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Porteous

[11] **3,731,453**

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[54] METHOD FOR PREPARING SYRINGE TYPE VIALS OF HYDROCOLLOID IMPRESSION MATERIAL

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[52] **U.S. Cl.** **53/37**

[51] **Int. Cl.** **B65b 3/04**

[58] **Field of Search** ..... 53/37, 42, 43, 281, 53/282, 319, 328, 329; 128/218 D, 234; 141/27

[56] **References Cited**

UNITED STATES PATENTS

2,823,500 2/1958 Brown 53/328

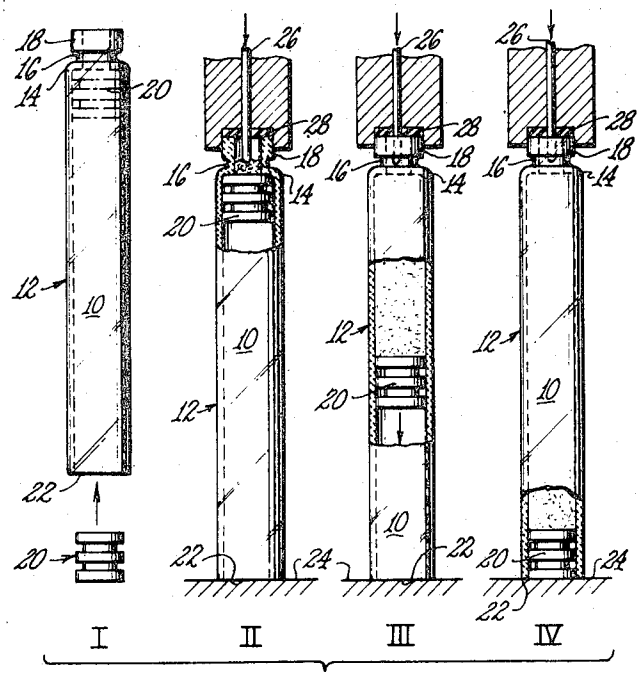
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[57] **ABSTRACT**

A method is provided for preparing an enclosed vial of reversible hydrocolloid dental impression material which includes the step of positioning a stopper a sufficient distance within the vial to permit expansion of the impression material upon subsequent heating of the vial without ejecting the stopper from the vial. The vial, which may take the form of an open ended tube having an enlarged portion terminating at one end in shoulder, neck and rim portions, is initially loaded by a multi-step process which includes (*a*) inserting a stopper through the enlarged portion until it engages The shoulder portion, (*b*) placing the open end of the enlarged portion in abutment with a substantially flat surface and (*c*) filling the vial through the rim and neck portions with hydrocolloid under sufficient pressure to move the stopper through the enlarged portion and into abutment with the substantially flat surface.

In a second embodiment, the aforementioned vial is initially loaded by a multi-step process which includes (*a*) inserting a stopper into the enlarged portion until the rearward end of the stopper is substantially aligned with the lip of the enlarged portion, (*b*) placing the closed end of the enlarged portion in abutment with a substantially flat surface, (*c*) inserting a filling tip through the rim portion until it is in juxtaposition to the stopper and (*d*) filling the vial through the filling tip while simultaneously withdrawing the filling tip from the vial. After the vial is filled with hydrocolloid impression material, the stopper is moved into the vial a sufficient distance to accommodate expansion of the impression material when the vial is heated to 212° F. to condition the material for further use. Following this step the rim portion of the vial is closed with a needle permeable cap.

