United States Patent [19]

Nalbach

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[54] **STABILIZING APPARATUS FOR LIGHTWEIGHT CONTAINERS**

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[52] **U.S. Cl.** **198/160**, 198/189

[51] **Int. Cl.** **B65g 15/58**, B65g 17/06

[58] **Field of Search** 198/19, 29, 160, 189, 227

[56] **References Cited**

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[57] **ABSTRACT**

An aerosol container filling line for use with lightweight aluminum aerosol containers. The line includes an intermittently and linearly movable conveyor having pairs of upstanding pins located thereon for engaging a lower portion of the container and moving it along the line to and past various operating stations. A pair of longitudinally extending brushes are mounted to the production line on both sides of the conveyor and are adapted and arranged to engage the sides of the container at a position between the conveyor surface and the top of the pins so as to prevent the container from toppling rearwardly as the line begins to move from its stopped position.

4 Claims, 4 Drawing Figures

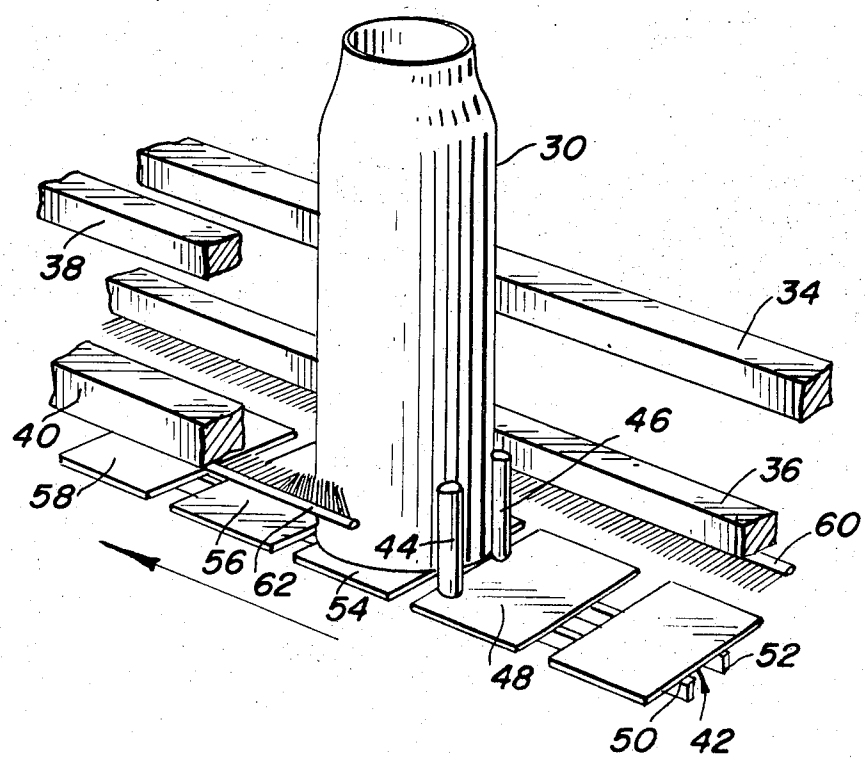


FIG. 1

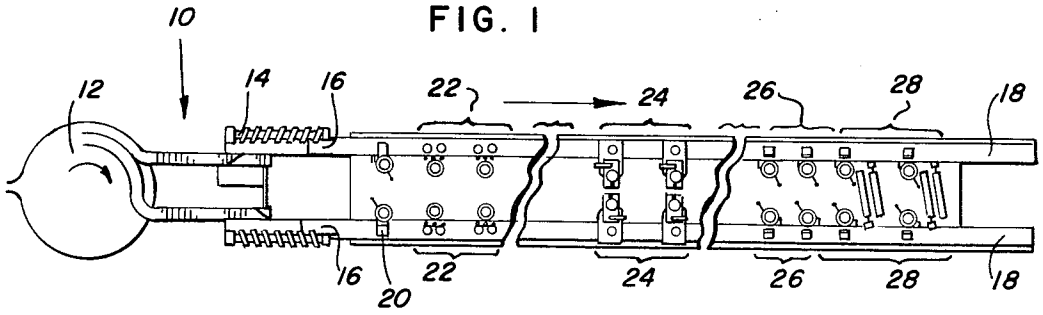


FIG. 4

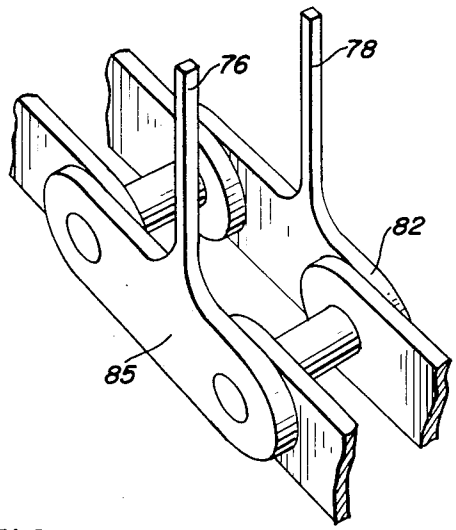


FIG. 3

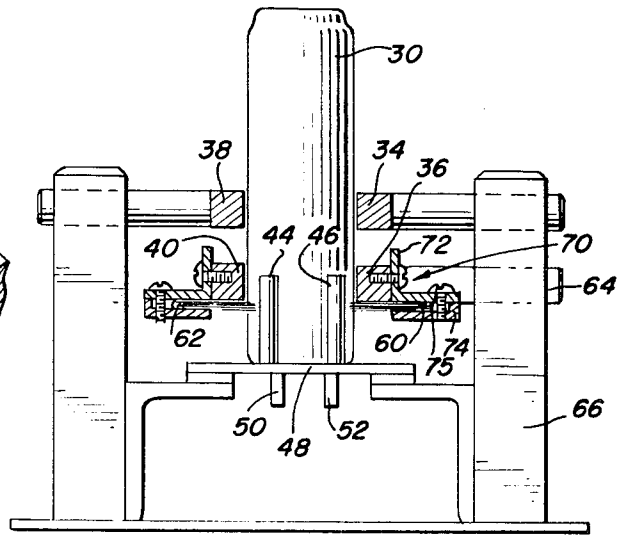
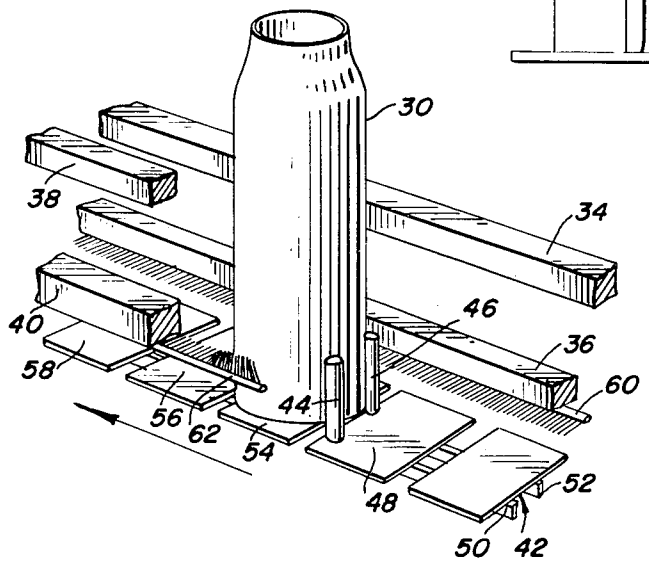


FIG. 2



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STABILIZING APPARATUS FOR LIGHTWEIGHT CONTAINERS

BACKGROUND OF THE INVENTION

This invention relates to assembly lines for filling aerosol containers; and in particular to the conveying apparatus used for light-weight containers.

One apparatus for filling aerosol containers is a production line in which an empty container is fed onto a linear conveyor which moves the empty containers progressively through a series of stations at which various operations such as purging of the container, filling the container with liquid, crimping, gas charging, and pressure checking is performed. The conveyor moves the container to a position aligned with a station at which point the conveyor is stopped so that the operation may be performed. The conveyor is then restarted to move or index the container to the next station for the performance of the next operation, and so on.

In existing apparatus, the empty containers are fed onto the conveyor belt by means of an infeed timing screw which controls the feeding and spacing of the containers onto the conveyor. These conveyors have been designed to provide a high-speed operation when using steel containers by having the containers, as they are fed onto the conveyor, engaged by a pair of transversly aligned pins which move the container with the conveyor. These pusher pins are of a height adapted to stabilize the container when the conveyor is indexed.

