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[54] **SUPPORT MEANS FOR RELEASABLY SUSPENDING CONTAINER**

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[51] **Int. Cl.** **B65g 15/00**

[58] **Field of Search** ..... 294/86.32, 93, 100, 294/90, 86 A, 33; 214/1 BA; 198/179, DIG. 8, 22 B, 131; 215/85, 52

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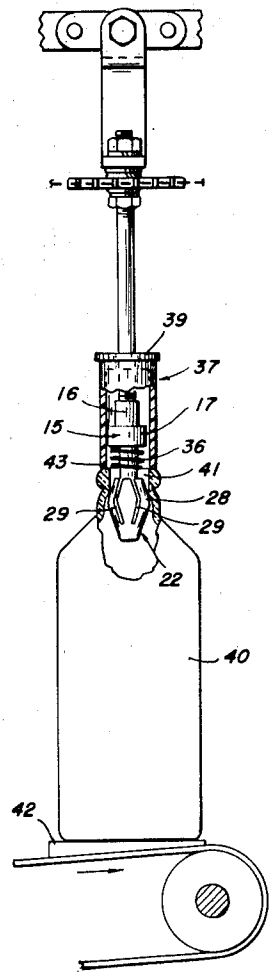
[57] **ABSTRACT**

A hanger or support apparatus is disclosed for suspending a container by engagement with the interior wall of the opening portion of the container. Means are provided for quickly engaging and disengaging the hanger. The hanger is particularly adapted for suspending heated glass bottles for conveyance through an electrostatic coating apparatus.

8 Claims, 6 Drawing Figures



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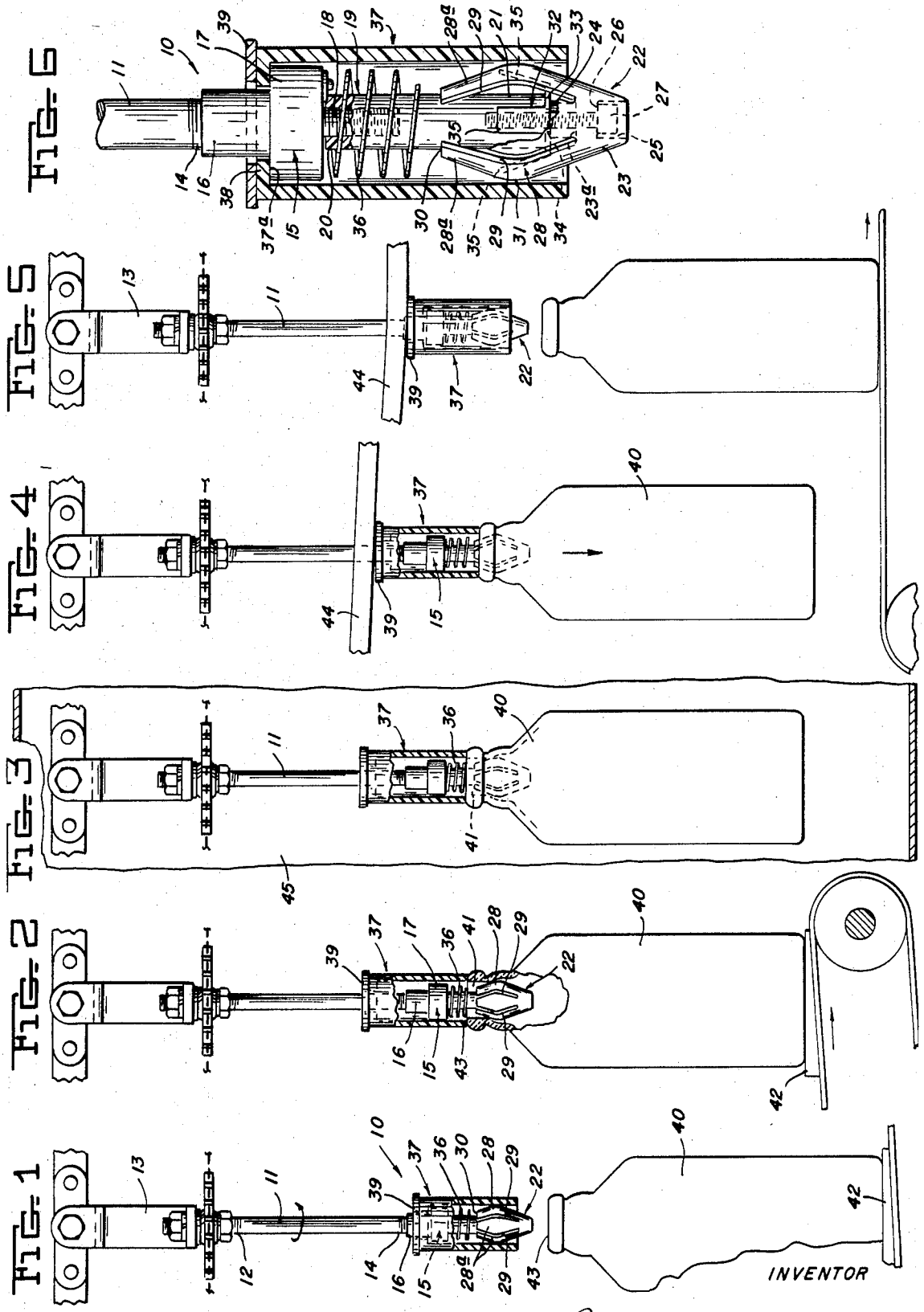

