

[54] **SYRINGE AND HOLDER**

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[58] Field of Search **222/386, 387, 546, 142.3, 179.5; 128/218 P**

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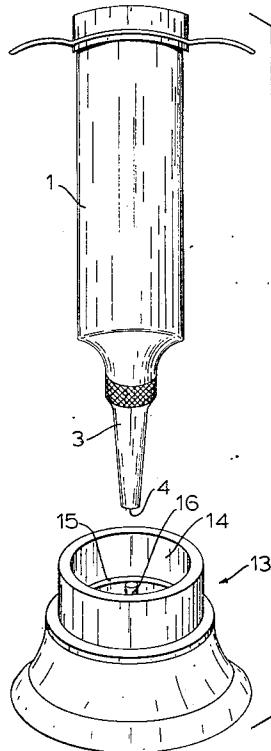
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[57] **ABSTRACT**

A syringe is provided with a vertical support having a stem closing the nozzle of the syringe whereby the cylindrical barrel of the syringe may be partially filled with the impression material such as an epoxy resin formed by constituents added separately through the open upper end of the body and mixed within the syringe. The plunger for the syringe has a minute vent opening therethrough permitting the escape of air as the plunger is forced downwardly into the upper end of the syringe barrel to the level of the material therein. The syringe is thereafter applied to the object to receive the impression and the plunger actuated to force the material through the nozzle into the object.

