

[54] **APPARATUS AND METHOD FOR
AUTOMATICALLY POSITIONING AND
INSERTING PLASTIC PLUGS IN A
CONTAINER TOP**

[76] Inventor: **Raymond A. Heisler**, 657 Dakota
Trail, Franklin Lakes, N.J. 07417

[22] Filed: **July 3, 1974**

[21] Appl. No.: **485,501**

[52] U.S. Cl. **53/43; 53/264; 53/319**

[51] Int. Cl. **B65b 7/28; B67b 1/04**

[58] Field of Search 53/43, 307, 319, 325, 303,
53/306, 264, 368, 328

[56] **References Cited**

UNITED STATES PATENTS

2,353,200	7/1944	Sundell	53/303 X
2,757,496	8/1956	Lanes	53/319 X
3,111,798	11/1963	Weller	53/306

Primary Examiner—Travis S. McGehee

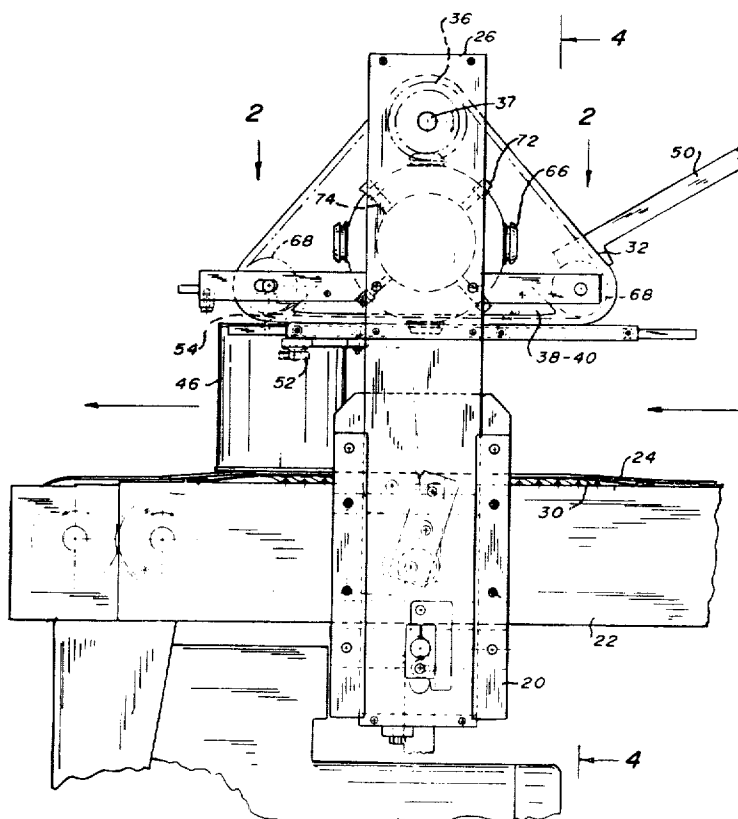
Assistant Examiner—Horace M. Culver

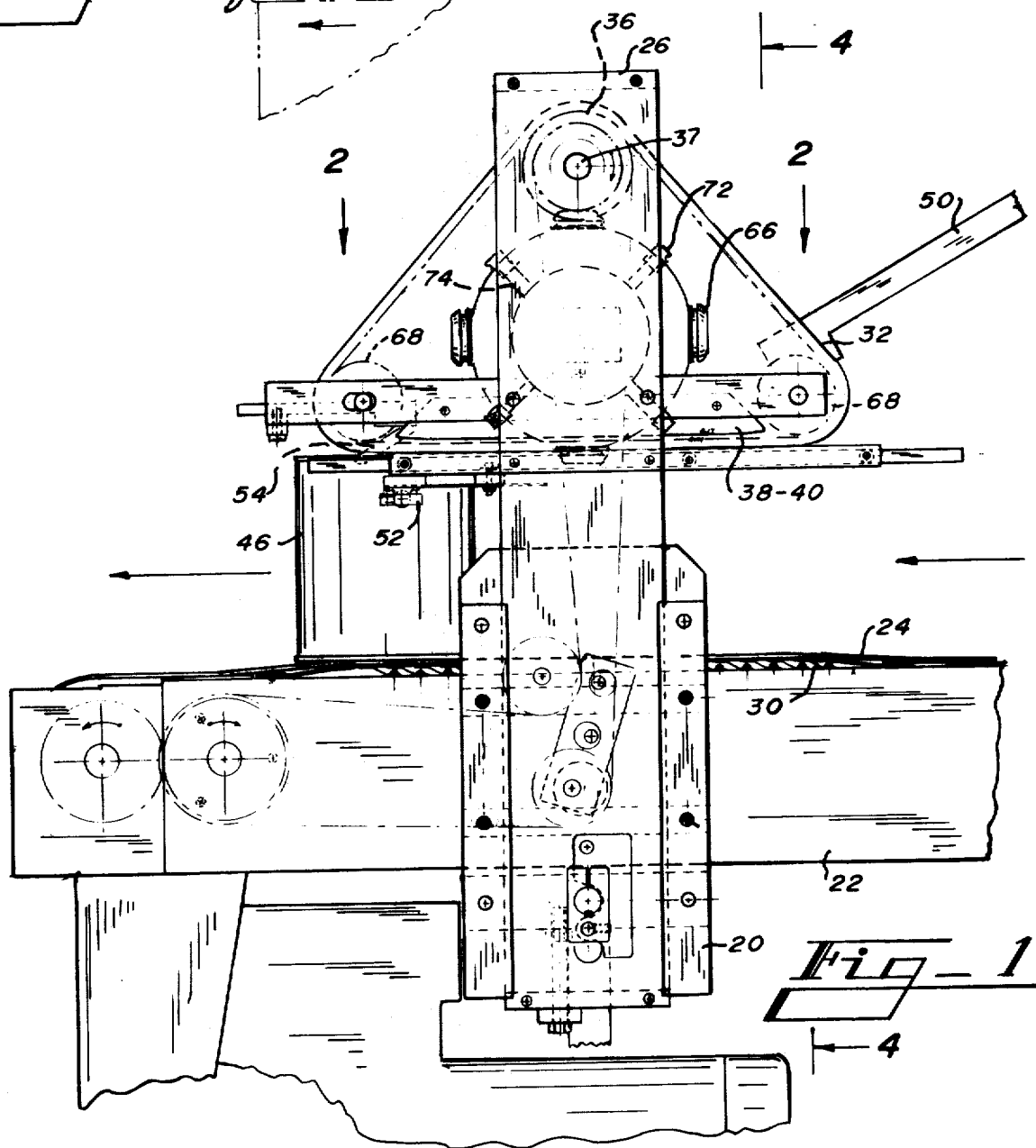
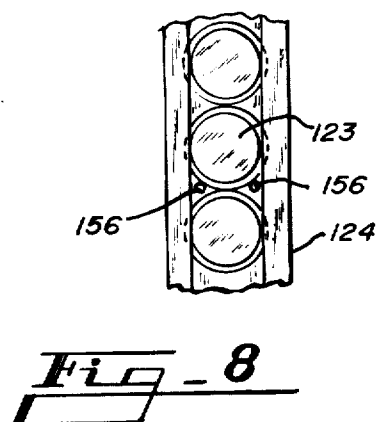
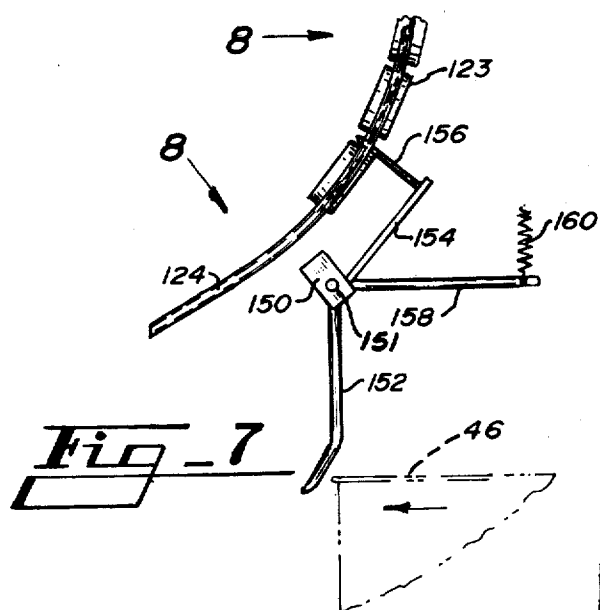
Attorney, Agent, or Firm—Ralph R. Roberts

[57] **ABSTRACT**

This invention pertains to the apparatus and the method for automatically feeding, positioning and then pressing in place a plastic plug into an aperture formed in the cover of a container. This plastic plug is of a shell-like construction and has a skirt portion which is forced into a tight-seated arrangement in the aperture in the cover. The plugs are serially delivered in a single file array to a chute and then to the applying apparatus whereat one plug is released with and positioned in the appropriate aperture with each advancement of a container. The container is advanced by conveying means into the inserting apparatus and on a belt carried on upwardly biased slides and brought into engagement with a pressure applying applicator wheel. This wheel carries a plurality of pressure pads each of which pushes a plug into place. As the container is delivered from the apparatus it is inspected as to the presence of the plug in a proper seated condition. If there is an absence of a properly positioned plug, the apparatus and other associated equipment is shut off until the problem causing the malfunction is corrected.