Recent product developments have demanded lightweight packages and as a result aluminum containers (known in the trade as "Peerless tubes") have become popular. It has been shown to be desirable to use these aluminum tubes in production lines substantially the same as have been used with these steel containers; however, it has been found that when these tubes are used with existing conveyors the forces acting upon the aluminum container when the conveyor is indexed are sufficient to cause the container to totter or even to topple. One suggestion for increasing stability has been to use very long pins which would engage a substantial length of the container. However, if this were done it would require a substantial space between containers on the conveyor, since the increased length of the pins would interfere with the timing of the entry of the containers onto the conveyor. This increased spacing would decrease the efficiency of the line and hence increase the cost of manufacture.

A second suggestion has been to reduce the speed of the conveyor so as to reduce the forces and thereby increase the containers stability. This approach has the same disadvantage in that the cost of producing the container would be significantly increased.

The present solution has been to utilize a conveyor having an annularly shaped ring (known in the trade as a "puck") into which the empty container is manually inserted at the beginning of the conveyor and from which the filled container is manually removed at the end of the line. It will be appreciated that different mechanisms would be required to automate the infeed of the containers into the puck and yet other mechanisms would be required to automate the removal of the filled container from the puck. Manual insertion and removal have been found to be less expensive than redesigning these production lines; however, the cost of this labor is a significant factor in the production of the aerosol products.

Thus the problem as to providing an aerosol packaging production line having a conveyor which can accommodate a light-weight container with little if any increase in production costs had yet to be provided.

SUMMARY OF THE INVENTION

There is provided by means of the invention described and claimed herein, a production line having a conveyor capable of operating at high speed for moving light-weight aerosol containers which does not require the manual insertion and removal of the containers from the conveyor; moreover, by virtue of this invention existing lines may be readily modified so as to accommodate the light-weight containers.

The concept embodied in this invention is to provide a means for applying a force to the lower portion of the container in a direction opposite to the forces applied thereto when the conveyor begins to move. These reaction forces can be applied in one embodiment by means of a pair of brushes which extend in a direction parallel to the direction of movement of the conveyor with the bristles extending and engaging the sides of the container. The interaction of the brushes with the container provides a force sufficient to prevent the container from tottering or toppling due to the forces applied to the container during the initial start-up movement of the conveyor. In other words, the brushes yieldably urge the container against the pusher pins so as to permit the container to move down the length of the production line and be retained against the pins during the first movements of the conveyor.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a diagramatic plan view of the aerosol packaging line;

FIG. **2** is a broken away diagramatic perspective view, showing a container held in position by means of a pair of pusher pins and the brushes;

FIG. **3** is a cross-sectional view taken along and in the direction of line **3-3** in the direction and as shown in FIG. **2**, depicting the mounting of the brushes to the production line; and

FIG. **4** is a perspective view of an alternative conveyor arrangement.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring first to FIG. **1**, there is shown an aerosol packaging production line **10**, generally. In viewing both Figures it will be seen that the empty containers are fed from the infeed transfer disc **12** into an infeed timing screw **14**. As the empty containers exit the timing screw **14** the containers are disposed upon a conveyor **16**, generally, which moves them through a series of stations, described hereinafter, to an exit position **18**. The conveyor moves the empty container to a purging or cleaning station **20**, at which point the conveyor stops so as to permit the cleaning and purging of the empty container. The conveyor then moves the cleaned container to a liquid filling station **22**, at which point the liquid to be dispensed from the container is charged into the empty container.

The conveyor is then restarted and the filled container is moved to a crimping station **24**, at which point the valve stem and cup are fitted to the open-topped

container; the closed container is then moved from the crimping station to the propellant charging station **26**, where the closed container is charged with the appropriate propellant and from there the container is moved to a pressure checking station **28**.

Referring now to FIG. **2**, one container **30** is shown in position on a conveyor and moving down the conveyor line in the direction shown by the arrow. From this Figure it can be seen that the empty containers are laterally restrained by means of a set of guiderails **34**, **36**, **38** and **40**, and are supported on the plate-like conveyor **42**. From this view only one pair of pusher pins **44** and **46** can be seen. The pusher pins **44** and **46** are shown mounted to a conveyor plate member **48**. The conveyor itself consists of a series of supporting links **50** and **52**, having mounted to the outer surface thereof the conveyor plate members **48**, **54**, **56**, **58**, etc. The upper guiderails **34** and **38**, in cooperation with the lower guiderails, **36** and **40**, guide the container in its movement along the line and restrains its lateral movement.

