle. Subsequently, beer would

flow downwardly into the bottle through the nozzle 61a.

For filling cans C, as shown in Figure 4, the filling heads would be equipped with the collars 80 and nozzles 81 and the upper portion 38 of the filling mechanism would be lowered to the proper extent to have the mouths of the cans contact with the sealing ring 85 in each collar. In filling, counterpressure gas would flow downwardly into the cans through the passages 64, 83 and 86 into contact with the shoulder 90 on nozzle 81, the shoulder deflecting any liquid which may be in the passages against the inner wall of the neck of the bottle. Subsequently, beer would flow downwardly into the bottle through the nozzle 81.

The crowning mechanism

As best shown in Figure 6, the body portion 52 of the crowning mechanism 37 surrounds a smaller casting 100 fixed to the upper portion of the post 49 and the cylinders 101 of the crowning heads 51 are mounted in vertical bores 102 of the body portion 52 in the usual manner and with rollers 103 rotatably mounted adjacent their upper ends to move in the cam track of casting 100 so that the crowning cylinders will be moved vertically to and from crowning position. The body portion of the crowning mechanism is also provided at its lower end with a ring 104 provided with substantially semi-circular pockets 105 (Figure 13) through which the crowning head may descend. When a crowning cylinder is in raised position, its lower portion will be flush with the underside of the ring 104.

A cap hopper 110 of well known construction is secured to the upper end of the post 49 and a cap chute 111 extends downwardly from the hopper 110 to a point substantially opposite the ring 104 of the crowning mechanism body portion, all as in the Stewart and Gladfelter construction referred to above.

The lower end of the chute 111 is supported by a bracket 112 depending from the crown hopper and the under or outer wall of the chute 111 is continued inwardly as best shown at 113 in Figures 6 and 13 to a point adjacent the central depending sleeve 52a of the body portion 52 and in such a plane that it will be closely adjacent the lower portion of a crowning head as the latter moves past the cap chute, at which time the crowning cylinder 101 will be in raised position. The horizontal continuation 113 of the cap chute forms the central portion of a wiper or cap supporting plate 114 formed of plate 113 and two end plates 115 having their outer portions secured to the depending bracket 112 as best illustrated in Figure 13.

As shown in Figure 12, the inner end of the chute plate 113 carries a cross plate 113a which bears against the undersides of the plates 115. This arrangement will prevent plate 113, carried by the chute 111, from rising above the rigid plates 115.

Cap latches 116 are mounted upon the bracket 112 adjacent the lower end of the side walls 117 of the cap chute 111 as illustrated in Figures 12 and 13, these latches being of the type disclosed in my application for Bottle capping machine, Serial No. 3,176, filed January 23, 1935, and being pivoted in the usual manner upon studs 118 and being tended toward each other and toward the outer surface of the crown ring 104 by a coil spring 119 joining the two latches.

It will be observed that by the above construction, caps may move downwardly through the chute 111 between the latches 116 and upon the cap supporting plate 114 carried at the lower end of the cap chute.

Each of the crowning heads comprises one of the cylinders 101 vertically reciprocable in a bore 102, the upper end of the cylinder being closed by a block 122 against which bears the upper end of a relatively strong spring 123 having its lower end bearing upon a shoulder 124 on a sleeve 125, the spring 123 thereby tending to hold the sleeve 125 and the mechanism carried thereby in extreme downward position. The sleeve 125 is guided in the cylinder 101 and its downward movement is also limited by key blocks 126 secured to the sleeve and moving in vertical slots 127 in the walls of the cylinder 101 and which, in the extreme downward movement of the sleeve 125, will abut against the collar 128 threaded into the lower end of the cylinder 101. The lower end of the sleeve 125 is enlarged as indicated at 129 to form a chamber for the crowning dies.

Crowning dies for cans

As best shown in Figure 11, the crowning dies used for cans include a rigid throat ring 135 secured in the chamber 129 by means of set screws 136 extending inwardly through the walls of the chamber into pockets in the outer wall of the throat ring. The lower edge 137 of the throat ring extends downwardly past the lower edge of the chamber 129 except at its outermost portion, that is, the portion furthest from the axis of the entire crowning mechanism, there being a cut-out 138 at the last named portion (Figures 11, 14 and 15). The lower wall of the chamber 129 is likewise slightly cut away at the corresponding portion and the upper edges of both cut-out portions are outwardly and upwardly inclined as indicated at 139 in Figure 11 to form a smooth inclined surface. As best shown in Figures 14 and 15, the outer edges 140 of the depending wall 137 are rounded and cut away, all for a purpose hereinafter set forth. The bore 142 through the throat ring 135 is perfectly straight, unlike previous throat rings, and is of slightly less diameter than the opening between the depending wall of the throat ring. The lower edge of the bore is slightly rounded as indicated at 143.