15 Claims, 18 Drawing Figures





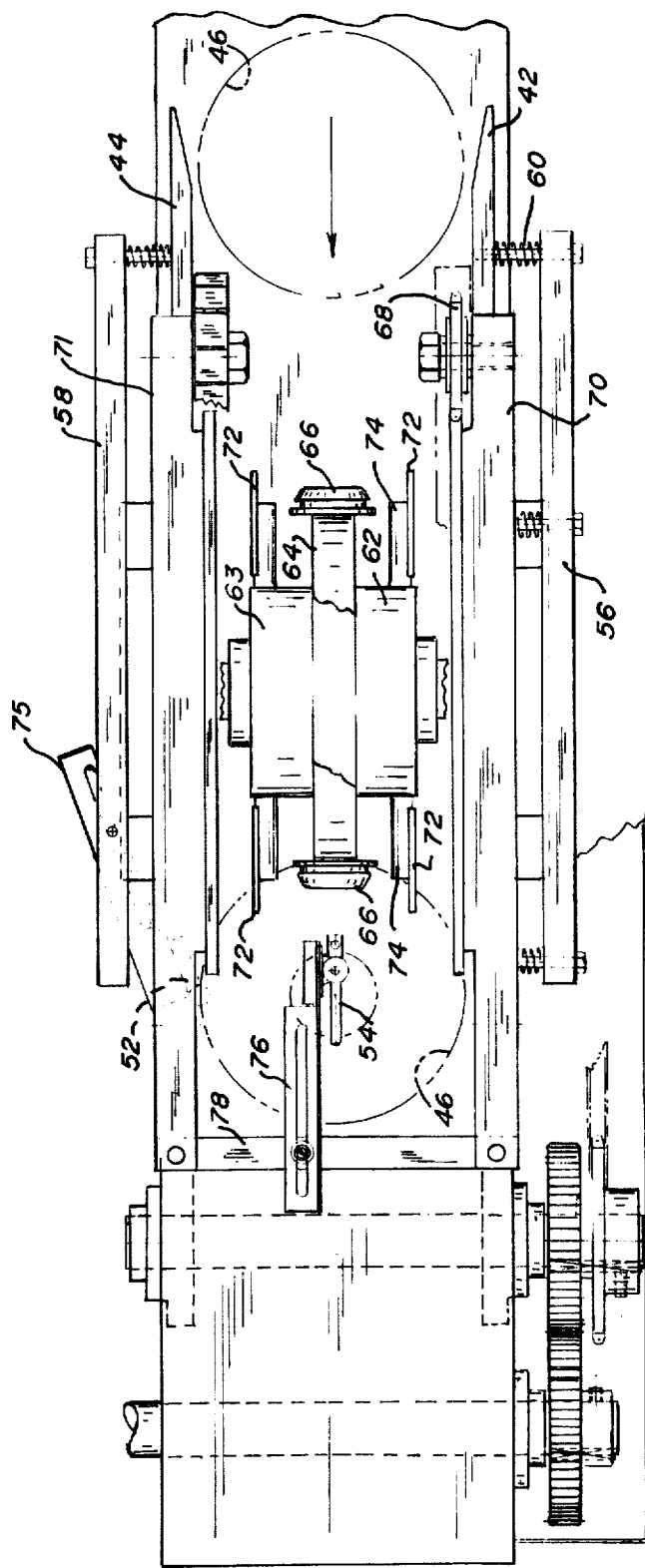


Fig. 2

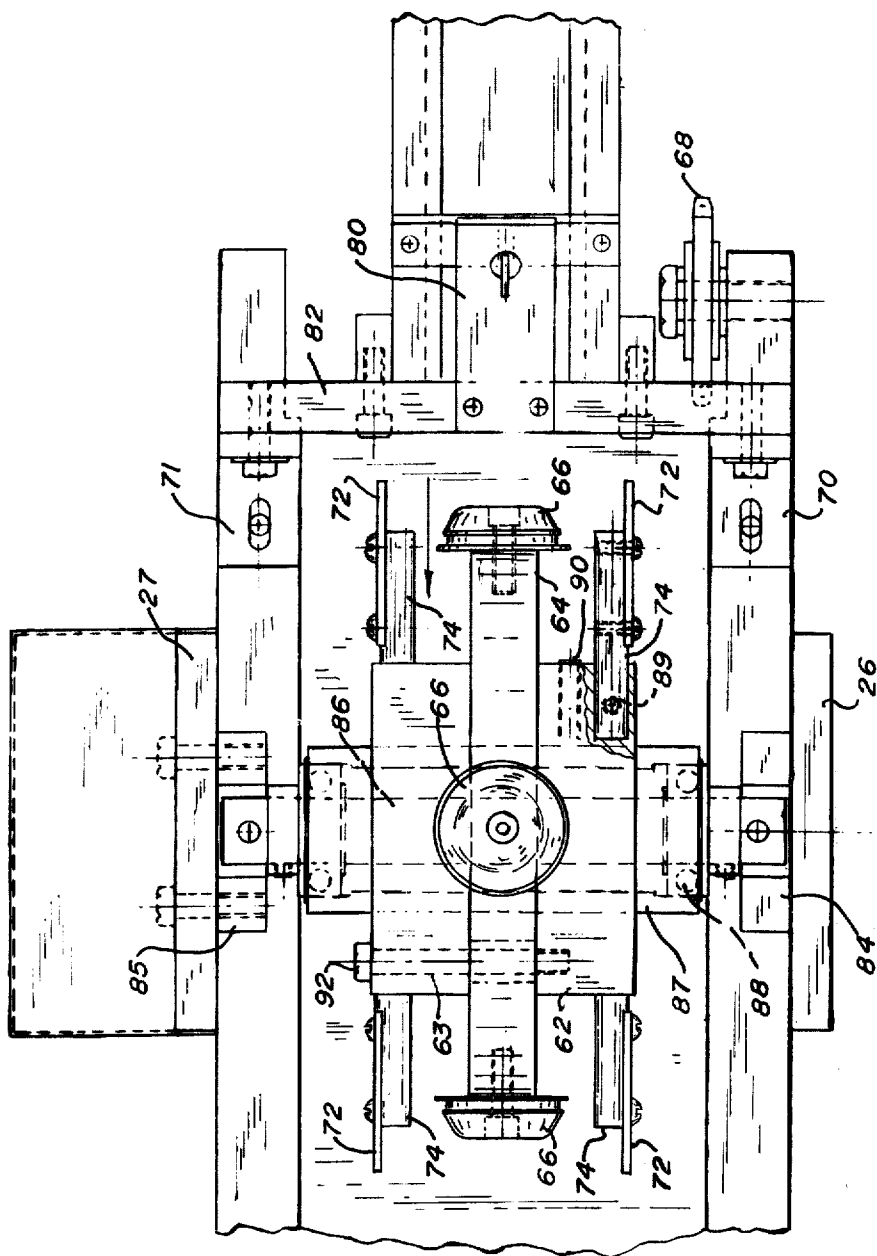
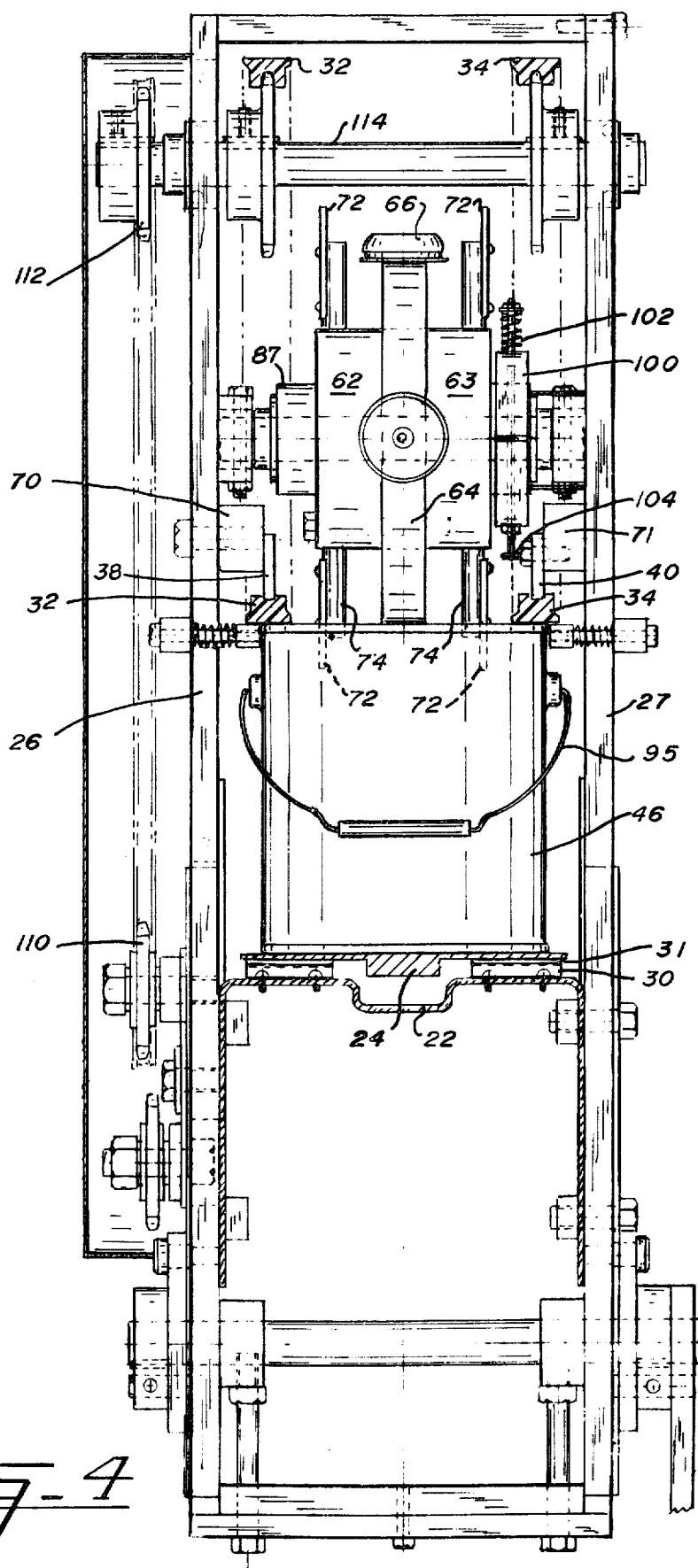
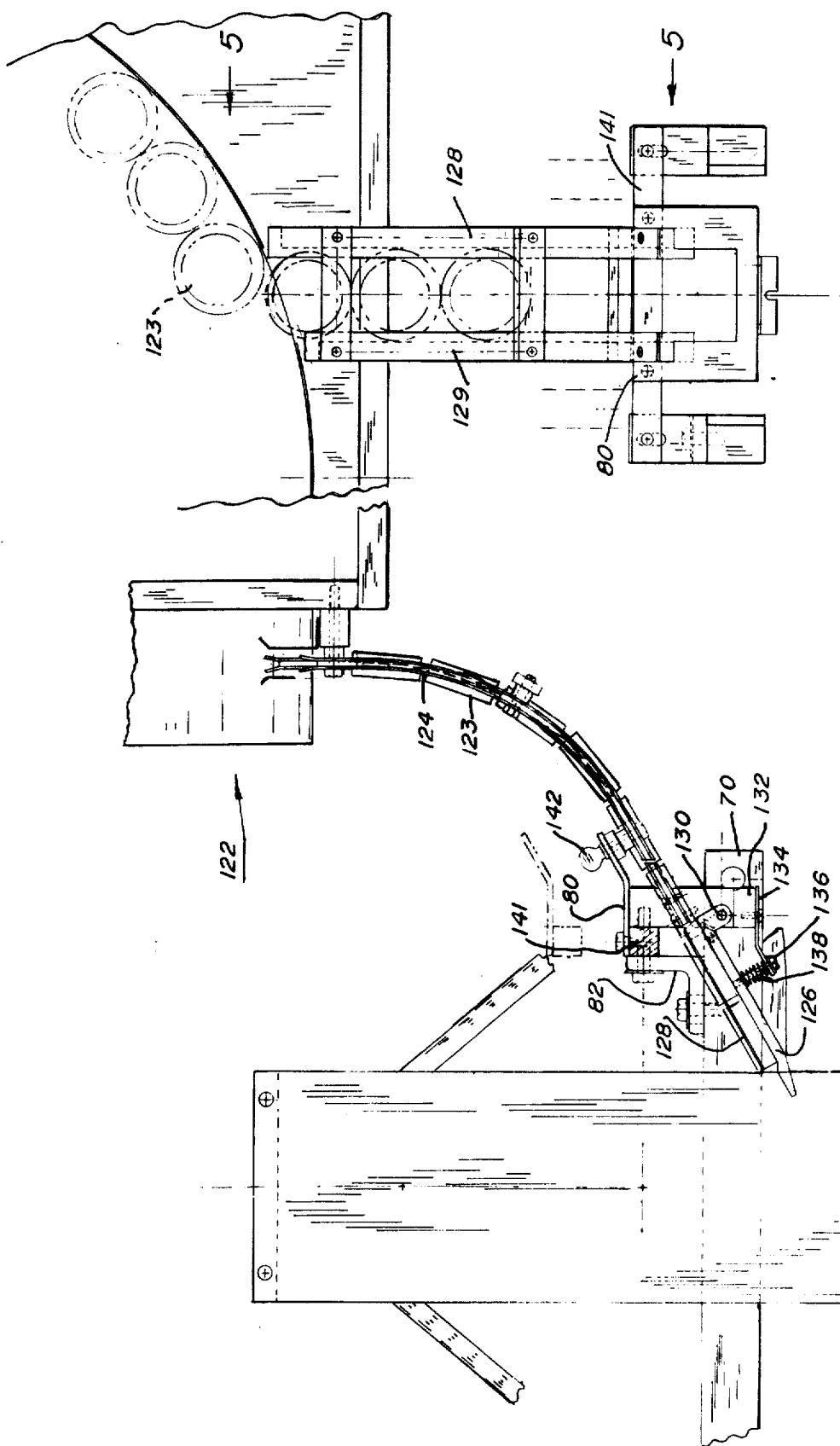