2 Claims, 4 Drawing Figures



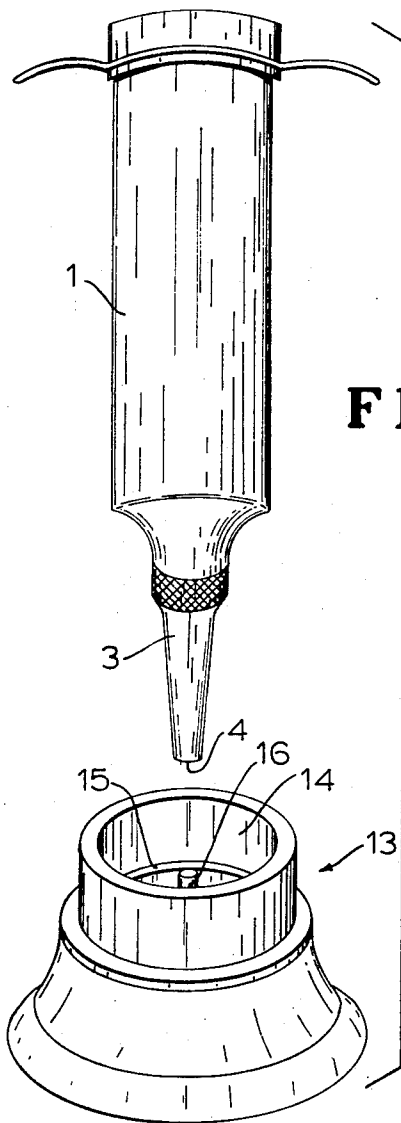


FIG 1

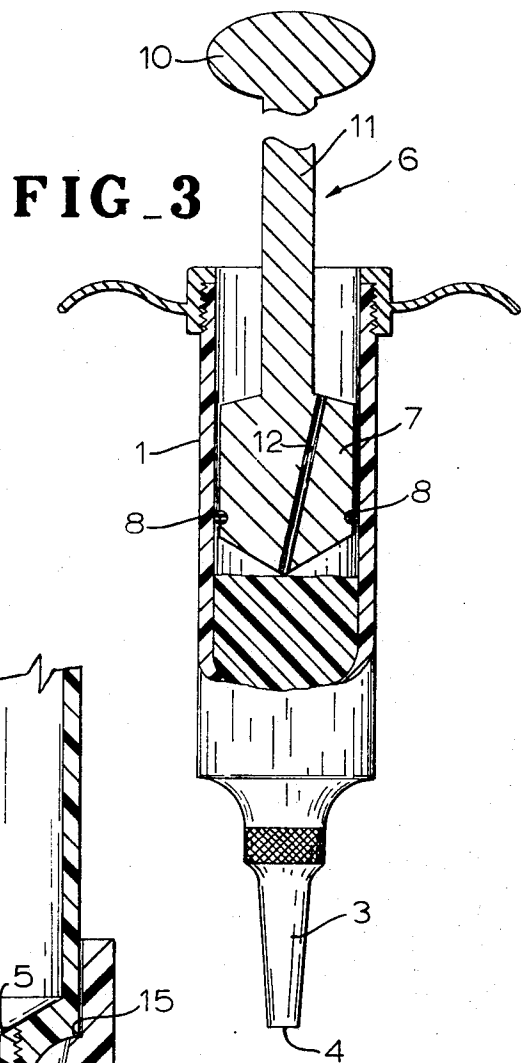


FIG 3

FIG 2

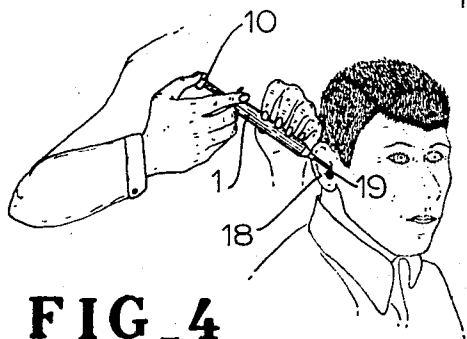


FIG 4

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SYRINGE AND HOLDER

BACKGROUND

This invention relates to a molding apparatus and method which has been adapted particularly to the molding of ear impressions for use in hearing aids, and the like, although the apparatus and method may have other uses.

In the fitting of hearing aids to individual ears, it has been the general practice to take an impression of the ear with an epoxy material, then form a mold or die to the shape of the impression, and thereafter cast or injection mold the final plug in the mold or die, after which the plug is used in connection with a hearing aid.

Heretofore, the impression was made by mixing the dry and liquid epoxy resin ingredients in a cup and then placing it on a sheet of paper, rolling the latter into a conical shape funnel and pouring the mixture out of the small end of the funnel into the open end of a syringe, inserting the plunger into the open end and then employing the syringe to inject the material into the ear of the patient.

The problems involved can be best understood from the following description of the technique published on page 9 of the Jan., 1967 issue of the National Hearing Air Journal:

1. Fold a piece of paper in half, making a sharp crease.
2. Fold the half-sheet on the bias, approximately $\frac{1}{2}$ inch on one edge, and $\frac{3}{4}$ inch on the other edge. Unfold and set it aside until needed as a funnel (See step 7).
3. Place one level scoopful of powder into the mixing cup.
4. Completely fill the vial with liquid.
5. Pour the liquid into the mixing cup.
6. Mix the powder and liquid for 30-45 seconds.
7. Remove half of the mixture from the mixing cup and place it in the center fold of the open paper funnel.
8. Roll the paper into a funnel, using the folds as a guide. Sharply fold the wide end of the funnel to form a crimp, locking the mixture in the funnel. Place the narrow tip of the funnel into the syringe.
9. Starting at the wide end of the funnel, force the mixture into the syringe. Insert the plunger into the barrel.
10. Place the tip of the syringe into the ear canal and depress the plunger with gentle pressure.
11. When the plunger is completely depressed and the canal is overfilled, remove the balance of the mixture from the mixing cup.
12. Place the remaining mixture into the folds of the outer ear. The mixture in the canal will unite with the material in the outer ear to form a complete and adequate impression. Allow the impression to set for 10 minutes before removing.

The time elements involved in the various steps are critical and experience in the past has often resulted in failures which necessitated new trials before an acceptable impression was obtained.

SUMMARY OF THE INVENTION

The present invention greatly simplifies the procedure and substantially eliminates failures and defective impressions.

In carrying out the present invention, the barrel of the syringe after removal of the plunger is positioned vertically with the nozzle end supported on a cup-like base having a long vertical stem which is adapted to enter and fill the long tubular passage in the nozzle, thereby closing the same against leakage of the liquid ingredient of the epoxy resin. The powdered and liquid ingredients of the epoxy resin are then introduced to the syringe through the upper open end of the barrel and mixed therein by a stirring rod for the required time, usually about 35 seconds. The plunger is then inserted into the open end of the barrel to the top of the material therein.

In order to prevent entrapment of air in the syringe as the plunger moves down into the barrel, air is allowed to escape through a small vent, preferably provided as a weep hole through the head of the plunger, but which may be a short

groove extending longitudinally of the barrel in the inside surface thereof at the open end.

The syringe is then removed from the base and applied to the ear of the patient, with the plunger serving to force the epoxy resin material out through the nozzle passage and into the canal of the ear.

After formation of the impression in the ear, and suitable setting of the resin occurs, the impression is merely pulled from the ear.

The syringe is readily cleaned of any remaining epoxy resin lodged in the barrel and nozzle passage by removing the plunger and pulling the resin from the barrel. The resin is generally rubber-like and does not stick to the metal of the syringe. Likewise, any remaining resin lodged in the vent in the plunger can be readily pulled therefrom.

The procedure and apparatus of the invention may be employed in making the final ear plug for the hearing aid by utilizing appropriate resin ingredients, and by eliminating the impression and molding procedures generally employed heretofore.