As shown in Figure 11, the throat ring 135 bears against a collar 144 threaded in the lower portion of the sleeve 125 and the collar 144 centers a presser foot 145 formed of permanently magnetized material. The presser foot is provided with the usual shoulder 146 adjacent its upper end against which bears a presser foot spring 147, which is somewhat lighter than the spring 123. The upper end of the presser foot spring bears against the upper and inner end of the sleeve 125. A reduced portion 148 on the upper end of the presser foot serves to center the spring 147 about the same and is provided with a socket 149 arranged opposite a presser foot stop rod or connecting member 150, which rod is threaded in the upper end of the cylinder 125 as indicated at 151 and has its outer end extending entirely through the upper end of the cylinder 101 (Figure 6). The extreme upper end of the rod 150 is squared so that a tool may be applied to the same to adjust the position of its lower end in the cylinder 125 and with respect to the presser foot 145. The rod 150 is adapted to be held in adjusted position by means of a square socketed member 152 intended to be held upon the upper end of the cylinder 101 by removable screws. A cover plate 153 may be pro-

vided on the top of the body portion 52 of the crowning mechanism over the socket member 152.

Cans to be crowned are delivered to the dial or rotating table 54 of the crowning mechanism by the spider 36 and positioned in pockets of the crowning spider 55. Because of the fact that cans can be formed of uniform diameter, the pockets of the spider may be designed to have a close clearance with the walls of the can and the guide brackets 57 may also be adjusted to have a close clearance with the cans in the spider pockets. As best shown in Figs. 1 and 2a, the guiding bracket 57 may be provided during the crowning of cans with an overhanging bracket 165 which overlies the portion of the path of travel of the can during which the crowning head is rising, preventing an empty can from being drawn upwardly by the magnetic presser foot.

Operation of crowning head for cans

When the crowning mechanism is to operate upon a can, the post 49 is adjusted downwardly so that the lower end of each crowning head will be at the proper point, with regard to the mouth of the can, when in the lowermost position imparted thereto by the circular cam track in the block 100. The cap hopper, cap chute and the cap supporting plate 114 will move downwardly with the body portion of the crowning mechanism so that when a crowning head is in the uppermost position imparted thereto by the cam track of block 100, it will pass above the plate 114 with the depending portion 137 of its throat ring closely adjacent the upper surface of the plate.

Also, in crowning cans, the presser foot stop rod 150 is adjusted upwardly so that its lower end will be positioned as shown in Figure 6 and spaced from the upper end of the presser foot a sufficient distance that the entire upward forcing movement imparted by the can to the presser foot during the crowning operation will still leave the presser foot out of contact with the lower end of the stop rod. Figure 11 shows the extreme upward movement of the presser foot 145 in the crowning of a can and, as there illustrated, the upper end of the presser foot is still out of contact with the lower end of the stop rod 150.

As a crowning head rotates about the post 49 in a clockwise direction (Figure 1) it will move over the cap supporting plate 115 while in an upward position. The portion of the crown ring 104 adjacent and in advance of the throat of the crowning head will hold back the line of caps in the chute 111 but when the open side 138 of the throat ring 135 comes opposite the lower end of the chute, the lowermost cap in the chute will move into throat ring and beneath the presser foot, due to the weight of the other caps in the chute and also because of the blast of air directed against the lowermost cap by the usual air nozzle 166. The cap will be centered in its movement across the plate 114 by the latch members 116. The inward movement of the cap into the throat ring will of course be stopped by the depending wall 137 of the ring and the inwardly and downwardly inclined upper surface of the opening 138 will properly direct the cap, its movement into the throat ring being further directed and centered by the rounded and inclined edges 140 and 141 of the ring.

