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Herbine et al.

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[54] **METHOD FOR PACKAGING VISCOUS VINYL PLASTIC SOLUTIONS**

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[52] **U.S. Cl.** **53/36**, 53/239

[51] **Int. Cl.** **B65b 3/08**

[58] **Field of Search** 53/36, 35, 37, 3, 53/239, 247, 248

[56] **References Cited**

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Primary Examiner—Donald R. Schran

Attorney—Eric P. Schellin et al.

[57] **ABSTRACT**

A simplified technique well suited for automated, high speed filling of packages with viscous vinyl plastic solutions, such as denture adhesives, which exhibit a (1) viscous taffy-like, sticky consistency and (2) a high degree of uniformity when utilized by the consumer. The first step of the technique requires he introduction of beads of the vinyl polymer into the open end of the package while simultaneously completely wetting each bead with a suitable solvent; a later step requires the aging of the wetted beads within the sealed package until the beads are fully dissolved and form a uniform product. In the preferred embodiment, the solvent is introduced into the open end of the package by a conduit. In the alternative embodiment, the solvent is injected into the package by an elongated needle with radial apertures, such needle being axially inserted into the interior of the package and being axially removed when the wetting step has been completed.

8 Claims, 4 Drawing Figures

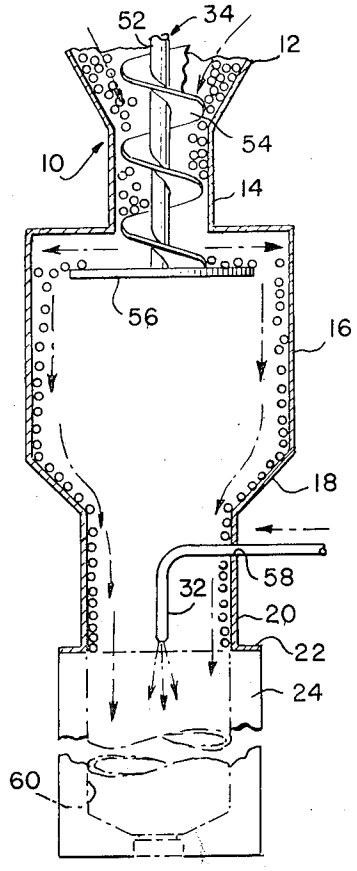


FIG. 1.

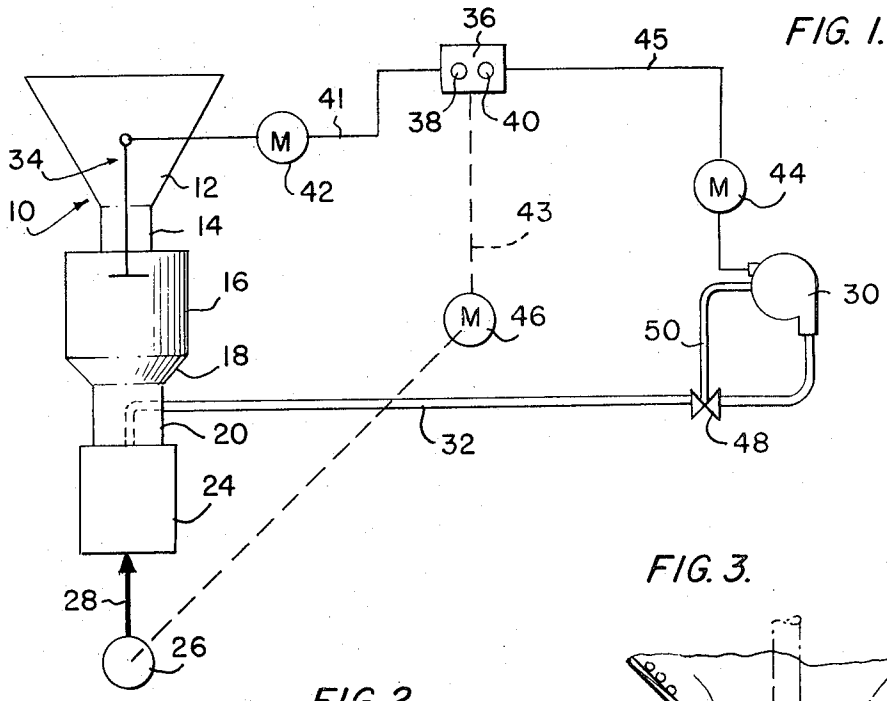


FIG. 2.

