CONTAINER ACTUATED APPARATUS POSITONING CAPPED STEM WITHIN CONTAINER AND CAP TO FALL THEREON

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This invention relates to an apparatus or device installed in an assembly line for the purpose of positioning capped stems downwardly from the device into containers passing on a conveyor thereunder, the device being actuated by each container to cause a respective stem to take position within the container, thereafter the capped stem dropping downwardly by gravity so that the cap falls to position on the top or neck of the container.

An example of capped bottles to be filled are bottles which are equipped with capped stems, the caps thereof including spring-urged check valves which are trigger operated to deliver the fluid from the bottles. It then becomes necessary in the course of the breakdown of assembly line operations, first to fill the bottles as they pass by a source of respective liquid and thereafter to place the capped stems in the bottles successively as they pass down the assembly line, the caps then passing between reversing or rotated rollers which thread up the caps on the bottle necks.

Presently, in the absence of most complex and costly machinery herefore employed for the purpose of assembling capped stems in filled bottles, it has been the custom to avoid the initial costs of expensive machinery by employing several operators placing the capped stems in the bottles by manual operation, or substantially by manual operation. This results in extra labor costs as balanced against a high initial outlay for high priced specialized machinery, classifiable as capital goods.

With the foregoing problem in mind, this invention has been developed with the object of providing an inexpensive and accurate mechanism which a single operator can serve and exceed the performance herefore accomplished by three or more individual operators.

It is another object of the invention to provide a device or apparatus of this class in which each individual container or bottle actuates apparatus to position the stems of a capped stem within the neck of that bottle which has actuated it, and promptly thereafter, upon slight further motion the container achieves position where the stem falls thereinto with the cap thereby to fall on the neck of the bottle.

It is also another and further object of this invention to provide apparatus of this class, including electrically operated means, which acts, as each bottle reaches a predetermined position along the conveyor, to actuate lower stem positioning apparatus whereby the lower part of the stem is positioned in the neck of its respective container, after which the stem falls further into the container by gravity so as to lodge the cap of the stem on the neck of the bottle to be subsequently threaded thereonto.

It is also another and further object of this invention to provide apparatus of this class which is positively reset or return actuated upon the passage of a stem thereby.

It is also a particular object of this invention to provide a device or apparatus of this class which is positive in operation, requires no manual manipulation and which is not limited for accuracy or performance by any variations of container spacing along the conveyor.

Other and further objects will appear upon the examination of the drawings in which:

FIG. 1 is a side elevational view of an embodiment of apparatus employable to carry out the purposes of this invention, the figure being taken in part in section;

FIG. 2 is a view, partially isometric, looking down from the front of the device from a plane which extends substantially 35 degrees to the horizontal; and

FIG. 3 is a fragmentary transverse elevational view taken along line 3—3 of FIG. 2.

Referring now in detail to the drawings in which like reference numerals are assigned to like elements in the various views, containers or bottles 10 upstand vertically from a continuous plate type conveyor 11 comprised of a succession of pivotally connected conveyor plates, not shown. Two spaced apart, upstanding support plates or frames 12 and 13 carry the apparatus which supports the capped stems 14. As best seen in FIG. 2, the capped stems 14 are fed through a delivery track 20, 21, with caps 22 to slide downwardly upon a slotted track 15, 16, and with the enlarged upper parts 25 of the stems 14 to pass through the upper track slot 19, and the lower, reduced diameter parts of the stems 24 to pass through the lower track slot 23 of a lower slotted track 17, 18.

Each bottle 10 is moved by the conveyor 11 to he point where it begins to cross the beam 26 which completes circuit between a photosensitive or photoelectric cell 27 and an intensity controlled source of light 28. The bottle occludes the eye 27 to break the beam circuit 26 to energize a solenoid 29 mounted on the outer side of a frame member 12. Energization of the solenoid 29 causes its armature 30 to be moved upwardly, as shown in FIG. 2. The armature 30 has a bifurcated upper end 31, having a pin 32 thereacross, to pass through a slot 33 in the outer end of a trigger lever 34 which passes through a slot 41 in the frame 12 and is pivotally mounted on the lower track 17 by means of a pivot pin 37. Inwardly the lever 34 has a spring 36 connected at one end 37 to the lever 34 and at the other end 36 to a pin spaced from the lever 34 opposite the direction of bottle movement.

As the caps 22 slide upon the upper track 15, 16, they take position, one after the other, with cap abutting cap, and with leading cap 22 retarded on stopped position against a stop bar 39 which has its ends 40 connected to the respective frames 12, 13 and which is of reduced diameter centrally at the location of cap contact.