The continuing rotation of the crowning mechanism will move the crowning head from above the plate 114 but before the presser foot leaves the plate, its magnetism will cause the cap to adhere thereto so that it will not drop from the crowning die.

It will be observed that the construction described above provides a means for retaining a cap in an open-mouth or flush-bottom crowning die or crowning chamber. By the terms "open-mouth" or "flush-bottom" crowning die or crowning chamber is meant a die or chamber which is not provided with the usual ledge or shoulder in its mouth or lower portion upon which a cap may rest in the interval between its delivery into the die or chamber and its sealing upon a container.

As the crowning head continues its clockwise movement, a can will be inserted in the spider pocket beneath the crowning head, and the crowning cylinder 101 of which the crowning head forms a part will be moved downwardly by the cam track in block 100. Near the lower end of this movement, the cap adhering to the lower end of the presser foot 145 will surround the mouth of the can and, as the downward movement of the cylinder continues, the contact of the lip of the can with the underside of the top of the cap will substantially stop or retard further downward movement of the presser foot so that the presser foot will be held in the position shown in Figure 11, while the throat ring 135 will continue downward movement about the skirt of the cap. The holding of the presser foot against downward movement will cause the presser foot spring 147 to be contracted so that a pressure approximating one hundred pounds will be exerted upon the cap and can by the presser foot spring. The downward movement of the throat ring 135 will cause the lower rounded edge 143 of its bore to first slightly iron the skirt inwardly and as the straight bore 142 moves downwardly about the cap, the length of the skirt will be ironed inwardly so that, during the final downward movement, the lower portion of the skirt will be turned well inwardly to the form illustrated in Figure 7. The only pressure exerted by the downwardly moving throat ring will be that necessary to break down, i. e., initially bend, the cap skirt, and will be but about two hundred pounds, making the total crowning pressure on the can only three hundred pounds.

The application of a cap by a rigid crowning throat having a straight walled bore gives a result with regard to cans that is extremely efficient, because of the action described above whereby the extreme lower edge of the skirt will be forced into close engagement with the underside of the annular shoulder about the mouth of the can. The straight throat is also of importance in the crowning of cans because it tends to mold the outer edge of the can mouth to a shape to result in a close seal betwen the same and the skirt of the cap.

As has been heretofore explained, the presser foot will not come in contact with the presser foot stop rod during the crowning of the can and, for that reason, the only downward pressure which will be exerted upon the can will be that of the presser foot spring 147.

The depth, vertically, of the locking ring LR of the standard can illustrated in Figure 7 is less than the depth of the locking ring of the standard bottle. This is due to the fact that the distance D from the upper surface of the can mouth to the centerpoint of the radius RA of the curve forming the edge of the lower shoulder U of the ring is .010" less than the corresponding measurement D' of the standard bottle illustrated in Figure 8. This radius is the same both for the

bottle and the can. The center point of the radius RB forming the underside of the shoulder U is likewise correspondingly closer to the upper surface of the can mouth.

By using a rigid crowning throat having a straight bore of uniform diameter, the skirt of the cap will be ironed inwardly along the under shoulder U of the can locking ring, causing the entire cap to be drawn further downwardly with respect to the mouth of the can and compressing the cork lining of the cap to a greater extent than occurs with a bottle. This entire action, affording a seal equally efficient to that provided on a bottle, is obtained merely by the use of the pressure derived from the comparatively light presser foot spring 147.

A crowning throat having a straight-walled bore of uniform diameter accomplishes the efficient sealing described above with a minimum downward movement, it being noted in Figure 11, which shows the crowning die at its lowest position, that the lower extremity of the straight-bore portion of the throat moves only very slightly past the lower edge of the cap skirt to apply the cap. Even at this position, the clearance between the depending skirt 137 of the throat and the upper wall of the can body will be very small.

Because of the fact that the can shoulder is of less depth than a bottle, it might be expected that since the area of contact between the vertical portion of the cap skirt and the can mouth is thus reduced, a less efficient seal would be obtained. However, this factor is more than offset by the circumstance that the contact of the metal skirt with the metal can mouth gives higher coefficient of friction than occurs between a metal skirt and a glass bottle mouth. Also, the above-mentioned action of the crowning die in drawing the cap liner into a more closely compressed form and the presence of a greater length of the cap skirt beneath the locking ring will augment the seal.