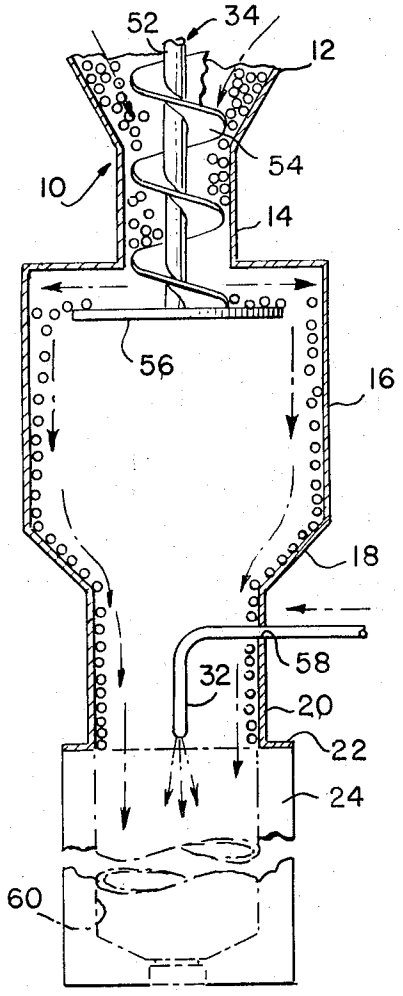


FIG. 3.

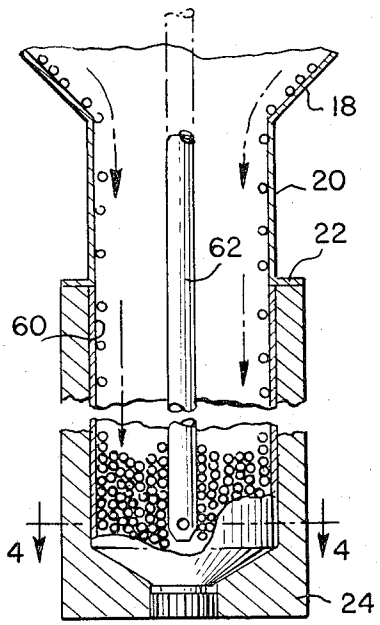
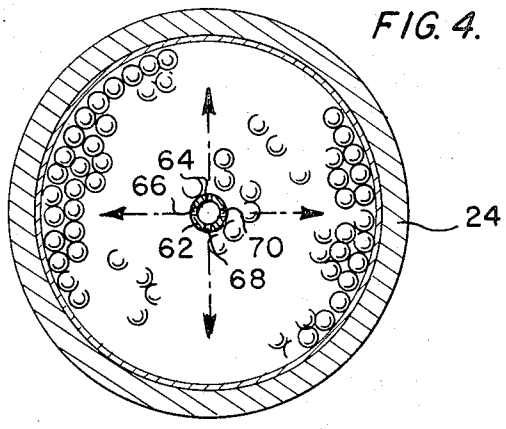


FIG. 4.



METHOD FOR PACKAGING VISCOUS VINYL PLASTIC SOLUTIONS

BACKGROUND OF THE INVENTION

1. Field of the Invention

The instant invention relates generally to methods for thoroughly wetting beads of a vinyl polymer with a suitable solvent so that the resultant viscous vinyl plastic solution can be aged within the confines of a consumer package.

2. Description of the Prior Art

Products, such as denture adhesives, which possess the above noted taffy-like consistency and high degree of uniformity are currently manufactured and packaged by cumbersome and inefficient manners unsuited for mass production, automated facilities. For example, in one method, the ingredients of the product are blended together by a heavy-duty mechanical mixer. Then, the batch of blended material is pressurized and/or advanced from the mixer into a filling head. The packages to be filled are passed beneath the filling head, and the product is introduced into each package in sequential fashion. A semi-skilled laborer controls the operation of the head and attempts to regulate the amount of blended viscous material introduced into each package. The laborer then manually severs the taffy-like material with a knife or shears, and the filled package is subsequently sealed, as by a crimping operation. Problems are frequently encountered with "tailing" of the viscous product; such "tailing" makes the subsequent sealing operation much more difficult and the "tail" detracts from the aesthetic appeal of the consumer product, with lowered commercial acceptance. Furthermore, such conventional filling technique is time-consuming, tedious, and far better suited for small, low-volume packaging runs than for continuous, high speed packaging lines.

SUMMARY

Thus, with the above noted deficiencies of the prior art packaging techniques for viscous solutions of vinyl plastics clearly in mind, the instant invention contemplates processes for accurately filling packages with beads of vinyl polymeric material and a suitable solvent to form a viscous, taffy-like product of high uniformity after aging within the sealed package. The solvent is introduced into the package by a conduit or an elongated needle with radial apertures. The package is sealed after being filled and the problems associated with the mechanical blending of the ingredients and the manual severing of the blended mass, such as the tailing, are obviated.

Furthermore, the viscous vinyl plastic solution produced by the instant invention is a highly uniform product. Uniformity indicates that imperfections or "fish-eyes," or undissolved beads similar in size to granules of sand, are absent from the product when utilized by the consumer. "Fish-eyes" reduce the effectiveness of the various properties of the product containing same; for example, with reference to denture adhesives, the gripping power of the adhesive might be reduced.