SUPPORT MEANS FOR RELEASABLY SUSPENDING CONTAINER

BACKGROUND OF THE INVENTION

In handling of containers, particularly open mouth glass containers, it is common practice to support the bottles from outside during processing steps. Any number of processing steps are performed on supported containers, such as heat treatment, coating processes, etc. These processes subject the container support device to unusual condition, and it is desirable to avoid breakdown of the container support device which must engage and disengage the containers reliably.

SUMMARY OF THE INVENTION

A hanger apparatus is provided for releasably suspending rigid containers which have an open mouth. The hanger apparatus comprises a support rod, and a resilient insert, fixed to one end of the support rod. The insert is forceably insertable into the open mouth of the container, and release means are provided which are slidably mounted on the support rod above the resilient insert for engaging the container on a downward stroke, whereby the container is moved free of the insert.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an elevational view partly in section of an embodiment of the present invention before insertion into a container;

FIG. 2 is a view in elevation showing insertion of the hanger apparatus into a container;

FIG. 3 is a fragmentary view in elevation showing the suspending container in an electostatic coating chamber whereby a uniform coating can be applied to the exterior of the container;

FIG. 4 is a view in elevation showing the suspending container in the process of being released from the hanger apparatus;

FIG. 5 is a view showing complete release of the container;

FIG. 6 is an enlarged elevation partly in section of the resilient insert portion and release means of the hanger apparatus.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The invention can be best understood by reference to the exemplary embodiment shown in the drawings, wherein the hanger apparatus **10** comprises a linearly extending support rod **11** which is adapted at one end **12** to be connected to a support structure **13** or to an indexing system for transporting the suspended container. Several coaxial extensions are provided from support rod **11**. The other end **14** of support rod **11** is preferably threaded and has screwed thereon a release means stop extension **15**, which is shown in greater detail in FIG. **6**. One end **16** of the extension **15** is internally threaded and screwed onto the threaded end **14** of the support rod **11**. Extension **15** is provided with a collar **17**, which acts as a stop for the release means as will be explained later. The other end **18** of extension **15** is threaded and has an extension rod **19** screwed thereon. Rod **19** is bored and internally threaded at each end **20, 21** with end **20** screwed onto threaded extension end **18**. The extension rod **19** is preferably formed of an electrically non-conductive, high-temperature resistant material to thereby electrically isolate the work piece end of the hanger apparatus **10**. A resilient insert **22** as best seen in FIG. **6** is then affixed to end **21** of rod **19**. The resilient insert **22** comprises a generally frusto-conic end portion **23** which aids in lining up the insert **22** with the container during insertion. A centralizing sleeve **24** extends from the base **23a** of the frusto-conic insert end portion **23** coaxial with the support rod longitudinal axis, back toward the support rod. A centralized aperture **25** extends axially through the frusto-conic insertion end portion **23** and has a screw head retaining shelf **26** provided therein so that the remaining screw **27** which is directed through the aperture **25**, the sleeve **24**, and screwed into end **21** of rod **19**, affixes the resilient insert **22** to the support rod. The resilient insert **22** further comprises a resilient, hollow, ellipsoidal, spheroid shaped portion **28** extending back about the extension of the support rod from the base **23a** of the frusto-conic insert end portion **23**. A predetermined number of symmetrically spaced slots **29** are provided in the barrel-like portion **28**, extending from the end **30** of the ellipsoidal spheroid shaped portion **28** to beyond the greatest diameter portion **31** of the ellipsoidal spheriod shaped portion **28**, thereby defining a like number of segments **28*a*** for the ellipsoidal spheroid shaped portion **28**. By way of example, when the greatest diameter of the barrel-like portion is about three-fourths inch, four symmetrically spaced slots each about one-eighth inch wide have been found suitable.