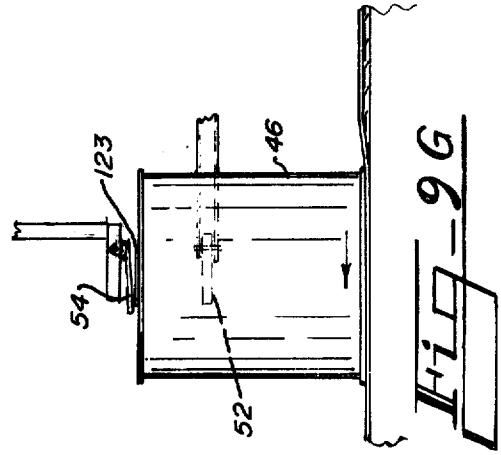
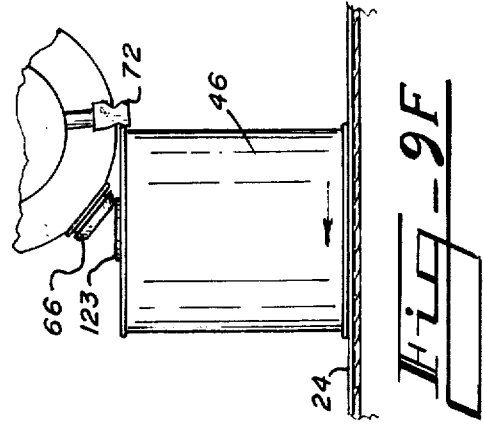
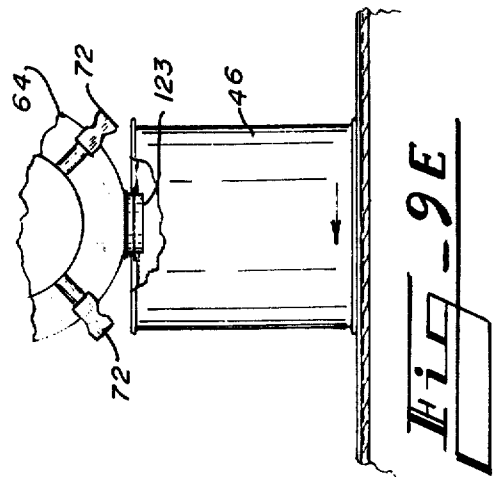
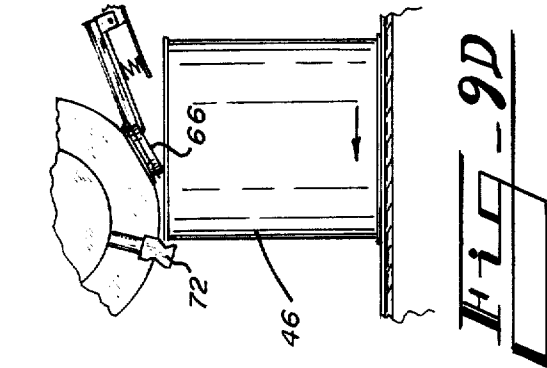
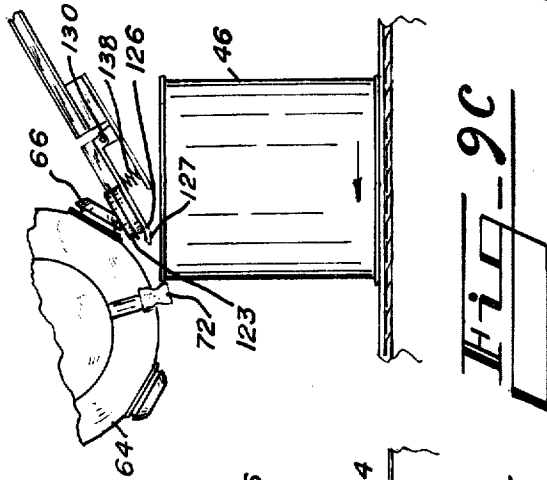
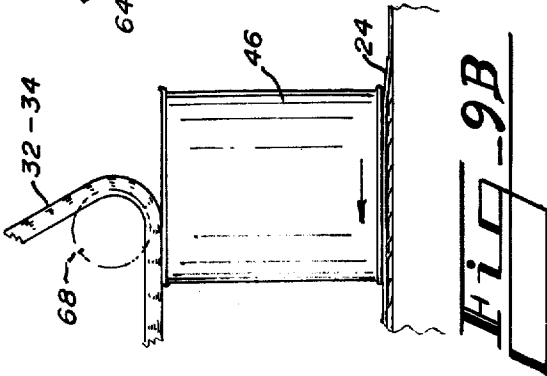
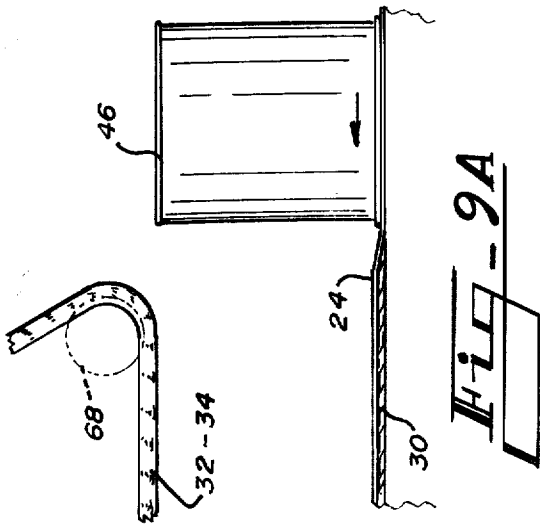
Fig. 3