Thus, it will be appreciated that the instant packaging method can readily be practiced with commercially available apparatus to economically perform high-speed, automated packaging of viscous vinyl plastic solutions under sanitary conditions while maintaining a high degree of uniformity in the consumer product.

Other objects, advantages and desirable features of the instant invention will become apparent in light of the following description of the invention when construed in connection with the accompanying sheet of drawings.

DESCRIPTION OF THE DRAWINGS

FIG. **1** is a schematic representation of a system for practicing the unique method of the instant invention;

FIG. **2** is a vertical cross-section, on an enlarged scale, of a preferred embodiment of selected segments of a hopper, auger, jig, and conduit employed within the system of FIG. **1**;

FIG. **3** is a vertical cross-sectional view of an alternative embodiment wherein an elongated needle is substituted for the conduit of FIG. **2**; and

FIG. **4** is a horizontal cross-sectional view on an enlarged scale, of the jig and the package with the needle inserted therein, such view being taken along line **4-4** in FIG. **3** and in the direction indicated.

DESCRIPTION OF THE INVENTION

Referring now in greater detail to the drawings in which similar reference numerals identify similar components, FIG. **1** depicts a representative system of commercially available components for practicing the unique method of the intant invention, and FIG. **2** illustrates, in greater detail, the more significant components of the system. More particularly, the system includes a hopper indicated generally by reference numeral **10.** Hopper **10** comprises an upper funnel **12** whose narrow bottom end opens into the first cylindrical section **14.** Section **14,** in turn, opens into the second larger cylindrical section **16,** which terminates in a tapering section **18** that leads into a third, smaller cylindrical section **20.** An annular ring **22** is defined at the lower end of the hopper.

A jig **24** holds the package, such as a collapsible tube, to be filled. A cam **26** and a follower **28** are provided for raising the jig at the initiation of the filling operation, and for lowering same when the operation has been completed. A pump **30** pressurizes the liquid to be delivered over conduit **32** to the package retained within jig **24.** The conduit terminates in a downwardly facing, axially extending nozzle that communicates with the package to be filled. Additionally, feed means, indicated generally by reference numeral **34,** are provided to assist the movement of solid materials through hopper **10.**

An electrical controller **36** with manually adjustable knobs **38, 40** and appropriate leads **41, 43** and **45** regulates (1) the operation of motor **42** that drives feed means **34,** as well as (2) the operation of motor **44** that drives pump **30** and (3) the operation of motor **46** that drives cam **26** to raise and lower jig **24.** By properly manipulating knobs **38** and **40,** the timed operation of feed means **34** and pump **30** relative to one another is altered. The flow of pressurized fluid through conduit **32** can be regulated by valve **48.** By-pass loop **50** may relieve pressure built-ups in the conduit.

Examining FIG. **2** in somewhat greater detail, the structural details of hopper **10,** feed means **34,** conduit **32** and jig **24** are clearly visible. Feed means **34** extends axially through sections **12, 14** and **16** and terminates near the upper end of section **16.** Feed means **34** comprises a vertically extending shaft **52** with a helical spiral **54** wound thereabout; an annular plate **56** is secured

to the lower end of the fillers, Auger-type filler, such as those described above, are well known and may be purchased from the G. Diehl Mateer Company of Wayne, Pa., or may be seen in U.S. Pat. Nos. re 23,888 and re 24,079 granted to G. Diehl Mateer.

Conduit **32** passes through an aperture **58** in the wall of third cylindrical section **20,** and terminates in a right-angled section that is coincident with the vertical axes of hopper **10** and jig **24.** The jig, sections of which are broken away, has a cavity **60** shaped to receive therein the outline of the package to be filled. In the illustrative preferred embodiment of FIG. **2,** cavity **60** receives a collapsible metal tube with a cap already screwed onto its threaded neck. Shoulder **22** on the lower end of hopper **10** assists in locating jig **24** relative thereto as cam **26** and follower **28** elevate the unfilled tube.

The method of this invention is particularly useful in the packaging of viscous solutions of vinyl plastics. Typical of the polyvinyl resin bases of such plastics are polyvinyl acetate, polyvinyl alcohol, polystyrene and polyvinyl chloride. A further description of such vinyl polymers can be found, for example, in Kirk-Othner, Encyclopedia of Chemical Technology, 2nd Edition (1970), Vol. 21, pp. 304–440. By way of further illustration, a representative formulation which can be successfully packaged by the method of this invention is a known denture adhesive prepared by admixing in the manner of this invention 50–85 parts of polyvinyl acetate beads having an average viscosity in the range of 15–25 cps. together with 15–70 parts of a suitable solvent therefor such as ethyl alcohol, additionally incorporating the usual amounts of plasticizer and coloring agents.