4 Claims, 4 Drawing Figures



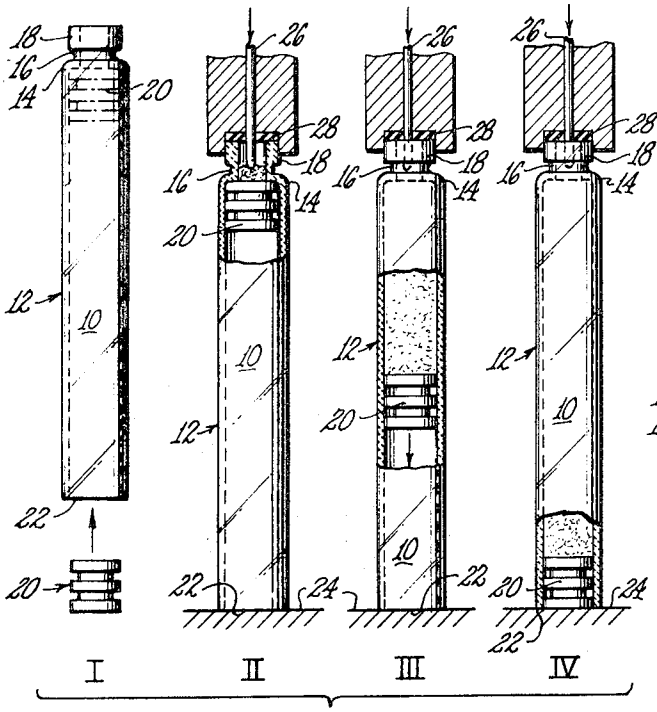


FIG. 1.

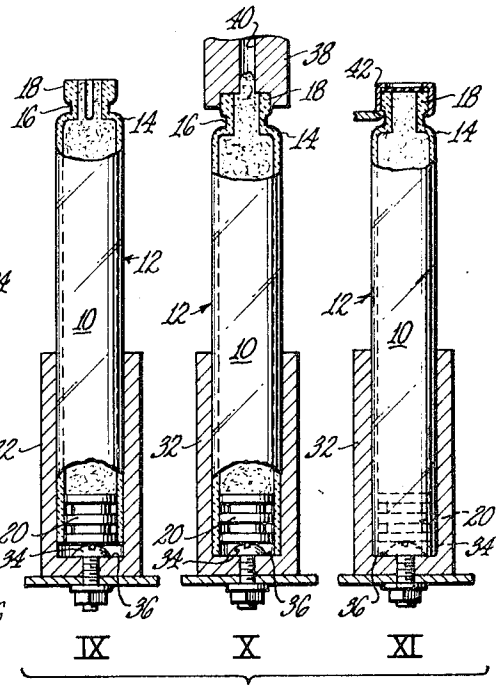


FIG. 3.

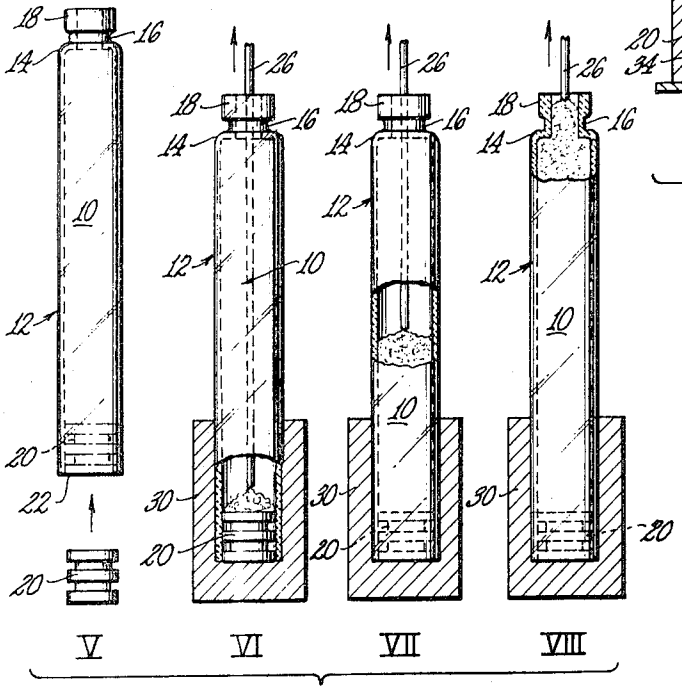


FIG. 2.

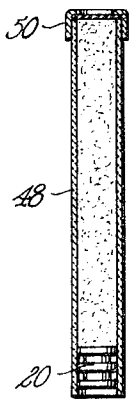


FIG. 4.