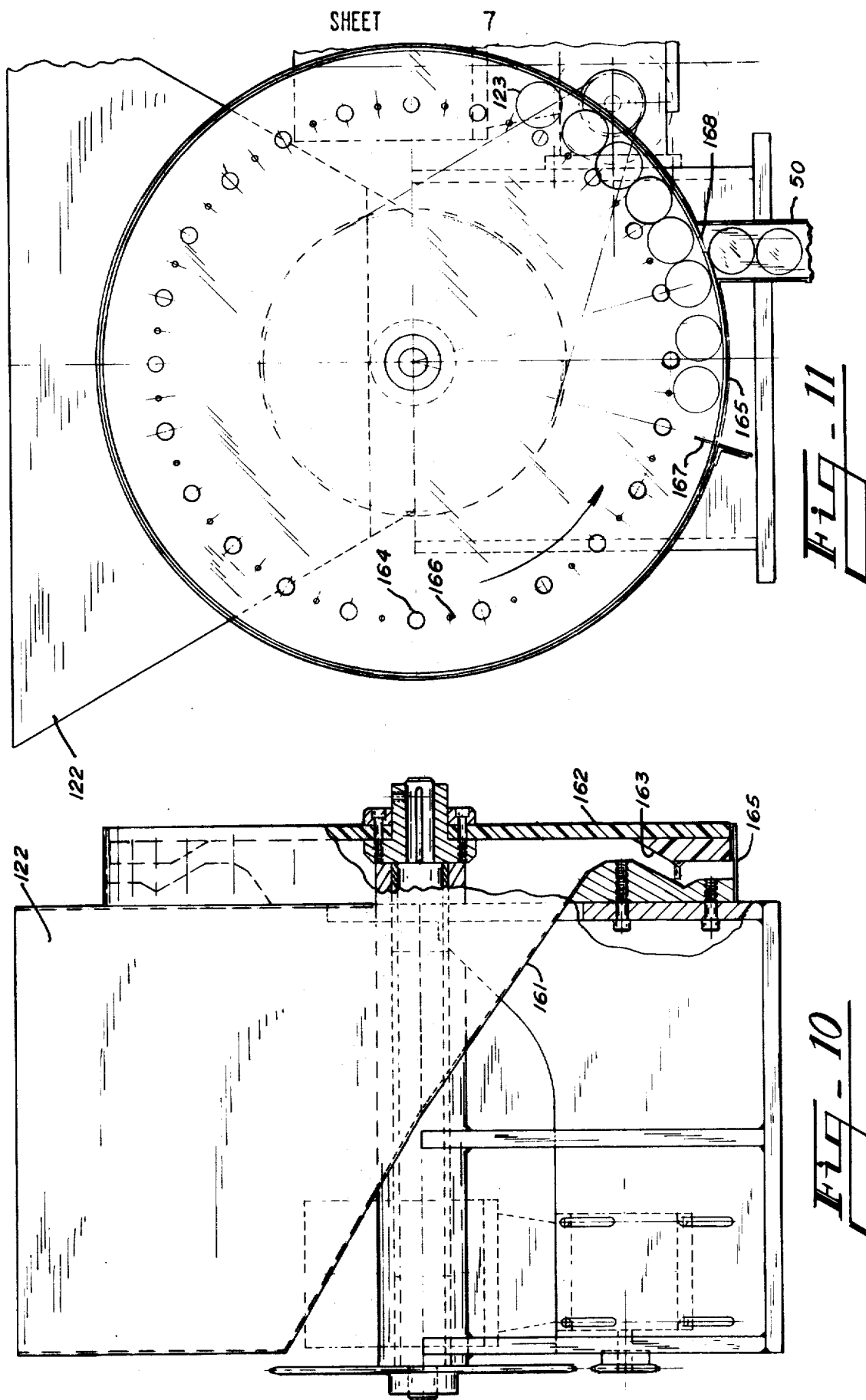


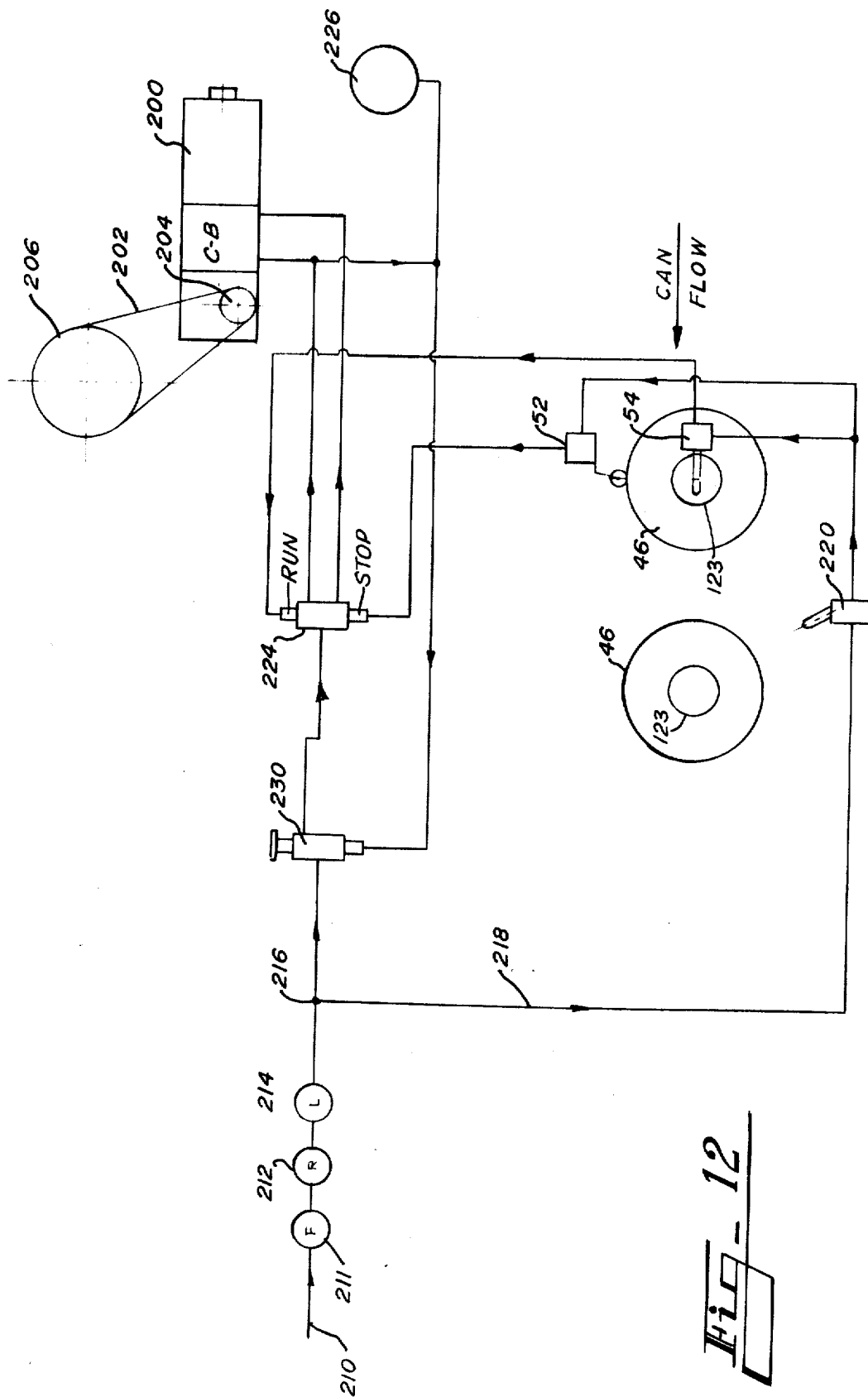


119-6

Fig-5







APPARATUS AND METHOD FOR AUTOMATICALLY POSITIONING AND INSERTING PLASTIC PLUGS IN A CONTAINER TOP

BACKGROUND OF THE INVENTION

1. Field of the Invention

With respect to the classification of art as established by the United States Patent Office the present invention is found in the general class entitled "Dispensing" (class 222) and the subclass thereunder entitled "with flow controller or closure-plug" (subclass 554).

2. Description of the Prior Art

Containers in which "see through" plastic plugs are provided are now becoming popular. These containers are usually filled on a production line of rather high speed. Except for the aperture which is to be closed by the plug the cover is secured to the container body so as to be released only by removal of a tear strip or the like. The container is filled through the aperture and is closed by the plug which may be removed for adding color. Where the plug supplied is translucent or nearly transparent the contents of the container can be viewed. Automatic apparatus and methods for feeding and inserting plastic plugs into the covers of containers are known. In the present invention in which the apparatus has an in-feed conveyor which transports containers one-at-a time to the inserting apparatus portion whereat the containers as they are transported are elevated by a spring section to cause the advancing containers to be elevated to engage a pair of upper chains which is retained in a fixed plane and is advanced at the same speed as the lower conveyor. A plug inserting wheel is driven by fingers placed in way of the advancing container. A plug pusher carried by the wheel engages and removes a plug from a delivery chute, places the plug in the aperture and as the container is advanced the pusher is rotated to push the plug into seated condition. After insertion the container is discharged from the apparatus. It is believed that the present invention in its method of presenting the container in a positive plane to the plug inserting wheel and in its inspection of the container for effective insertion is new and novel.

SUMMARY OF THE INVENTION

It is an object of this invention to provide, and it does provide, an apparatus and method for automatically positioning and inserting one plastic plug from a series supply of plugs into a container whose top has an aperture in which is mounted and retained this plastic plug. The apparatus includes a conveyor which includes a supporting table-top-type chain which in an endless manner is moved to and through the plug mounting station of the apparatus. In the insertion station of the apparatus, this table-top chain is elevated by a spring bias means so that the container is elevated into engagement with a pair of upper roller chains. These upper chains have plate attachments which engage the top of the container and also provide an established plane of travel of the top of the container. The lifting of the container to the upper conveying chains insures that each container, no matter what discrepancies have occurred in its manufacturing of the height of the container, is advanced through the apparatus with the top of the container in a positive established plane during the po-

sitioning and the insertion of the plug into the aperture. Each plug is delivered by means of an orienting device to a one-at-a-time chute and through this chute is brought to a gate feed mechanism wherein as each container is moved by the delivery end one plug is engaged and released. A gate released actuated by the advancing containers insures that the feeding of the plugs into and from the delivery chute by gravity does not cause the plugs to be driven from their desired forward seating position. The forward portion of the delivery chute contains a hinged delivery leaf member which is spring-biased into a selected seating position. At this forward position the leading plug is retained so that a recess in the plug is engaged by a rotating wheel upon which is mounted at least four plug pushers. This wheel is free to rotate except for the restriction imposed by a small brake which provides a small drag and prevents unwanted rotation of the wheel. Rotated with this wheel and in adjusted alignment with each plug pusher is a pair of engaging fingers which is positioned so as to