The reason the slots **29** extend from the end **30** is to permit greater resilience of the insert **22**. By extending the slots **29** beyond the greatest diameter portion **31** of the ellipsoidal spheroid shaped portion **28**, a pressure relief path is provided from the interior of the supported container. This is important if the processing involves heating the container.

A back-up spring **32**, which can be termed a tulip-spring is preferably disposed inside the hollow ellipsoidal spheroid shaped portion **28**. The back-up spring **32** comprises a base **33** with a centralizing aperture **34** therethrough via which the spring **32** is mounted on the retaining screw **27** abutting the end **21** of rod **19**. A plurality of petal-like extending arms **35** are directed from the base **33** back about the extensions of the support rod **11**. The term tulip spring is had from the petal-like extending arms **35**. The extending arms **35** are symmetrically disposed about and spaced from the longitudinal axis of the support rod **11**. The back-up spring **32** preferably has as many extending arms **35** as there are segments **28a** for the ellipsoidal shaped portion **28** of the resilient insert **22**. The extending arms **35** are disposed behind the segments **28a** to give support to the resilient insert **22**, and to keep it centered during insertion into a container. The back-up spring **32** is not essential for operation of the hanger apparatus, but is desirable for increasing the operational lifetime of the flexible insert.

A coiled conductive switch spring **36** is electrically connected to the collar **17** extending from the support rod **11**, and is wound about extension rod **19** down toward the resilient insert **22**. The switch spring **36** extends far enough to contact the finish or top rim of the container when the resilient insert is in place in the container mouth. The switch spring is only needed when it is desirable to provide a conductive path from the container, such as during an electrostatic coating process as will be described later in detail.

A cylindrical sleeve release means **37**, which includes an interiorly disposed centralizing flange **38**, is slidably mounted on suport rod **11**. The release means **37** is slidable in an axial direction along the support rod axis. As can be seen in FIG. **6**, the centralizing flange **38** at end **37a** of the release means **37** contacts collar **17** to restrain the downward movement of release means **37**. The diameter and length of release means **37** is such that it contacts the finish or top rim of the supported container and upon a downward stroke forces the container off the resilient insert **22**. A wear-resistant washer member **39** is preferably mounted on support rod **11** above the release means **37**.

OPERATION OF THE HANGER STRUCTURE

The operation of the hanger structure in releasably suspending open-mouth containers is illustrated in FIGS. **1**, **2**, **4**, and **5**. A conventional container **40** which has an open-mouth portion **41** is disposed and advanced on a conveyor pallet **42** to a position where the open-mouth portion **41** is approximately aligned with the resilient insert **22**. The container shown is a typical glass bottle, but it is apparent that a variety of other containers of different design can be utilized with the apparatus of the present invention. The resilient insert dimensions can be varied to allow use with a variety of open-mouthed or necked containers.

While insertion of resilient insert **22** into the open-mouth portion **41** of container **40** can be accomplished by simple relative movement between the resilient insert **22** and the container **40**, it has been found desirable to effect insertion by moving the container **40** upward. This allows the frusto-conic end portion **23** of the resilient insert **22** to be centralized, and minimizes the possibility of tipping over the container **40** due to slight initial misalignment. A sufficient upward force is applied to container **40** so that the resilient insert **22** is forced into the open-mouth portion **41** as is seen in FIG. **3**. The inside wall of the container **40** actually rests on the greatest diameter portion **31** of the ellipsoidal spheroid shaped portion **28** of the resilient insert **22**. The release means **37** rides up on the support rod, but remains in abutting contact with the finish **43**, or top rim of container **40**.

The resilient insert **22**, extension rod **19**, and the cylindrical sleeve release means **37** are all preferably formed of a non-electrically conductive, high-temperature, chemically resistant material, such as Teflon, a trademarked product of DuPont Chemical Co. The supported container **40** as seen in FIG. **2** is then ready for processing, without being in contact with any reactive surface. The container **40** can thus be supported solely from the inside the container if desired, or an auxiliary support can be provided. When the container is thus supported solely from inside, the entire exterior surface is then exposed for processing.

ELECTROSTATIC COATING OPERATION OF SUPPORTED CONTAINER

The suspended container can then be transported to various processing stations. One particular processing for which the hanger apparatus described is particularly advantageous in supporting the container, is in electrostatically applying a coating to the container. The coating material is for example thoroughly described in copending application Ser. No. 810,000, now abandoned filed Mar. 24, 1969, and owned by the assignee of the present invention. The container can be rotated during the coating process, or a plurality of spraying apertures can be provided in the wall of the coating chamber to facilitate depositing a uniform coating over the container.