A pair of longitudinally extending strip brushes **60** and **62**, are mounted to the underside of the lower guiderails **36** and **40**. The bristles of the brushes extend inwardly toward one another so as to engage the lower portion of the container **30**. In the preferred embodiment the brushes **60** and **62** contact the container **30** at a position below the top of the guide pins **44** and **46**, but above the conveyor surface. It will be appreciated from this view, that without the strip brushes engaging the container, the forces applied during indexing to the lower portion of the container **30** would cause the lower portion to move forwardly with respect to the upper portion of the container and cause it to topple backwardly over the pins **44** and **46**, totter, or perhaps fall forwardly with respect to the pins **44** and **46**. However, the action of the brushes **60** and **62** on the lower portion of the container stabilizes the container and maintains it in an upright position notwithstanding the initial movement of the lower portion of the container.

With regard to the brushes themselves, the only limitations that have been found are that the brushes not be so stiff as to mar or scratch the surface finish of the container nor so soft or flexible as not to exert the stabilizing force on the container.

The brushes **60** and **62** are shown mounted to the lower guide-rail **36** and **40** in FIG. **3**. The guiderail **36** is in turn mounted to a laterally adjustable support rod **64**. The upright support **66** carries the rails **34** and **36** as described while the upright **68** carries the rails **38** and **40**. A simple gripping device **70** which comprises an L-shaped angle member **72** and a gripping plate **74** holds the brush **60** between one leg of the angle **72** and the plate **74** by means of screws such as **75**. The remainder of the Figure depicts the pusher pins **44** and **46** which threadably engage the plate **48** for pushing the container **30**. Mirror image brush gripping means are provided on the opposite side of the conveyor.

The brushes **60** and **62** extend the full length of the conveyor for ease of manufacture and to permit the operation or cycling of the production line with empty containers. It will be appreciated that the brushes need only extend for the length of the line during which the container is empty. Since once the container is filled, the reaction forces exhibited by the brushes may no longer be necessary. Thus, aside from the matter of convenience the brushes need not extend past perhaps the liquid filling station **22**. However, as a matter of general practice it is easier to manufacture the machine and to utilize it in empty runs with the brushes extending the full length of the line.

Referring to the brushes themselves, it will be appreciated that this invention is not limited to brushes, but is intended to cover any yieldable method of applying force against the lower portion of the container tube so as to present a reactive force against the sides of the container sufficient to retain the container against the pusher pins.

The conveyor as shown in FIGS. **2** and **3** is a plurality of table-type links **48** to which the pins **44** and **46** are threadably engaged. The invention herein contemplates the use of many different types of conveyor arrangements. FIG. **4** depicts an open-top link type conveyor in which the pins **76** and **78** are formed integral with the links **80** and **82** respectively, and may be a unitary stamping.

Although this specification discloses the use of this invention in conjunction with an aerosol container filling production line it is understood that it is useful in any production line where lightweight containers (for example, plastic bottles) are moved on an indexing and substantially linear conveyor.

It will be appreciated that numerous changes and modifications can be made to the embodiment disclosed herein without departing from the spirit and scope of this invention.

What is claimed and desired to be secured by Letters Patent of the United States is:

1. A production line which includes an indexing and substantially linearly movable conveyor which supports and moves upright lightweight containers to a plurality of operating stations, wherein said conveyor includes means mounted thereto for engaging said container and positioning said container on the conveyor, the improvement which comprises in combination therewith, means mounted to said production line and aligned therewith for yieldably urging the container against the container-engaging means, which urging means include brush means disposed on both sides of said conveyor and arranged to engage opposite sides of said container.

2. A production line as in claim **1** wherein said container engaging means includes a plurality of pairs of upstanding pusher pins.

3. A production line as in claim **2** wherein said means are mounted to said production line between the plane defined conveyor surface and the plane defined by the tops of the pusher pins.

4. A production line as in claim **1** wherein said brush means comprise longitudinally extending strip brushes.

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