be in way of the container as it is advanced into the apparatus. This pair of fingers is engaged by the upper edge of the container and as the container advances causes the wheel to be rotated in precise time and movement. A plug pusher on the wheel first enters the forward plug, pulls it from the delivery chute and places it loosely into the aperture in the container. The further advance of the container causes the plug pusher at the plug inserting position to press the plug into a desired seated condition against the spring-bias of the lifted bottom table-top conveyor. As the container leaves the apparatus it is brought in way of a sensing device where a first sensor means detects the presence of the container and shortly thereafter a second sensor means detects the presence of a plug in proper position. The absence of a plug in a container that has reached the second sensor causes the plug inserting mechanism to be shut down until it is determined for what reason the malfunction occurred.

In plug inserting apparatus heretofor known, the delivery of plugs by means of an orienting mechanism and a guide chute is, of course, well known. However, the present apparatus is believed to be unique in that in combination with the conveying system it causes the container to be elevated into position and it also employs a unique method of delivering the plugs to the plug inserting wheel.

In addition to the above summary the following disclosure is detailed to insure adequacy and aid in understanding of the invention. This disclosure, however, is not intended to prejudice the inventive concept therein no matter how it may later be disguised by variations or additions of further improvements. For this reason there has been chosen a specific embodiment of the apparatus for automatically positioning and inserting plugs into a container top. This specific embodiment has been chosen for the purposes of illustration and description as shown in the accompanying drawings wherein:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 represents a side view of the apparatus and showing fragmentarily the conveying chute delivery of the plugs to the inserter and also in the conveying means the spring lifting means for bringing the transported container in way of the positive guide path established by a pair of upper conveying chains;

FIG. 2 represents a plan view looking downwardly at the plug inserting apparatus of FIG. 1;

FIG. 3 represents in a slightly enlarged scale a plan view of the plug inserting portion of the apparatus seen in FIG. 2, this view depicting in greater detail particularly the plug inserting wheel and the associated fingers which are engaged by the advancing container to cause the wheel to be rotated;

FIG. 4 is an end view looking toward the plug inserting wheel, this view taken on the line 4—4 of FIG. 1 and showing the general arrangement of the components wherein the container is retained between and by both upper and lower conveyor belts;

FIG. 5 represents a fragmentary side view of the delivery end of the chute and the manner of conveying the plugs to the container path, this view partly diagrammatic so as to show the feeding means;

FIG. 6 represents a fragmentary plan view showing the chute of FIG. 5 and in particular the plug guide arrangements of the chute;

FIG. 7 represents in a slightly enlarged scale a fragmentary side view of the plug stop which is provided in the chute guide, this plug stop and release being actuated by a container as it is moved forwardly on the conveyor into the plug inserting mechanism;

FIG. 8 represents a side view showing a small fragmentary portion of the chute of FIG. 5 and the relationship of the plug stop to the plug release gate of FIG. 5;

FIG. 9 represents a diagrammatic progressive view showing from FIG. 9A through FIG. 9G the various movements of the container as it is first brought in way of the plug chute and then into and through the plug pusher path and then into and from the plug inserting inspection station and finally the discharge of the container from the apparatus;

FIG. 10 represents a somewhat diagrammatic side view of a plastic plug orienting apparatus;

FIG. 11 represents a front view of the plug orienting and feeding apparatus of FIG. 10, and

FIG. 12 represents a pneumatic and electronic control circuit by which the plug inserting apparatus is actuated and/or operated.