The continued rotation of the crowning head will cause the cam track and block 100 to raise the crowning cylinder out of contact with the can and cap and when the crowning head entirely rises from the cap, the weight of the filled can C will prevent the can from rising with the magnetic pressure foot. In the event that the can which has been capped is an empty can, it will be held from rising with the presser foot by the over-hanging plate 165 on the guide member 57. As the crowning mechanism rotates, the can will leave the crowning dial and will move upon the outfeed end of the straight line conveyor 28.

Operation of crowning head for bottles

For crowning long-necked bottles, a crowning throat 170 illustrated in Figures 9, 10 and 16 is fitted in the die chamber 139 of each crowning head. The throat ring 170 is substantially identical in construction with the throat ring 135 used for crowning cans except that the wall of the central bore 171 is tapered very slightly inwardly from its lower end 172 to its upper end. Also, the edge of the lower end 172 of the bore may be somewhat more rounded than the corresponding edge of the throat ring 135.

To enable bottles to be properly centered on the crowning dial 54 with respect to the mouth of the corresponding crowning head, a spider 175 may be secured to the lower sleeve 52*a* of the crowning mechanism body portion, this spider being provided with an indentation beneath each crowning head to insure that the bottle will be properly centered, regardless of the fact that the neck of the bottle may not be concentric with the axis of the body portion of the bottle.

To enable the crowning mechanism to operate upon bottles, the body portion 52 would be raised by vertical raising of the post 49 to position the crowning heads at the proper point with regard to the bottles to be crowned, whether the bottle is of the long-necked type shown in Figure 9 or the short-necked type shown in Figure 10. Also, the presser foot stop rod 150 of each crowning head would be adjusted downwardly so that the upper portion of the presser foot would contact therewith after the cap and throat ring have moved down a short distance about the mouth of the bottle.

In the operation of the crowning mechanism shown in Figures 6 and 9 for long-necked bottles, the caps would be delivered to the crowning heads in the manner heretofore described in connection with the crowning of cans. When a bottle is positioned beneath a crowning head, the subsequent downward movement of the crowning head will, upon contact of the cap adhering to the presser foot with the mouth of the bottle, cause the presser foot to be raised with respect to the descending crowning head and against the action of the presser foot spring 147, while the throat ring 170 continues its downward movement about the skirt of the cap. A slight upward movement of the presser foot 145 with respect to the descending crowning head will likewise cause the presser foot stop rod 150 to be raised with respect to the crowning head, drawing the sleeve 125 upwardly with respect to the crowning head and against the action of the stronger spring 123. As a result, the crowning pressure applied upon the cap and bottle will approximate seven hundred and fifty pounds. As the throat ring moves downwardly about the cap, its tapered bore 171 will force the skirt of the cap inwardly and position its lower edge beneath the lip of the bottle as shown in Figure 8.

The operation described above will be the same for the shorter type bottle shown in Figure 10, except that the crowning heads must be moved further downwardly in the initial setting of the mechanism, and a neck spider such as 175, but having its pockets of a proper size to fit the necks of the shorter bottles, would be fitted upon the crowning mechanism.

In crowning short-necked bottles, a straight-bored die throat 135 may likewise be used, with the presser-foot stop rod 150 set to contact with the presser foot as described above in connection with the crowning of long and short-necked bottles so as to exert a high crowning pressure. The ability to use a straight-bored throat is dependent upon the fact that the newly introduced short-necked bottles have all been made under present day improved bottle molding practice, so that they are more uniform than the long-necked bottles, any run of which may include old bottles of comparatively non-uniform configuration.

Modified form of crowning mechanism

Figures 17 to 20 illustrate a modified form of mechanism which is generally similar to the construction disclosed in my application for Bottle handling machine and control therefor, Serial No. 626,151, filed July 29, 1932, and which comprises a base 180 provided with a table 181 rotating about a fixed post 182 projecting upwardly

from the base 180. The post 182 supports the crowning head supporting casting 183, which is rotated about the post 182 with the table 181 by suitable driving means of well known type and including a hollow vertical shaft 184 to which the table is fixed and to which the crowning head casting 183 is keyed as indicated at 185. The crowning head casting 183 is adapted to be vertically adjusted on the hollow shaft 184 by means of a collar 186 threaded on the hollow shaft.