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METHOD FOR PREPARING SYRINGE TYPE VIALS OF HYDROCOLLOID IMPRESSION MATERIAL

BACKGROUND OF THE INVENTION

This invention relates to a method for preparing syringe type vials of reversible hydrocolloid dental impression material and, more particularly, it relates to a method for preparing such vials which includes the step of positioning a stopper a sufficient distance from the end of the vial to permit expansion of the impression material upon subsequent heating of the vial without ejecting the stopper from the vial.

Reversible hydrocolloid impression material used in dental work usually comprises a formulated aqueous suspension of agar agar which is a gel at ordinary temperatures, melts or changes to the sol condition at approximately 200° – 212° F. and sets or changes back to the gel condition at approximately 100° F. Under storage conditions, the reversible hydrocolloid will remain in a fluid condition when initially melted and thereafter maintained at a temperature between about 145° – 212° F. The hydrocolloid material is used for taking dental impressions for the subsequent construction of inlays, fixed bridges and partial dentures. Heretofore, when hydrocolloid material was to be used for making inlay impressions, the hydrocolloid was supplied in cylindrical stick form. The cylindrical stick was inserted into a dental hydrocolloid syringe and the syringe together with the hydrocolloid were heated in a water bath in order to convert the impression material from the gel to the sol condition for injection directly into the cavity. A typical hydrocolloid syringe in which a hydrocolloid stick may be conditioned for subsequent injection into a cavity is illustrated and described in U. S. Pat. No. 2,381,785 — Thompson. An electric water bath heater for conditioning hydrocolloids to be used in making inlay impressions is illustrated and described in U. S. Pat. No. 3,345,497 — D. D. Porteous.

Since the prior art method for preparing hydrocolloids for making inlay impressions requires concurrent heating of the syringe and the hydrocolloid stick, it would, of course, be advantageous to provide a vial of hydrocolloid which could be independently conditioned and subsequently inserted in an appropriate syringe for further use. A. W. Sears, in an article entitled "Hydrocolloid Impression Techniques for Inlays and Fixed Bridges," which was published in Dental Digest, describes a relatively complex laboratory procedure for preparing carpules or vials of hydrocolloid material. In the method outlined by Sears, a mixing gun containing specified quantities of water and hydrocolloid is placed in boiling water for four minutes. Liquid hydrocolloid is added to a Luer syringe until it is three-fourths full, after which air is expelled from the syringe. The Luer syringe, equipped with a 19-gauge needle, is used to fill an emptied metal-end carpule, provided with a stopper, by puncturing the metal cap end and forcing hydrocolloid into the carpule until it is about three-fourths full. The hydrocolloid carpule is prepared for use by heating it in boiling water for at least one minute after which it is loaded into a carpule syringe equipped with a Mercitan needle for injection of the impression material into the tooth cavity and the space between the gum tissue and gingival margin of the cavity.

Since the procedure disclosed by Sears is a laboratory method for preparing vials of hydrocolloid which are

three-fourths full, it would be desirable to provide a method for commercially producing vials of hydrocolloid which are substantially completely full except for that amount of space beyond the stopper which is required to accommodate the expansion of the impression material upon subsequent heating for further use.

Accordingly, an object of this invention is to provide a new and improved method for preparing enclosed vials of reversible hydrocolloid dental impression material.

Another object of this invention is to provide a simple and economical method for preparing enclosed vials of hydrocolloid material which includes the adjusting of the volume of the material to permit the maximum amount thereof to be loaded in the vial but yet provide sufficient space beyond the end of the stopper to accommodate the expansion of the material upon subsequent conditioning for further use.

SUMMARY OF THE INVENTION

In accordance with this invention, a method is provided for preparing an enclosed vial of reversible hydrocolloid dental impression material which includes the step of positioning a stopper a sufficient distance within the vial to permit expansion of the impression material upon subsequent heating of the vial without ejecting the stopper from the vial.