In the following description and in the claims various details are identified by specific names for convenience. These names, however, are intended to be generic in their application. Corresponding reference characters refer to like members throughout the several figures of the drawings.

The drawings accompanying, and forming part of, this specification disclose the details of construction but it should be understood that these structural details may be modified in various respects and that the invention may be incorporated in other structural forms than shown.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now in particular to FIG. 1 and FIG. 4, there is depicted a general frame 20 on which is carried a conveyor base 22 which, as seen, is disposed to support a table-top chain 24 such as is made by Rex Chain Company. This table-top chain as it approaches and passes between upright supports 26 and 27, (FIG. 4) is carried and moved upwardly by means of a plurality of leaf springs 30 so that the transported container is lifted as it moves from the right portion of the conveyor as seen in FIG. 1 into the midportion.

Each set of springs have a slide guide 31 (FIG. 4) which support the chain as it is elevated. A pair of roller chains 32 and 34 is carried by sprockets arranged so as to form a triangular path or pattern. Each of the upper sprockets 36 is carried on a headshaft 37 driven by a motor and chain drive. This motor also drives the conveyor belt 24. These upper chains 32 and 34 are faced by attachments of plate member portions to provide a flat flexible support belt surface. These attachments preferably are of plastic such as acetal, and also are available from Rex Chain Corp. As these chains are brought in way of the lower guide path they are retained against upward movement of a pair of positioning guides 38 and 40 which are carried by the upright members 26 and 27 to provide a determined guide path for chains 32 and 34. Transverse guide means provided by guide bars 42 and 44 as best seen in FIG. 2 are disposed to engage the upper sides of a container 46 to insure that the container follows the desired directed path. Figuratively shown in the upper right portion of FIG. 1 is a guide chute 50 by which the plastic plugs are fed to discharge means by which the plugs are delivered for insertion into the advancing container 46. Carried by one of the side guides 42 and 44 is a sensing switch 52 and midway of these guides is a plug engaging leaf member 54 which is disposed to activate a switch for a purpose to be hereinafter more fully described.

Referring next to FIG. 2, it is to be noted that as seen, the guide members 42 and 44 are carried by supports 56 and 58 and are spring-biased by means of springs 60. These guide members engage the side of the container and with at least one of the members resiliently urged toward the other to accommodate irregularities in container diameter. As further shown there is provided near and far hub members 62 and 63 between which in the present embodiment a pusher rotating wheel 64 is mounted. This wheel 64 has mounted on its periphery four substantially identical plug pushers 66. These plug pushers are spaced ninety degrees from each other and each is contoured to fit into the skirt portion of a plastic plug which is to be inserted into the aperture of a container. Three sprockets 68 are grouped and arranged to carry each of the upper chain belts 32 and 34. The two lower sprockets 68 carried on support member 70 and two like sprockets are carried on the facing like support member 71 on the far side. Hub members 62 and 63 are rotatable with rotary wheel 64. These members 62 and 63 carry four finger members 72. These finger members are carried by base post units 74 fixed in the associated hub member. Each finger member is adapted to engage the top of a container 46 when said container is brought in way the fingers. It is also to be noted that as the containers are transported on the conveyor they are successively brought in way of the plug sensing finger 54. This finger lays in the plane of the rotating wheel 64 while the sensing switch 52 is adjustably carried on an arm member 75 to sense the side of an advancing container. This adjustment permits different diameter containers to be sensed as they are transported on the conveyor. It is, also, to be noted that leaf member 54 is carried by means of a bracket member 76 which is adjustably carried on the upper frame rear transverse member 78 whose ends are secured to the support members 70 and 71.

Plan View of FIG. 3

Referring next to FIG. 3, which presents an enlarged

scale of the apparatus of FIG. 2 is seen chute support 80 carried by transverse head end member 82 attached to support members 70 and 71. Carried by upright supports 26 and 27 are support members 84 and 85 which carry the upper head shaft 86. This shaft carries a sleeve 87 in which bearings 88 are mounted. The wheel 64 and hub member 62 and 63 are retained on sleeve 87 and rotate with the freely rotatable sleeve 87. Base post units 74 are secured to members 62 and 63 by screws 89. The fingers 72 are carried on unit 74 so that they may be selectively adjusted and also are easily replaced if damaged. Precise timing of the container advancement with the associated plug pusher is essential. In the depicted embodiment hub member 62 is secured by means of a set screw 90 so as to be rotated with sleeve 87. Holes are formed in rotary wheel 64 and cap screws 92 rotatably mounted in holes in hub member 63 pass through these holes in wheel 64 and into threaded holes in hub member 62 to clamp hubs 62. The cap screws 92 align hub member 62 with hub member 63 although a keyway and keys or dowels, not shown, may maintain alignment of the hub members 62 and 63. Wheel member 64 is a rotary fit on sleeve 87 and is rotated forward or back to precisely time the plug pushers 68 with finger members 72. After positioning the cap screws 92 are tightened and 63 to wheel member 64. Referring again to the support members 70 and 71 as in FIG. 2 it is to be noted that the sprockets 68 carry the lower extent of chain forming the near upper belt 32 and the opposite belt 34 which engage the top of the containers as they are advanced.

The fingers 72 are adjustably positioned to accommodate the diameter of the container and the center of the container aperture. Bolts 92 are loosened slightly and set screw 90 is loosened so that hub members 62 and 63 may be moved on sleeve 87. The fingers 72 are adjusted as to the diameter of the container, after which screws 90 and 92 are tightened to secure the adjustment.

End View of FIG. 4

Referring now to FIG. 4 there is shown the relationship of the several components of the apparatus. As seen container 46 is depicted as having a bail 95 but the apparatus will operate with containers without bails. This container is carried on the lower table-top chain 24 which is lifted by springs 30 supported by the conveyor base 22. This base is carried between and by the uprights 26 and 27. Plastic slide strips such as teflon or nylon and identified as 31 are carried on springs 30 so that the chain 24 as it is urged upwardly by means of these leaf springs 30 slides easily on its inclined and lifted portion. It is to be noted that the downwardly extending finger member 72 carried by supports 74 extends downwardly a predetermined distance below the top of the container 46 so that the forward progress of the container causes the forward edge of the advancing container to engage the aligned pair of finger members and the wheel 64 to rotate.

This wheel 64 and sleeve 87 are both freely rotatable on fixed head shaft 86 with the exception of a brake 100 which is adjusted so that with and by means of a spring 102 a drag friction is applied to sleeve 87. The brake is prevented from rotation by means of drag link 104 which is secured to the support member 71 to prevent the brake from rotating with sleeve 87. This brake is nothing more than a friction drag means and prevents

any unwanted free or continued rotation of the wheel 64 except as it is pushed by an advancing container 46. The upper chains 32 and 34 are positively driven at a predetermined speed and direction by means of a sprocket drive including a lower sprocket 110 and an upper sprocket 112 and connected by means of a typical endless roller chain. This lower sprocket is driven by a chain drive to a lower chain arrangement which drives the table top chain conveyor 24. Sprocket 112 is carried on head shaft 114 driven by sprocket 110.

Referring next to FIGS. 5 and 6 it is to be noted the guide chute portion 50 generally indicated on the plan view of FIG. 1 is in this view shown in detail and is carried by support angle 82 which is fastened to the extending members 70 and 71. Plate 80 also seen in FIG. 3 provides the upper attachment member means. A rotary orienting device generally indicated as 122 orients and feeds one-at-a-time a series supply of plastic plugs 123 to and down a guide chute 124. The flanges of these plugs are retained in parallel guideways and an oriented path until they are engaged and stopped by a gate means to be hereinafter more fully described in conjunction with FIG. 7. This gate means is actuated by an advancing container and releases the plugs so as to slide further down the chute until they come to rest upon pivoted leaf member 126 which has an upper channel into which the plugs are received. A forward stop shoulder 127 engages the leading plug between upper guide member 128. This forward stop shoulder prevents unwanted discharge from the chute.

This forward portion of leaf member 126 is conventionally integrally formed with a small upward projection 127 which in cooperation with side guides 128 prevents accidental discharge of the forward plug from the chute until and as a plug pusher member 66 as depicted in FIG. 1 is brought in way the other to the plug with at least one of the members resiliently urged toward of portion of the plug and urges it forwardly past projection 127 to forcibly remove it from the chute. Leaf member 126 is pivotally supported at its rear by a pin 130 carried by a bracket support member 132 mounted to angle 82. Also carried by bracket support member 132 is a finger support 134 whose distal end carries an adjusting screw 136 whose threaded end is secured in a tapped hole in leaf member 126. A spring 138 urges the member 126 away from the support finger 134 to a predetermined spaced position from guides 128, which distance is established by rotating the screw 136 to establish the plug supporting spacing between the leaf member 126 and finger support 134.