The table 181 is provided with container supporting platforms 187 adapted to be reciprocated vertically by contact of rollers 188 carried by the lower ends of the platforms with a cam track 189 mounted in the base.

As shown in Figure 18, the crowning head casting 183 is provided with vertical bores or cylinders 195 in each of which a crowning head generally designated by the numeral 196 is positioned. Each crowning head comprises a sleeve 197 enlarged at its lower end to provide a die chamber 198 and has lateral projections 198a spaced about its lower portion, each projection being provided with an upward extension cooperating with a key 200 in the casting 183 to hold the crowning head against rotation in the cylinder 195. The sleeve 197 is supported in the chamber 195 by means of a relatively strong spring 201 positioned between the projections 198a and the upper edge of chamber 195.

Each sleeve 197 carries a magnetic presser foot 202 having a rod 203 threaded in its upper portion, the rod being provided with a flange 206 adjacent its upper end against which bears a presser foot spring 207. The extreme upper end 208 of the rod 203 is arranged opposite a presser foot stop or connecting member 209 threaded in a block 210 threaded into and closing the upper end of the chamber 197. The position of the stop 209 with regard to the upper end of the rod 208 may thus be adjusted, the stop being held in adjusted position by a suitable lock-nut 211.

The cap hopper 215 is keyed to the fixed post 182 but is supported upon the upper portion of the crowning head casting 183 so that vertical adjustment of the latter casting will cause the hopper 215 as well as the cap chute 216 to move vertically. The lower end of the cap chute 216 terminates in a cap supporting plate 217 of identical construction with that described in connection with Figures 1 to 16.

Operation of crowning head for cans

In order to support cans on the apparatus of Figure 17, each container supporting platform would be provided with an adapter 220 illustrated in detail in Figures 18 and 19. As best shown in Figure 19, the adapter 220 is provided with a base 221 and an upstanding portion 222. The base 221 has apertures 223 adapted to receive screws by which it may be secured on the upper end of a container supporting platform. Its upstanding portion 222 is arcuate in shape to partially encircle the body portion of the can. Cans sometimes move through a filler without being filled, and to prevent such unweighted cans from being lifted by the magnetic presser foot 202 when the latter rises, a flange 225 projects from the upper end of the upstanding portion 222, this flange being arranged to overlie the upper shoulder of the body portion of the can to hold an empty can on the adapter against the lifting action of the presser foot 202. The cans are held in the pockets of the adapters 220 by an arcuate guide member 230 supported from the base of the machine.

In the crowning of a can with the mechanism of Figures 17 and 18, the rotation of the table 181 will cause the platform and adapter 220 on which the can is carried to be raised upwardly so that its mouth will be presented to the crowning die, comprising the presser foot 202 and a straight bored throat ring 135 such as is illustrated in Figures 14 and 15, a cap having been positioned on the presser foot of the die from chute 216 and plate 217 in the manner described in connection with Figures 1 to 16.

In order to crown a can, the stop 209 (Figure 18) will be raised in the block 210 a sufficient extent to prevent the rod 203 carried by the presser foot from coming into contact therewith, even in the extreme upward position imparted to the rod.

The raising of the can will cause its mouth to move into the cap supported on the presser foot and the cap and presser foot will be forced upwardly, the throat ring 135 remaining stationary during this movement and thereby sealing the cap to the mouth of the can. Since the only spring pressure applied in this crowning operation will be that of the presser foot spring 207, and since the throat ring is identical with the throat ring of Figures 14 and 15, the application of the cap will be the same as has been described in connection with Figures 1 to 16 and the cap will be positioned upon the can as illustrated in Figure 7.

Crowning head used for bottles

In order to crown bottles on the mechanism shown in Figures 17 and 18, the crowning head supporting casting 183 would be moved vertically upward to position the crowning heads at the proper height for the bottles to be crowned and the adapter 220 would be removed from the container supporting platforms 187, preferably being replaced by resilient pads arranged to be secured in the sockets in the upper ends of the platform. Also, a neck engaging spider would be secured to the lower portion of the body casting or the ring 186 by means of which the latter is adjusted, the spider being of the type discussed in connection with Figure 2.