The vial, which may take the form of an open-ended tube comprising an enlarged portion terminating at one end in shoulder, neck and rim portions, is loaded, in one embodiment, by a multi-step process. Initially, a stopper is inserted through the open end of the enlarged portion of the vial until it engages the shoulder of the vial. The open end of the enlarged portion of the vial is then placed in abutment with a substantially flat surface. A filling tip is inserted into the neck portion of the vial until it is in juxtaposition to the stopper and the open rim is sealed at its lip with respect to the filling tip. The vial is filled through the filling tip with reversible hydrocolloid impression material under sufficient pressure to move the stopper through the enlarged portion of the vial and into abutment with the substantially flat surface. Following the filling step, the filling tip and sealing member are removed from the vial.

In a second embodiment, the aforementioned vial is loaded with hydrocolloid impression material by a multi-step process in which a stopper is initially inserted into the open end of the enlarged portion of the vial until the rearward end of the stopper is in substantial alignment with the lip of the open end of the enlarged portion. The open end of the enlarged portion of the vial is then placed in abutment with a substantially flat surface. A filling tip is inserted into the open end of the neck portion of the vial until it is in juxtaposition to the stopper and the vial is filled through the filling tip while simultaneously withdrawing the filling tip from the vial.

The configuration of the vial is not critical and it can take the form of an open-ended, straight cylindrical tube.

After the vial is filled with impression material, the stopper is moved inwardly in the vial a sufficient distance to permit expansion of the material upon subsequent heating without ejecting the stopper from the vial. The open neck portion is then capped with a nee-

dle permeable cap to provide an enclosed vial of hydrocolloid which is adapted for use in an appropriate syringe as, for example, an anesthetic type syringe.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic illustration of the steps involved in one embodiment for loading a vial with hydrocolloid material.

FIG. 2 is a schematic illustration of the steps involved in a second embodiment for loading a vial with hydrocolloid material.

FIG. 3 is a schematic illustration showing the steps of advancing the stopper inwardly in the vial to permit subsequent expansion of the material and capping the vial.

FIG. 4 shows a filled vial wherein the configuration of the vial is in the form of a straight, cylindrical tube.

DETAILED DESCRIPTION

Referring to FIG. 1, there is shown in Illustration I an open-ended vial **10** having an enlarged portion **12** which terminates at one end in shoulder portion **14**, neck portion **16**, and rim portion **18**. A stopper **20** is inserted through the open end **22** of the enlarged portion of the vial until it engages the shoulder portion **14** of the vial.

In Illustration II, the open end **22** of the enlarged portion of the vial is placed in abutment with a substantially flat surface **24**. A filling tip **26** is inserted into the open rim portion of the vial until it is in juxtaposition to the stopper **20** and the open rim is sealed with respect to the filling tip by means of a sealing member **28**.

Reversible hydrocolloid dental impression material is introduced into the filling tip **26** at a temperature between about 170° to 180° F. and a pressure between about 40 to 90 psi in order to simultaneously fill the vial and move the stopper **20** through the enlarged portion **12** of the vial and into abutment with the substantially flat surface **24** as shown in Illustrations III and IV. When the filling of the vial with hydrocolloid has been completed, the filling tip **26** and the sealing member **28** are removed from the vial.

In FIG. 2, a second procedure is shown in Illustrations V – VIII for loading the above-described vials with hydrocolloid impression material. A stopper **20**, as shown in Illustration V, is inserted into the open end **22** of the enlarged portion 12 of the vial **10** until the rearward end of the stopper is in substantial alignment with the lip of the enlarged portion of the vial. The vial is placed in a support structure **30** and a filling tip **26** is inserted into the vial through the rim **18** and neck **16** portions until it is in juxtaposition to the stopper as shown in Illustration VI. Reversible hydrocolloid impression material is introduced into the filling tip **26** at a temperature between about 180° to 190° F. and a pressure between about 20 to 50 psi for filling the vial while the filling tip is simultaneously being withdrawn from the vial as shown in Illustrations VI, VII and VIII. In this embodiment for filling the vial, it is not necessary that the open rim portion **18** of the vial be sealed with respect to the filling tip.

After the vial is filled with hydrocolloid in accordance with either of the above-described loading techniques, processing of the vial is completed by moving the stopper inwardly a sufficient distance to permit expansion of the impression material upon subsequent heating and, thereafter, capping the open end of the vial as shown in Illustrations IX, X and XI of FIG. 3.