Referring particularly to FIG. 6, it is to be noted that a rotary hopper, to be more fully described hereinafter, has a discharge chute portion through which the plugs are delivered. The plugs are retained by their flanges in side guide members 128 and 129 which slidably guide the plug to the discharge end. These chute guides carry the plugs downwardly until they engage the stop depicted in FIG. 7. The chute is adjustably carried by means of a support member 80 which extends from the top of support bracket spacer 141 attached to angle bracket 82. A wing screw 142 is carried by support member 80 and provides the necessary means for upper and lower side guides and supports the guide chute 124 in a selected oriented guide path from the hopper to the discharge leaf member 126.

Gate of FIGS. 7 and 8

Referring next to FIG. 7, it is to be noted that a pivot support block 150 is rotatably carried on and by a shaft 151 by appropriate chute apparatus and that secured in this rotatable block is a pair of fingers 152. Each finger has its lower end bent to provide a skid deflecting deflecting surface. Also carried by block 150 and rotatable therewith is an arm 154 whose upper end carries a pair of pins 156. These pins are disposed so as to move between the guide members of the chute and provide stop means impeding the downward flow of plugs until block 150 is rotated clockwise around pin 151. Spring pin 158 is fixed in block 150 and has mounted on its end a tension spring 160 which is tensioned and secured to appropriate chute frame means to urge the block counterclockwise around pin 151. The spring 160 urges the pins 156 into the plug stop condition in the chute path. The projecting extent of the stop pins is limited by appropriate stop means. As the container comes in way of and pushes the two fingers 152 forwardly the block 150 is rotated sufficiently to cause the pins 156 to drop from in way of the guide path of the plugs. The released plugs are now free to slide down the chute by gravity. When the released plugs have filled the chute and the container has passed by, the fingers 152 are moved back to their plug arresting position as seen in FIG. 7. Spring 160 causes block 150 to be rotated to return the pins to this position.

Referring next to FIG. 8, the plug stop pins 156 are shown in position on the chute 124 with these pins shown in relation to the path of the plugs 123 in the chute.

Diagrammatic Representation of FIG. 9

Referring next to FIG. 9, it is to be noted that at FIG. 9A a container 46 is carried forwardly on the conveyor and is approaching the inserting apparatus. In FIG. 9B the container has reached or nearly reached the inserting apparatus and the lower belt 24 is being lifted by the ramp leading to the spring biased section. In FIG. 9C, the container is lifted until the top surface of the container is brought in way of the under surface of chains 32 and 34 such as seen in FIG. 4. The container 46 is lifted upwardly against the belts 32 and 34 whose lower extents are retained in a determined plane by means of guides 38 and 40. These guides establish the plane in which the container is propelled forwardly by the upper belts 32 and 34 and the support belt 24 which is run in timed relationship to the top belts. The bottom belt is biased upwardly by means of the springs 30 to maintain the container in a flat transport plane which is essential if the plug is to be properly positioned, oriented and mounted into the aperture in the container. As the container moves forwardly up the ramp and along the biased support the forward portion of the upper edge of the container strikes the two depending fingers 72 to cause the plug pusher wheel 64 to be rotated and bring the plug pusher 66 in way of a plug in leaf member 126. This plug is disposed at an angle for the ready entrance of the plug pusher into the cavity previously molded in the plug. As the plug pusher 66 enters this portion of the plug it causes the leaf finger 126 to be pushed downwardly so that the engaged plug is dragged over the forward retaining lip portion 127 of the member 126. This finger 126 as it is pushed downwardly against the bias of the spring 138 is pivoted

around the pivot pin 130 to allow the plug to be stripped from the retaining trough in member 126, as it moves forward. The plugs between this and the stop pins 156, seen in FIG. 7, move forwardly and downwardly in the chute, however, as the plug is stripped from the retaining groove in leaf finger 126 the spring 138 urges the member 126 upwardly to retain the succeeding plugs at the stop lip projection 127. As the container continues to move forwardly as in FIG. 9D it pushes the fingers 72 which results in the plug pusher 66 moving to a more-or-less vertically down condition as seen in FIG. 9E. At this extreme down position the plug is fully inserted into the recess in the container. As the container continues to move forwardly it is still pushing fingers 72 to cause the wheel 64 to rotate until the plug pusher is lifted out of the now inserted plug as in FIG. 9E. However, until the fingers 72 are cleared of the container rim the container continues to rotate the wheel. As the container reaches this disengage condition it is still upon the upwardly biased portion of the lower belt where the container is brought in way of the container sensing switch 52 as in FIG. 9G which causes a signal to be sent to the control circuit. As the container is transported further forwardly toward the discharge point of the apparatus the plug is brought in way of the upper sensing finger 54 also shown in FIG. 9G and when the plug is properly positioned this finger actuates a switch and causes a signal to be sent to the control circuit to be hereinafter more fully described.

Plug Orienting and Feeding Device of FIGS. 10 and 11

Referring now in particular to FIGS. 10 and 11, it is to be noted that there is pictured one method of separating and orienting a large group of plugs so that they may be fed single file in a single-file array down a guide chute 50 previously described. As seen in FIGS. 10 and 11, the hopper portion 122 has a sloped bottom member 161 which guides the plugs to its bottom area. At this bottom position the plugs are engaged by a large rotating disc 162 having large and small pegs or posts 164 and 166. This disc is rotated by means of a motor and chain and is rotated counterclockwise as seen in FIG. 11. As the disc 162 is rotated around, the large pegs 164 penetrate the recess in those plugs that are oriented in the right way and as they penetrate the plug slides on sloped surface 163 downwardly and between pins 164 to the arcuate shroud 165. When the plugs are oriented the opposite or wrong way the large pins engage the bulged portion of the plug and with the small pegs 166 the misoriented plugs are caused to be carried upwardly to again drop into a tumbling condition to the bottom of the hopper. In order to prevent a jamming of the oriented plugs as they are aligned supported in an arc at the bottom of the shroud 165 of the hopper 122 there is provided a stop 167 which insures that when a large surplus of plugs are arranged in an oriented condition and lay at the bottom of the hopper that an alignment is developed to assist them in falling down the slot 168 which provides the entryway into the chute 50. No patentable distinction is made for this apparatus since this type of orienting device is commonly used to orient circular members having irregular faces, ends and tops. In addition to this method a vibratory hopper wherein a guide finger is used to orient pieces delivered to a guideway may also be used. It is only desirable that in the present invention an automatic supply of oriented plugs be provided.

Circuit Diagram of FIG. 12

Referring next and finally to a circuit diagram depicting some of the operational control of the apparatus included is a pneumatic signal system used to control the operation of a motor 200. The output of this motor is conventionally gear reduced and by means of a belt 202 drives a driving pulley 204 and a driven pulley 206. Air at a determined pressure is fed in through line 210 through a filter 211 and a regulator 212 and when desired a lubricator 214 so that the air flowing through the system after the lubricator is in the desired treated condition and at the desired pressure. From a T-connection 216 air is fed through conductor 218 to a manual control switch 220 which is used to open the system to initiate operation or to disconnect the system from operation where the plug inserting mechanism is to be by-passed when this apparatus is part of a line operation system. The containers 46 are fed to the signal system as indicated by the arrow and as the container 46 engages the sensor 54 it causes air to be sent to the pilot of valve 224 to set the valve in one direction and this valve 224 stays in this set condition until a signal arrives from the switch 52 to move valve 224 to a condition to stop the apparatus. The signal from sensor 54 does not shift valve 224 which is already in the run condition and remains in this run position as the succeeding signal from sensor 52 is received. The run condition position of valve 224 is removed by a signal from sensor 52 in the absence of a run sustaining signal from switch 54. The presence of a plug 123 in a container 46 causes the sustaining signal from sensor 54 and the motor 206 continues the run positioning of valve 224 to drive both the upper and lower conveyors and any other access equipment that may be connected therewith. Any emergency stop switch 226 is provided to send a signal to upstream station units to stop the whole line as and until a manual reset switch 230 is actuated to again reset the system and permit the equipment to be started.

It is, of course, recognized that the depicted apparatus has shown only a single file arrangement. If two or more lines of containers are to be simultaneously accommodated, side-by-side conveying and plug inserting apparatus may be provided. Means is provided to expand or open the distance between table-top chain 24 and the roller chains 32 and 34 so that when the plug inserting apparatus is to be made inoperative the containers may pass freely through the apparatus.

