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DENTAL IMPRESSION MATERIAL AND
METHOD FOR FORMING SAME

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This invention relates to dentistry and particularly to dental impression material and to methods for forming and using same.

Dental impressions according to the prior art have been made using one of three general types of impression materials. One material is a gypsum plaster which, after "setting" about the teeth in the patient's mouth, is usually required to be broken into several different parts for removal and subsequent reassembly. This is unsatisfactory and requires considerable skill despite the relatively low cost of the impression material. Another material is a wax product which pulls or draws over undercuts with consequent distortions of the impression. The remaining material, of possibly more frequent use for taking impressions, is a hydro-colloidal mass which must be rendered malleable by preheating, is applied while heated, to the annoyance of the patient, and must be chilled to attain an impression-retaining substantial rigidity. After embracing engagement of the heated mass about the teeth, the matrix must be chilled in the patient's mouth by the application of cold water. This requires special apparatus and occasions discomfort and annoyance to the patient incident to both the heating and chilling. If, owing to the existence of undercut or bulbous teeth the impressed material must be deformed to permit withdrawal from the teeth and mouth, as is practically certain, accuracy of the impression may be more or less impaired. This is sometimes true despite the general resilience of the hydro-colloidal impression materials.

The impression material forming the subject matter of this invention is intended to replace all of the described types of impression materials without loss of any of their advantages while obtaining advantages not previously attaching to any such material.

It is among the objects of this invention; to provide a dental impression material by means of which temporary distortion of the impression may be resorted to so as to permit withdrawal of the teeth from the impression mass, with a subsequent automatic resilient return to the undistorted true impression; to provide an impression-receiving material of economy and efficiency; to provide a dental impression material, the basic ingredient of which is a resin of an acrylic acid but which can be used with an appreciable quantity of inert fillers without sacrifice of efficiency; to provide a dental impression material which with a single impression can be used for a plurality of substantially

5 identical models; to provide a dental impression material requiring a very short period of preparation and application; to provide a dental impression material possessed of what may be termed "elastic memory" by which despite temporary distortions, as for the removal of the impression from the mouth or for the removal of a model from the impression, there will be a return to the initial "set" position after a more or less slight time lag; to provide a dental impression material of an acrylic resin in predetermined arrested probably partially polymerized condition; to provide an impressionable mass formed of ethyl methacrylate and ethyl alcohol in intimate association; to provide a dental impression mass formed of an acrylic resin so treated that the human mouth can tolerate it because of reduction of the causticity normally attaching to methacrylates.

10 In carrying out the invention in the preferred form there is provided a powder which, illustratively, comprises dry powdered ethyl methacrylate. While ethyl methacrylate is preferred other methacrylates may also be used, but the latter may require the use of additional catalysts and be open to criticism because of high causticity. The ethyl methacrylate powder may be mixed with suitable amounts of fillers, such as cotton flock, mica, wood pulp filler or similar materials although this is immaterial to the functioning of the resin. The powdered material may also contain suitable pigmentation materials such as zinc oxide and English vermilion, and the like, to impart a desired colored or shaded effect thereunto.

15 A liquid constituent is provided with is preferably ethyl alcohol. All of the lower and higher alcohols, esters, acetates, and similar solvents will give substantially similar reactions but ethyl alcohol is preferred as no other solvent so far used contributes such a low causticity factor to the mixture, and this is of great and controlling importance in view of the tenderness of the mouth tissues with which the mix comes in contact. The ethyl or other alcohols need not be pure but may contain denaturants such as the law requires in alcohol of low cost because of reduced taxes, as neither the caustic nature of the resin in reaction is increased, nor is any material change in the reaction itself attributable to the presence of the denaturants. Preferably, but not necessarily, flavoring essences of other ingredients are added to the alcohol which may serve either to conceal or to minimize the caustic properties and flavors of the ultimate mix.

Such flavoring or concealing material may comprise peppermint or menthal flavoring or the like, or one of the plasticisers, such as mineral oil or the like. The presence or absence of the flavoring materials or plasticisers, as noted, makes no appreciable difference in the functioning of the ethyl alcohol.

In use, the dry ethyl methacrylate, preferably without fillers, in a purely illustrative proportion of three parts by volume, is stirred into and mixed with one part of alcohol in a container and is spatulated and mixed therein until a viscous consistency having a preliminary form-retaining nature is secured. At this point the generally mushy mixture is placed upon a conventional dentist's impression tray or the like, just as with other impression materials, is placed in the patient's mouth and forced lightly but firmly about his teeth and gums. While in this position, after about three minutes after introduction into the mouth, the mixture acquires a resilient solidity without rigidity, which receives and retains the impression of the teeth and gums with which it is in contact. This is probably due to the incompleteness of the polymerization of the resin and to the peculiar properties of ethyl methacrylate and ethyl alcohol. It is sufficiently resilient as to permit the withdrawal from contact with the teeth and from the mouth with a subsequent return to the impressed position of all of the surfaces of the parts, so as to regain and then to retain the true impression of the teeth and gums despite temporary resilient distortions due to withdrawal from undercut and bulbous teeth.

The action of the alcohol or analogous solvent seems to be primarily to soften the outer surfaces of the grain of the polymer so that adhesion between the grains of the polymer becomes possible. This may possibly involve a partial polymerization of the resin but it is slow, and incomplete, and apparently represents a combined partial polymerization and solvent action that is excellent for the specific purposes of this invention so far as the characteristics of the dental impression material are concerned.

After the impression is formed in the mass it

may be retained for indefinitely long periods if a plasticiser has been used in forming the mix. It can be retained without drying out and hardening by immersion in liquid, or by merely coating with mineral oil or the like. Thus the impressed material may be laid aside temporarily until it is convenient to make a model. This latter procedure is one with which all dentists have long been familiar. After the mold, say of hard plaster, has hardened inside of the impression, made as described, the impression mass is easily peeled off. If this is done carefully a second successive model can also be made from the same impression. The impressed mass is discarded after the mold or models are completed as it takes no further part in any denture, the end result of the taking of the impression. This factor of discarding after a single impression is important as it prevents re-use of the materials and thus protects the patients. The waxes and hydro-colloids are susceptible to re-use which the present invention prevents.

While the preferred proportions of dry powder to the solvent is three to one, this is not essential as different proportions such as one to one, for instance, may also be used to excellent advantage.

The advantages of the invention for the rigorous requirements of dental impression material for contact with tissues of the human mouth are thought to be clear.

I claim as my invention:

1. The method of forming an impressionable mass for taking intra-oral dental impressions which consists in combining ethyl methacrylate resin with ethyl alcohol in the proportions of from one to three parts of dry powdered ethyl methacrylate resin to one part of ethyl alcohol by volume.
2. An impressionable mass for intra-oral dental impressions comprising a mixture of ethyl methacrylate resin and ethyl alcohol in the proportions of from one to three parts of dry powdered ethyl methacrylate resin to one part of ethyl alcohol by volume.

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