Referring to Illustration IX, the filled vial is placed in a support structure **32** which has a member such as a screw-head **34** projecting upwardly from its bottom wall **36** for engaging the rearward end of the stopper **20**. A cylindrical member **38**, as shown in Illustration X, engages the lip of the rim portion **18** of the vial and force is applied to the cylindrical member for moving the vial downwardly with respect to the screw-head **34** whereby the stopper **20** is advanced inwardly in the vial. Excess material from the neck and rim portions of the vial is removed through an opening **40** in the cylindrical member **38**. The height of the screw-head **34** is such that the stopper will be moved into the vial a distance which substantially corresponds to the expansion of hydrocolloid material at 212° F. with the result that the stopper will not be ejected when the vial is subsequently heated to condition the hydrocolloid. It has been found for anesthetic type vials that this distance is about one-sixteenth of an inch. Also, it should be noted that any air which remains in the neck and rim portions of the vial is expelled together with excess material as shown in Illustration X.

Preparation of the vial of hydrocolloid is completed by capping the rim portion **18** of the vial with a needle permeable cap **42** as shown in Illustration XI.

The configuration of the vial is not critical. In FIG. 4, there is shown a vial **48** in the form of a straight cylindrical tube. The vial, which is filled with hydrocolloid, is provided with a stopper **20** adjacent one end and is capped at the other end with a needle permeable friction type cap.

The process described herein is applicable to heat expandable materials such as plastics, adhesives and metals which are adapted for use with syringe type applicators.

While in the foregoing drawing and description there has been shown and described the preferred embodiment of this invention, it will be understood, of course, that minor changes may be made in the process without departing from the spirit and scope of the invention as claimed.

I claim:

1. A method for preparing an enclosed vial of reversible hydrocolloid impression material wherein the vial is an open-ended tube having an enlarged portion terminating at one end in a shoulder portion, neck portion and rim portion which comprises:

inserting a stopper into the open end of the enlarged portion of the vial and moving the stopper in said vial until the forward end of the stopper engages the shoulder of the vial;

placing the open end of the enlarged portion of the vial in abutment with a substantially flat surface;

inserting a filling tip through the rim and neck portions of the vial until the filling tip is in juxtaposition to the stopper, sealing the lip of the rim portion of the vial with respect to the filling tip and filling said vial through said filling tip with reversible hydrocolloid impression material under sufficient pressure to move the stopper through the enlarged portion of the vial and into abutment with the substantially flat surface;

unsealing and removing the filling tip from the rim and neck portions of the vial;

moving said stopper inwardly in said vial a sufficient distance to expel air and permit expansion of the impression material upon subsequent heating of the vial without ejecting the stopper from the vial, and, thereafter, capping the open end of the vial with a needle permeable cap.

2. A method according to claim 1 wherein a member, in fixed position, engages the stopper and a force is applied to the other end of the vial for moving said vial towards said member whereby said stopper is moved inwardly in said vial.

3. A method according to claim 2 wherein the stopper is moved inwardly in said vial for a distance which substantially corresponds to the expansion of reversible hydrocolloid impression material contained in said vial when heated to 212° F.

4. A method for preparing an enclosed vial of reversible hydrocolloid impression material wherein the vial is an openended tube of substantially uniform diameter having a filling end and a non-filling end and provided with a stopper near the filling end, which comprises:

placing the non-filling end of the vial in abutment with a substantially flat surface;

inserting a filling tip through the filling end of the vial until the filling tip is in juxtaposition to the stopper, sealing the lip of the filling end of the vial with respect to the filling tip and filling said vial through said filling tip with reversible hydrocolloid impression material under sufficient pressure to move the stopper through the vial and into abutment with the substantially flat surface;

unsealing and removing the filling tip from the vial;

moving said stopper inwardly in said vial a sufficient distance to expel air and permit expansion of the impression material upon subsequent heating of the vial without ejecting the stopper from the vial, and thereafter, capping the filling end of the vial with a needle permeable cap.

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