As the solenoid 29 is actuated by the leading bottle 10 breaking circuit by interrupting the beam 26, the lever 34, initially in the position A shown in heavy lines in FIG. 2 moves to the intermediate position B, shown in dotted lines, the inner end of the lever 34 has moved forwardly to contact the trailing surface of the lower end of the leading stem 24, the cap 22 of which is in stopped position against the stop bar 39 thereabove.

During the period the lever 34 now moves from intermediate position B to its forwardmost position C the leading stem 24 is being forced forwardly against a dent 42 to pivot the dent 42 about a pivot pin 43 anchored in the lower track 18, while this movement is yieldingly opposed by a spring 44 which is connected at its forward end 45 to the dent 42 centrally thereof and which is connected rearwardly to a pin 46 upstanding above the track 18.

As the trigger lever 34 continues to force the leading stem 24 forwardly, the line of contact of the stem fartherly to the right, as viewed in FIG. 2, clears the tip of the dent 42, whereby the spring 44 and the dent 42 rearwardly to be stopped upon contact with a stop pin 47 which upstands above the lower track 18. In this movement it becomes the stop for a following stem 24.

When the trigger lever 34 reaches its forwardmost position, it has forced the lower end of the stem 24 into the neck of the leading bottle 10. The trigger lever 34 may still be under the force of the energized solenoid at this point to remain until the beam circuit 26 is restored.

The leading bottle 10, as it now moves forward with the lower end of the leading stem 24 in its neck, causes
the cap 22 of the leading stem 24 to change positions as the trailing edge of the under surface of the cap progresses forwardly and upwardly clear the lower end of the upper surface of the upper track 15, 16, whereby it falls by gravity so that the lower end of the stem 24 falls down into the bottle 10 as the cap falls into position upon the neck of the bottle. This occurs approximately as the leading bottle or container 10 clears forwardly of the beam 14, so that the beam circuit may be restored.

As the beam circuit 26 is restored, the solenoid 29 is de-energized, so that the armature 30 is freed to be returned to initial position which is brought by the spring 36 yieldably pulling rearwardly on the inner end of the trigger lever 34.

As the inner end of the trigger lever 34 is moved rearwardly, it passes in the path of the following stem 24 now resting on the end surface of the detent or dentet lever 42 as such is restrained in stopped position against the stop 47. The inner rear surface of the trigger lever 34 is cammed at 48 whereby as it passes the aforesaid following stem 24 it may move it rearwardly away from the detent 42 sufficiently that the trigger lever cammed surface 48 may clear it to permit it to return to the dentet position. Then after passing the following stem, the trigger lever is finally brought back to initial position or position A, as the armature 30 is moved downwardly to a corresponding initial or stopped position within the sole- noid 29.

The operations hereinabove described with relation to FIGS. 1 and 2 may be more thoroughly explained by reference to FIG. 3 which shows the relation of the trigger lever 34, detent 42, and leading stem 22 in the intermediate position B as indicated in FIG. 2. This view further shows that since the trigger lever 34 and dentet 42 are at different elevations, a spacer ring 49 must be provided between the trigger lever 34 and the track 17 therethrough, to receive the pivot pin 35 therethrough, and to space the lever 34 sufficiently above the tracks 17, 18 so that there can be no interference between the trigger lever 34 and dentet 42.

The machine or device 50 straddles the conveyor 11 and requires no special structural members or special mechanism other than the essential working parts, and it is only necessary that the frame members 12 and 13 are held parallel and accurately spaced apart, which is accomplished, as best seen in FIG. 1, by means of a large spacing stud 51 between the upper forward corners of the frames 12, 13, and by a pair of spacing lugs 52 at the rear of the machine between these frames, substantially centrally thereof.

Machine 50 of this type can well accomplish the performance of six operators when fed by a single operator whose only duty is to place capped stems 24 in the slot 19 of the feeder track 20, 21. As a specific example of what this machine can accomplish, a process was being carried out where three operators were employed in positioning capped stems 24 manually, and these three operators were able to position from 50 to 55 capped stems per minute over a measured time run. After installation of a machine 50 at the point in the assembly line where these three operators had formerly been stationed, a single operator was employed whose sole duties consisted of keeping continuity of capped stems in the slot 19 of the feeder track 20, 21, and the machine placed 120 capped stems per minute over a measured time run.

A machine of this type can be fabricated for a fraction of the cost of the former machines which additionally thread the caps fast up on bottle necks. However, since this threading on apparatus can consist of no more than two adjacent positions, oppositely rotated rollers mounted at the requisite level to contact the capped stems after they are in position on the bottles, the machinery of this invention can be supplement by the aforesaid reversely rotated rollers at only a slightly increased total cost, so that an improved total invention may still cost a fraction of the cost of a conventional mass production machine for this purpose.