A throat ring 170 as illustrated in Figures 9, 10 and 16 and having a tapered bore would be positioned in the die chamber 198, though in crowning the new short-necked bottles, a straight-bored throat 135 may be used. In order that the crowning head may exert the full spring pressure thereof upon the bottles, the presser foot stop 209 would be adjusted downwardly so that it would be engaged by the upper end 208 of the presser foot rod 203 after a short upward movement of the presser foot.

In operation, shortly after a bottle comes in contact with the lower end of the presser foot, or rather with the cap carried by the same, the upper end of the presser foot rod will contact with the lower end of the stop 209, only the presser foot spring 207 exerting pressure upon the cap and bottle until this moment. Upon contact of the presser foot rod with the stop 209, the continuing upward movement of the bottle in the throat ring will cause the stop 209, threaded in the block 210, to draw the latter upwardly thereby likewise moving the sleeve 197 upwardly against the action of the heavier spring 201, the force of both springs thus being exerted upon the container.

Whichever type of throat ring is used in crowning bottles in the apparatus of Figure 17, the action of such a throat ring would be the same as has been described in connection with the apparatus of Figures 1 to 16 and the cap would be applied as shown in Figure 8.

It will be understood that the invention is not limited to the details of construction shown in the drawings and that the phraseology employed in the specification is for the purpose of description and not of limitation.

I claim:

1. In a flush-bottomed crowning head, a throat ring having a portion cut away at one lower edge to enable a cap to be laterally moved into the crowning head.

2. In a crowning head, a presser foot normally positioned substantially flush with a lower surface of the head, the presser foot being formed of magnetic material to cause a cap to adhere thereto, and means to present a cap to said presser foot.

3. The combination in a crowning mechanism, of a support, a crowning head rotatable upon said support, cap feeding means including a chute fixed to said support, a fixed plate upon which the lower end of the chute opens to receive caps from the chute, said crowning head being movable across the upper surface of said plate and opposite the lower end of said chute, a magnetic element in said crowning head to pick up caps from said plate during movement over the same, and means associated with the crowning head to normally close the open end of said chute.

4. The combination in a crowning mechanism, of a crowning head including a magnetic crowning die element normally positioned flush with a lower surface of the head, a fixed plate, cap feeding means including a chute having an end opening to said plate, said means being adapted to urge caps in said chute toward said plate, said crowning head being movable across said plate and opposite the open end of said chute to receive a cap therefrom so that the magnetic die element will receive the cap, and means associated with said crowning head to normally maintain the open end at said chute closed.

5. The combination in a filling machine for operating upon containers of a plurality of types, of a filling mechanism and a crowning mechanism, said filling mechanism including a filling head adapted to receive one of a plurality of filling nozzles according to the type of container to be operated upon, and said crowning mechanism including a crowning member, means to maintain said crowning member in crowning position with respect to a container, said last named means comprising a plurality of elements, and means adapted to be selectively actuated to control said elements according to the type of container to be operated upon.

6. The combination in a crowning mechanism, of a supporting element, a throat ring carrying member, said member being provided with a bore and a restriction in the bore to form an upwardly facing shoulder, a presser foot movable in said bore and including a downwardly facing shoulder adapted to normally seat on the restriction shoulder, means to resist movement of said presser foot, means to resist movement of said throat ring carrying member, and a connecting element mounted on said throat ring carrying member in alignment with said presser foot, said connecting element being mounted and arranged to be selectively positioned either in or entirely out of the path of movement of said presser foot so that the total crowning pressure upon containers may be varied, said presser foot being of uniform diameter a sufficient distance below its shoulder that upward movement of said presser foot will be unobstructed by said restriction.

7. The combination in a crowning mechanism for operation upon containers of a plurality of types, of a supporting element, a throat ring carrying member provided with a bore and a restriction in the bore to form an upwardly facing shoulder, a presser foot movable in said bore and including a downwardly facing shoulder to normally seat on the shoulder of said member, a relatively light spring to resist movement of said presser foot, said spring being of sufficient strength to provide capping pressure for containers of certain types, a relatively heavy spring to resist movement of said throat ring carrying member, said spring being of sufficient strength that, acting with said first spring, it will provide higher capping pressure for containers of other types, and a connecting element mounted on said throat ring carrying member in alignment with said presser foot and arranged to be selectively moved upwardly to leave said presser foot free for upward movement, said presser foot being of uniform diameter below its downwardly facing shoulder so that upward movement of said presser foot will be unobstructed by said restriction.

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