In FIG. **3**, the supported container **40** is disposed within a coating chamber **45**. An electrostatic coating system is well known in the glass coating field, and includes a spray generator, from which the coating composition eminates as a fine spray. The spray is passed near a high voltage probe to produce an electrostatic charge on the spray particles. The spray is then directed into the coating chamber **45**, and directed onto the container **40**. The container can be rotated during the coating process, or a plurality of spraying apertures can be provided in the wall of the coating chamber to facilitate depositing a uniform coating over the container.

The helically wound spring **36** is preferably included with the hanger apparatus **10** when electrostatically applying a coating. The spring **36** is conductive and acts as a conductive path between the container and typically ground potential, to maintain a potential difference between the electrically charged spray particles and the container. This insures forming a uniform, adherent coating over the container.

The non-conductive, high-temperature resistant, non-reactive elements of the hanger apparatus **10**, which are the resilient insert **22**, the extension rod **19**, and particularly the cylindrical sleeve release means **37**, which are in contact with or close to the container during the coating application are unaffected by the coating composition. Any coating composition which is applied to these surfaces is easily removed. These elements shield the other portions of the hanger apparatus from the sprayed coating thereby minimizing maintenance of the system.

RELEASE OF THE CONTAINER

After the supported container is processed or transported, it is moved to a release position at which the resilient insert is removed from the container. This operation is shown in FIG. **4** and **5**. A camming means **44**, aligned with the direction of travel contacts the wear-resistant washer member **39**, to apply a downward force on the cylindrical sleeve release means **37**. This force is transmitted to the container to remove the resilient insert **22** from the container. The container is then set down upon a support surface, which can be a conveyor.

I claim:

1. A hanger apparatus for releasably suspending rigid containers having open mouths comprising:

a. a support rod,

b. a resilient insert fixed at one end of the support rod and being forceably insertable into the open mouth of the container, said resilient insert comprising a frusto-conic insert end portion which has a centralizing aperture extending axially therethrough, and a centralizing sleeve extending therefrom back toward the support rod about the support rod longitudinal axis, with the centralizing aperture continued through the sleeve, and a resilient ellipsoidal spheroid shaped portion extending from the base of the frusto-conic end portion about the support rod longitudinal axis, and

c. release means slidably mounted on the support rod above the resilient insert for engaging the container on a downward stroke, whereby the container is moved free of the insert.

2. The apparatus as specified in claim **1**, wherein said ellipsoidal spheroid shaped portion has a predetermined number of symetric slots therein extending from the support rod end to beyond the greatest diameter section thus defining a plurality of resilient arms for the ellipsoidal spheroid shaped portion.

3. The apparatus as specified in claim **1**, wherein the greatest diameter section of the ellipsoidal spheroid shaped portion of the insert is slightly larger than the container open mouth dimension, said resilient insert being forceably insertable into the container open mouth whereby it retains and supports said container.

4. The apparatus as specified in claim **1**, wherein a back-up spring is provided spaced between the support rod and the ellipsoidal spheroid shaped portion of said resilient insert, said back-up spring comprising a base portion with a centralizing aperture therethrough, a plurality of extending arms from the base extending back about the support rod longitudinal axis and symmetrically spaced therefrom, with the back-up spring extending arms disposed proximate the resilient arms of the resilient insert.

5. A conveyor apparatus for releasably suspending and transporting rigid containers having open mouths comprising:

a. a generally vertically disposed rod supported by the conveyor;

b. a compressible resilient insert tapered downwardly from a dimension larger than the container opening to a dimension less than the container opening fixed at the downwardly directed end of the support rod, said resilient insert being forceably insertable into the open mouth of the container upon relative movement between the axially aligned resilient insert and the container;

c. release means comprising a generally cylindrical sleeve having an internal bore larger in diameter than the compressible resilient insert but smaller in diameter than the container concentrically mounted on the support rod above the resilient insert by means disposed near the upper end of the cylindrical sleeve, said cylindrical sleeve being axially slideable along the support rod downward over the resilient insert and freely movable upward under the urging of the container as the resilient insert enters the mouth of the container; and

d. means for selectively applying a downward force to said cylindrical sleeve to move the same downward over the resilient insert while in engagement with the container to strip the container from said insert.

6. The apparatus as specified in claim **5**, wherein the resilient insert, and the generally cylindrical sleeve are preferably formed of a high-temperature resistant, electrically insulating, non-reactive material.

7. The apparatus as specified in claim **5**, wherein conductive means for contacting the suspended container are provided for maintaining the container at a predetermined potential.

8. The apparatus as specified in claim **7**, wherein said conductive means comprises a coiled metallic spring disposed about the longitudinal axis of the support rod, one end of the coiled spring is electrically connected to the support rod, and the other end is disposed to contact the container when the resilient insert is inserted into the open mouth of the container.

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