In the particular usage of the invention shown, capped stems 24 are positioned in bottles filled with spray starch or window cleaner and the cap includes an atomizer or spring urged check valve to sprays the contents. However other containers having special caps, top closures or their contents can be treated in a manner comparable to the manner shown for the specific structural capped stem shown handled in the drawings.

Obviously the invention is not limited to the specific structural arrangement shown, or to any specific kind of container, but rather the invention considers a wide range of modifications, embodiments, and variations as long as such may fall within the broad spirit of the invention and within the broad scope of interpretation claimed for, and merited by the appended claims.

What is claimed is:

1. Apparatus actuated by horizontally conveyed, open necked, filled containers, for positioning capped stems within the container necks with caps to fall on said necks, said apparatus comprising support means, upper and lower slotted tracks carried thereby with said caps to ride along said upper track and said stems to extend downwardly through said lower track slot, said means to contact the upper part of a cap at the lower end of said upper track, a yieldable detent pivotally mounted on said lower track normally in path of stem movement, light means and a photoelectric cell in beam circuit and in circuit with a relay and a solenoid, a trigger yieldably mounted on said lower track normally out of path of stem movement and urged by said solenoid as relay actuated as a leading container breaks said beam circuit to urge leading stem past said dentet and the lower end thereof into a leading container, while container movement pivots said leading cap between upper track and stop means so that said leading capped stem takes upright position and drops with said stem falling further into said container and said cap falling upon said container neck.

2. Apparatus actuated by horizontally conveyed, open necked, filled containers, for positioning capped stems within the container necks with caps to fall on said necks, said apparatus comprising support means, upper and lower slotted tracks carried thereby with said caps to ride along said upper track and said stems to extend downwardly through said lower track slot, said means to contact the upper part of a cap at the lower end of said upper track, a yieldable detent pivotally mounted on said lower track normally in path of stem movement, light means and a photoelectric cell in beam circuit and in circuit with a relay and a solenoid, a trigger yieldably mounted on said lower track normally out of path of stem movement and urged by said solenoid as relay actuated as a leading container breaks said beam circuit to urge leading stem past said dentet and the lower end thereof into a leading container, while container movement pivots said leading cap between upper track and stop means so that said leading capped stem takes upright position and drops with said stem falling further into said container and said cap falling upon said container neck.

3. Apparatus actuated by horizontally conveyed, open necked, filled containers for positioning capped stems into the container necks with caps to fall on said necks, said apparatus comprising support means, upper and lower slotted tracks carried thereby with said caps to ride along said upper track and said stems to extend downwardly through said lower track slot, said means to contact the upper part of a cap at the lower end of said upper track, a yieldable detent pivotally mounted on said lower track normally in path of stem movement, light means and a photoelectric cell in beam circuit and in circuit with a relay and a solenoid, a trigger yieldably mounted on said lower track normally out of path of stem movement and urged by said solenoid as relay actuated by leading con-
tainer breakage of said beam circuit to urge the leading stem past said detent and the lower end thereof into a leading container, whereby said detent may be yieldably urged rearwardly to be contacted by a following stem, container movement then pivoting between upper track lower end and said stop to upright position with said stem to fall further into said container and with said cap to drop around said neck, upon said leading container being moved forward to restore said beam circuit, said trigger being yieldably urged rearwardly to be cammed past said following stem into an initial position as said solenoid is likewise yieldably restored to initial positioning and upon trigger clearance, said following stem being returned by gravity and cap disposition again into detent contact.

4. A capped stem positioner to place capped stems with stems in necks of conveyed containers and caps on the necks thereof, said positioner comprising track means and stop means, including yieldable detent means normally to hold said capped stems in parallel relationship and upon said track means, a yieldably mounted trigger, circuit means operable responsive to a leading container respectively arriving at, and passing by a predetermined conveyor position first to actuate said trigger to move a leading stem past said detent means into a leading container neck, said detent thereby being yieldably restored to initial position, and second to permit said trigger to be yieldably restored past a following stem to initial position, container movement, after leading stem has been positioned therein, moving a leading cap with relation to said track and stop means to position where its stem falls further into said leading container and said leading cap falls upon the neck of the leading container.

5. A positioner as claimed in claim 4 in which said track means comprises an upper and a lower slotted track.

6. A positioner as claimed in claim 4 in which said circuit means includes a photoelectric cell and an oppositely disposed light means completing a beam circuit across the path of container movement.

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