The above-described invention provides a basis for the method of receiving, transporting and delivering containers to a plug inserting station whereat a plug is positioned and inserted into an aperture in the cover of an advancing container; said method including the steps of: feeding like containers to and on a lower conveyor to and through a plug inserting station; advancing said lower conveyor at a selected speed; positioning a pair of upper transport chains so that a portion of their lower extents are aligned with, are parallel to and are disposed at an established distance above the lower conveyor which distance is slightly greater than the height of the container to be transported on the lower conveyor; moving the upper transport chains at the same speed and direction as the lower conveyor; elevating by resilient means the intermediate portion of the lower conveyor that is in opposition position with the lower extents of the upper chains said elevating of

the conveyor sufficient to cause the top surface of a transported container to be brought into engagement with the lower extents of the upper chains; feeding and delivering plugs one-at-a-time through a chute to a delivery station; mounting a rotatable wheel above the plane of the top of an advancing container and providing on said wheel a plurality of plug pushers which are carried by said wheel, this wheel so positioned that when the plug pusher is brought to its lowest extent it is adapted to push said plug into a seated condition in the aperture of the container; feeding through a chute a single file array of plugs to a spring closed discharge end and arranging this end so that the lowermost plug is in way of a plug pusher as the wheel is rotated; rotating said wheel in timed relationship to the advancement of the container; removing the lowermost plug and positioning the plug in the container aperture by the engagement of the plug by the plug pusher on the rotating wheel, and inserting said plug with the rotation of the wheel and discharging the container from the apparatus by means of the upper and lower conveyor chains.

Terms such as "left", "right", "up", "down", "bottom", "top", "front", "Back", "in", "out" and the like are applicable to the embodiment shown and described in conjunction with the drawings. These terms are merely for the purposes of description and do not necessarily apply to the position in which the apparatus and the method of inserting the plug may be constructed or used.

While a particular embodiment of the plug inserting apparatus has been shown and described it is to be understood the invention is not limited thereto and protection is sought to the broadest extent the prior art allows.

What is claimed is:

1. Apparatus for receiving, transporting and delivering containers to a plug inserting station whereat a plastic plug is positioned and inserted into an aperture in the cover of an advancing container, said inserting apparatus including: (a) a support means; (b) a lower conveyor carried by the support means and having means for receiving containers and with their bottoms resting on said conveyor advancing said containers in a single file array to and through a plug inserting station; (c) means for advancing said lower conveyor at a selected rate of travel; (d) a pair of upper transporting chains carried by the support means and having their lower extents parallel to and disposed at a distance above and in alignment with the lower conveyor which distance is slightly greater than the height of a container to be transported; (e) means for retaining the lower extents of the upper chains in a fixed plane parallel to the lower conveyor; (f) spring biasing means for elevating that intermediate portion of the lower conveyor that is in spaced alignment and parallel with the upper transporting chains, said spring biasing means locally elevating the lower conveyor so that a transported container is brought upwardly into engagement with the lower extents of the upper chains to cause the top surface of the container to be moved through the apparatus in an established plane; (g) chute means for feeding and delivering plastic plugs one at a time to a delivery station; (h) a rotatable wheel carried above the upper chains and having a plurality of plug pushers mounted thereon; (i) means for rotating said wheel in a timed relationship with the advancement of the container so that an associated plug pusher on the wheel

first engages and then removes the lowermost plug in the chute means and then guides the plug into an aperture in the container cover, said rotatable wheel and plug pusher so spaced from the top of the advancing container that as the aperture and plug is brought in way of the lowpoint of the circular travel of the plug pusher, the plug carried thereby is pushed into seated engagement in the aperture, and (j) means for the continuation of the rotation of the wheel so that the plug pusher is eventually lifted from inserted engagement with the plug, and the container is free for transport from the inserting station.

2. Apparatus for inserting plastic plugs into the apertures of container covers as in claim 1 in which the spring biasing means for elevating an intermediate portion of the lower conveyor includes leading and trailing ramps and slide strips between said ramps the slide strips carried by a series of leaf springs.

3. Apparatus for inserting plastic plugs into the aperture of container covers as in claim 2 in which the lower conveyor is a link plate chain such as a table top chain.

4. Apparatus for inserting plastic plugs into the apertures of container covers as in claim 1 in which the upper transporting chains are faced with attachments so as to provide substantially continuous outwardly facing engaging surfaces.

5. Apparatus for inserting plastic plugs into the apertures of container covers as in claim 4 in which the means for maintaining the lower extents of an upper chain in a fixed plane is a positioning guide bar fixedly secured so as to slidably engage the upper surfaces of the lower extents of chain.

6. Apparatus for inserting plastic plugs into the apertures of container covers as in claim 1 in which the chute means includes a pivoted leaf member having a form and lip projection adapted to engage a plug to prevent unwanted forward discharge of the plug until and as a plug pusher carried by the rotating wheel is brought into advancing engagement with the plug to move it past the forward lip projection.

7. Apparatus for inserting plastic plugs into the apertures of container covers as in claim 6 in which the chute means also includes a stop means which is selectively movable from impeding the path of the advancing plugs in said chute to permit advancement of the plugs to the discharge end, said movement of the stop means from plug impeding position occurring in response to the forward movement of a container on the lower conveyor.

8. Apparatus for inserting plastic plugs into the apertures of container covers as in claim 1 in which the means for rotating the wheel includes a pair of spaced fingers carried by the wheel and positioned in relation to the plug pusher also on said wheel so that the form and portion of the advancing container engages the spaced fingers to push the fingers forwardly and as the fingers are moved in an arcuate path the wheel and associated plug pusher is rotated until the container displaces the fingers from its forward path.

9. Apparatus for inserting plastic plugs into the apertures of container covers as in claim 8 in which the spaced fingers are adjustably mounted in relation to the radial axis of the plug pusher the adjustment of the fingers permitting a precise positioning of the plug pusher in relation to the engaged pushing surface of the fingers.

10. Apparatus for inserting plastic plugs into the apertures of container covers as in claim 9 in which the rotation of the wheel is unrestricted except that a drag brake is provided to limit rotation, the brake restriction being overcome by and as the fingers are engaged by an advancing container.

11. Apparatus for inserting plastic plugs into the apertures of container covers as in claim 1 in which there is provided an inspection means for determining that a container has been advanced to and past a plug insertion station and a second inspection means for determining that a plug has been properly mounted in the aperture in the container, the absence of a plug causing a responsive signal to be initiated.

12. The method of receiving, transporting and delivering containers to a plug inserting station whereat a plug is positioned and inserted into an aperture formed in the cover of an advancing container; said method including the steps of (a) feeding like containers to and on a lower conveyor to and through a plug inserting station; (b) advancing said lower container at a selected speed; (c) positioning a pair of upper transport chains so that a portion of their lower extents are aligned with, are parallel to and are disposed at a distance above the lower conveyor which distance is slightly greater than the height of the container to be transported on the lower conveyor; (d) moving the upper transport chains at the same speed and direction as the lower conveyor; (e) elevating by resilient means the intermediate portion of the lower conveyor that is in opposition position with the lower extents of the upper chains said elevating of the lower conveyor of sufficient extent to cause the top surface of a transported container to be brought into engagement with the lower extents of the upper chains; (f) feeding and delivering plugs one-at-a-time from a source to a chute leading to a delivery station; (g) mounting a rotatable wheel above the plane of the top of an advancing container and providing on said wheel a plurality of plug pushers which are carried by said wheel so that when the pusher is brought to its lowest extent it pushes said plug into a seated condition in the aperture in the container (h) feeding through said chute a single file array of plugs to a spring closed discharge end and arranging this end so that the lowermost plug is in way of engagement of a plug pusher as the wheel is rotated; (i) rotating said wheel in timed relationship to the advancement of the container; (j) removing the lowermost plug by the engagement of the plug by a plug pusher on the rotating wheel, and (k) inserting said plug into the aperture with the rotation of the wheel and discharging the container with the inserted plug from the apparatus with the advancement of the upper and lower conveyor chains.

13. The method of inserting plastic plugs into the apertures of container covers as in claim 12 and including the further step of providing on said wheel a pair of spaced fingers in association with each plug pusher, and further the step of arranging said fingers so as to be engaged by an advancing container with the engaged fingers causing the wheel to rotate for a determined arc during the period of engagement.

14. The method of inserting plastic plugs into the apertures of container covers as in claim 13 which includes the further step of adjustably positioning the fingers in relation to the radial axis of the plug pusher so that the advancement of the container coincides with

13

bringing the pusher into precise alignment with the axis of the aperture.

15. The method of inserting plastic plugs into the aperture of container covers as in claim 12 which includes the further steps of ascertaining the presence of a container at the discharge end of the inserting apparatus and when the presence is determined to send a signal

14

to a control means and prior to the determining of the presence of said container detecting the presence of a satisfactory mounted plug in the aperture of said container's cover, the absence of a satisfactorily mounted plug causing a malfunction signal to be sent to the control means.

* * * * *

10

15

20

25

30

35

40

45

50

55

60

65