A predetermined quantity of beaded polymeric material is fed into hopper **10** and then controller **36** is energized to start the operation of motor **46** and thus elevate jig **24** against retaining shoulder **22.** Controller **36** also energizes motor **42** which drives feed means **34** so that the helix **54** advances the beads onto plate **56.** Plate **56** rotates rapidly and propels the beads radially outwardly against the walls of chamber **12** by virtue of the centrifugal force. The beads then follow the configuration of the hopper walls and fall downwardly into the collapsible tube retained within the cavity **60** in jig **24.** The path of travel of the beads through the hopper is indicated by appropriate directional arrows in FIG. **2.**

A second or two before the beads following the contour of hopper **10** fall down into the tube held within cavity **60** in jig **24;** motor **44** is turned on to drive pump **30** and thus pressurize a predetermined quantity of the solvent, plasticizer and coloring agent for discharge from conduit **32.** The initial quantity of liquid dispensed wets the bottom of the inverted tube in the vicinity of the cap to thereby prevent undissolved beads from gathering at such spot and clogging the narrow neck of the tube. Thereafter, the liquid and the beaded material are simultaneously introduced into the tube retained in jig **24** so that each bead is saturated with the solvent until the predetermined quantity of beads has been collected in the tube. Lastly, conduit **32** continues to supply liquid for a fraction of a second after the last bead has been discharged. It will be noted that the discharge end of conduit **32** is located on the vertical axis of hopper **10** and jig **24** so that the beads will be saturated in a uniform fashion. After saturation, jig **24** is lowered by motor **46** and cam **26,** and the filled tube is removed therefrom and then sealed by crimping or rolling over the open end of the tube. Lastly, the tube is then retained in a storage facility where it will be allowed to age. The aging process, which takes place in a commercially acceptable time frame aids in the formation of a uniform product of high quality.

The aging process occurs in the sealed tube over a period of at least one week. In many instances, however, an aging period of four to six weeks is commonplace. The range of one to six weeks defines a commercially acceptable time frame.

FIGS. **3** and **4** depict an alternative embodiment of the means for saturating the beads of polymeric material with solvent to form a viscous vinyl plastic solution. An elongated needle **62** with a series of radial apertures **64, 66, 68** and **70** is utilized in lieu of conduit **32.** Needle **62** is inserted axially into the tube retained within jig **24,** and the pre-determined quantity of liquid containing the solvent, plasticizer, and color is then discharged, under pressure, through apertures **62, 64, 66** and **68.** The needle can be slowly withdrawn as the tube is gradually filled with the polymeric beads, and many levels or rows of axially spaced apertures may be utilized.

The force of the liquid discharged through the aperture, the constantly changing position of needle **62** as it is moved upwardly, plus the capillary action and gravimetric force of the solvent upon the beads, assures wetting of all the beads. Over a period of time, such as 1–6 weeks, all of the beads dissolve completely in the solvent in the sealed package, thus forming **2** uniform viscous mass of high quality identical to the finished product previously manufactured by conventional blending techniques. Additionally, since the product is formed within the package, by combining of ingredients, the problems of accurately weighing or measuring a quantity of viscous material, and then manually severing same without producing an unsightly "tail" of taffy-like material are obviated.

Manifestly, numerous modifications of the above described apparatus and method will occur to the skilled artisan without departing from the spirit or essential characteristics of the unique, two-phase method described in the specification. Consequently, the appended claims should be accorded a wide range of equivalency.

What we claim is:

1. A method for packaging a viscous vinyl plastic solution comprising the steps of:

a. introducing a small quantity of a solvent for the vinyl polymer into the open package;

b. introducing beads of said vinyl polymer and an additional larger quantity of said solvent into said open package so that each beads is thoroughly wetted;

c. sealing said open package; and

d. storing said sealed package for a time at least sufficient for the vinyl plastic therein to form a homogeneous solution.

2. The method of claim **1** wherein said vinyl plastic is polyvinyl acetate.

3. The method of claim **1** further including the step of introducing a small quantity of solvent into the package after the last bead has been deposited therein.

4. The method of claim **1** further including the steps of subjecting the beads to a centrifugal force to sepa-

rate the beads from one another prior to introducing the beads into the package.

5. The method of claim **1** wherein the solvent is pressurized before being introduced into the package through an axially extending conduit.

6. The method of claim **1** wherein the solvent is pressurized before being introduced into the package through an axially extending elongated needle having radial apertures for discharging the solvent.

7. The method of claim **6** wherein the needle is axially lowered into the package prior to introducing the solvent into the package, and the needle is axially withdrawn from the package subsequent to discharging the solvent, the axial movement of the needle assisting in the wetting of the beads in the package.

8. The method of claim **1** wherein said sealed package is stored for a time frame of at least one week.

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