BRIEF DESCRIPTION OF THE DRAWING

The best mode presently contemplated for carrying out the invention is illustrated in the accompanying drawing in which: FIG. 1 is a perspective view of a syringe and base about to be assembled;

FIG. 2 is a vertical axial section showing the assembly of the syringe and the base;

FIG. 3 is a vertical axial section showing the upper end of the barrel with the plunger inserted to approximately the level of the material in the barrel; and

FIG. 4 is a perspective view showing the syringe applying the resin to an ear in the making of an impression or of a final ear plug.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings, the syringe comprises a cylindrical tubular barrel 1 having a partially closed lower end with the inner surface 2 thereof tapered downwardly in a generally frusto-conical shape to a central threaded opening into which a tubular nozzle 3 is threaded.

The nozzle 3 has a central discharge opening in the form of a straight cylindrical passage 4 extending longitudinally for the full length thereof, with a shallow frusto-conical funnel portion 5 at its upper end registering with the inner surface 2 of the end of the barrel 1, and a tip end for discharge of material therefrom.

The plunger 6 of the syringe has a head 7 adapted to fit closely within the cylindrical barrel 1 from the open upper end thereof, with a replaceable O-ring seal 8 disposed in a groove encircling the lower or inner end of the head.

The plunger 6 has a handle 10 joined to the head 7 by a rod 11 of sufficient length to provide for actuation of the plunger head in barrel 1 for the full length of the barrel.

The end face of the plunger head 7 is conical to match the frusto-conical surface 2 of the lower end of barrel 1 and assist in forcing a heavy or stiff mixture through the nozzle 3.

A small air vent or weep hole 12 extends upwardly longitudinally through the plunger head 7 to relieve air pressure in the barrel 1 as the plunger head is first inserted in the upper end of the barrel and moved downwardly to the level of the mixture therein. Preferably, the air vent 12 extends upwardly from the center of the front conical face of plunger head 7.

A syringe support or base 13 is provided to receive the lower nozzle end of the syringe and hold the syringe vertically upright during the loading of the syringe.

For this purpose, the base 13 has a recess or cavity 14 therein generally complementary to the outside of the nozzle 3 and lower end of the barrel 1, with a circumferential upwardly facing abutment shoulder 15 adapted to support the end of barrel 1.

A stem 16 extends upwardly centrally of the bottom of cavity 14 to enter and substantially fill passage 4 in nozzle 3 when the syringe is lowered onto base 13 and engages shoulder 15.

A soft resilient seal 17 is provided in the bottom of cavity 14 around the base of stem 16 for engagement with the end of nozzle 3 and additionally prevent escape of the materials going to make up the epoxy resin.

In carrying out the method phase of the invention, after the plunger 6 is removed from the barrel 1 and the latter mounted on base 13 with stem 16 closing the nozzle passage 4, the ingredients of the resin are introduced to the barrel 1 and mixed thoroughly therein as required. Then the head 7 of plunger 6 is inserted into the upper end of barrel 1 and pushed down until the conical face of the piston head reaches the level of the mixed material. In this step the air entrapped in barrel 1 escapes through vent 12. Thereafter the syringe is removed from base 13 and employed in the usual manner for making an impression in the ear 18 by directing nozzle 3 to the canal of the ear and pushing on plunger handle 10 to force the material into the ear.

In the making of an ear impression 19 with epoxy resin the material is permitted to set for about 10 minutes after which it may be removed intact from the ear, and employed in an investment molding of the final plug for the hearing aid.

Where the materials employed are capable of molding a final ear plug, the impression becomes unnecessary, but the method of the present invention remains as described above with the exception of the ingredients. In other words, the ingredients may vary depending upon the intended usage and

end product desired.

The accompanying claims particularly point out and distinctly claim the subject matter which the applicant regards as his invention. Various embodiments and procedures may be employed within the scope of the claims.

I claim:

1. In combination with a syringe having a cylindrical barrel member with a nozzle extending axially from one end thereof with a central discharge opening of substantial length and with an open end opposite to the nozzle, of a base for supporting the syringe comprising a block having a cavity in its upper surface adapted to receive the nozzle end of the syringe and having a circumferential upwardly facing shoulder adapted to engage and support the end of the syringe to thereby hold the syringe in an upright position with the nozzle facing downwardly, said block having an upward vertical stem centrally of the recess therein and adapted to enter and fill the nozzle opening for substantially its full length, a plunger member with a piston head adapted to reciprocate in said barrel member in sealed relation to the walls thereof and removable through said open end thereof, and air vent means in one of said members disposed to provide for the escape of entrapped air from said barrel when said plunger is initially inserted through said open end of said barrel.

2. The combination of claim 1, in which said air vent means comprises a weep hole extending longitudinally through the piston head of said plunger.

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