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LAURENCE E. HARRISON, OF TUJUNGA, AND STANLEY E. NOYES, OF LOS ANGELES, CALIFORNIA, ASSIGNORS, BY MESNE ASSIGNMENTS, TO STANLEY E. NOYES, OF LOS ANGELES, CALIFORNIA

DENTAL IMPRESSION MATERIAL

No Drawing. Application filed November 10, 1930, Serial No. 494,801. Renewed May 31, 1932.

This invention relates to a composition of material suitable for use by dentists or dental technicians in making impressions of the teeth and gums. More particularly, the invention relates to a wax-like somewhat resilient material which is adapted to become plastic upon heating or warming to a temperature somewhat above atmospheric temperature and to solidify or harden upon again cooling to a lower temperature, and which is in other respects particularly adapted for the making of detailed dental impressions and for the subsequent molding or casting of reproductions of the teeth and gums with plaster or other material.

This application is a continuation in part of the pending application of Stanley E. Noyes, Serial No. 428,827, filed February 15, 1930.

An important object of the invention is to provide a dental impression material which may be removed from the teeth as an integral body, even in cases in which the teeth are disposed at an angle forming undercuts or inverted wedges or dovetails in the impression, such as are sometimes formed by the extraction of a tooth or a number of teeth and the inward crowding of the adjacent teeth. The principal materials now in common use for this purpose are plaster of Paris, certain waxes, and other substances having similar properties. Such materials, however, are open to the objection that, when in their cooled and solidified state, they are substantially rigid and non-yielding, so that it is often found necessary to break the cast or impression in several places in order to remove it from the mouth and in other cases it is found impossible to remove the cast without completely destroying the impression. In the compound of the present invention these disadvantages are overcome by providing the material with a certain amount of elasticity or resiliency, so as to permit it to give or yield when pulled from the teeth, thus permitting the removal of undercut portions of the impression or of inverted wedges, and to cause it to again return or spring back to the original position of the impression after it has been removed, so that a perfect reproduction of the original structure may be obtained.

A further object of the invention is to provide an impression material having yielding or resilient properties as above mentioned, and being at the same time adapted to soften or become plastic upon warming to a sufficiently low temperature so as not to burn or hurt the mouth of the patient when placed therein, and to again solidify in a relatively short time, upon chilling, sufficiently to retain the exact shape of the impression after its removal from the mouth.

It is also necessary that the material, in order to be useful for the above purpose, shall have certain other properties. Such material must have sufficient body, cohesion, and toughness, so that when squeezed into small crevices and thereafter chilled it will retain its shape, thus enabling the dentist to obtain correct detail and measurements of teeth and of their relation to each other. Furthermore, the material must have the proper contraction upon chilling, in order to permit a correct impression to be obtained.

A further object of the invention is to provide a dental impression material having a pleasant taste and odor, so that the use thereof is not disagreeable to the patient.

The material of this invention comprises in general the product obtained by intimately mixing together and heating ingredients of the following general classes:

1. Oil or oleaginous material, consisting preferably in part of mineral oil, such as paraffin oil, and in part of a drying oil, such as boiled linseed oil.

2. Wax or waxy material consisting preferably in part of beeswax and in part of paraffin.

3. A water insoluble metallic soap, such as for example aluminum stearate or other aluminum soap.

According to a preferred embodiment of the invention, the resilience and other desirable properties of the material are further enhanced, by including as another ingredient:

4. Material containing rubber, gutta, or balata, singly or in combination, preferably

in the form of a latex or latices containing one or more of these rather closely related substances.

In addition to the above ingredients the material also preferably includes a certain proportion of starch intimately incorporated therewith during the heating. Other ingredients which it has been found to be advantageous to use, but which may in certain cases be omitted or replaced by other materials, include glycerol, sulphur, shellac, copal, or other resin-like substance of similar properties, and cotton lint or other finely divided fibrous material.

Furthermore, in order to give the material a pleasant taste and odor, it is preferable to incorporate therein a suitable flavoring and scenting material.

The materials above described, when heated and intimately mixed together, for example as hereinafter described, are freely miscible with one another to produce a homogeneous wax-like material having a certain elasticity and which is solid at ordinary temperatures but is adapted to soften to proper consistency for molding upon heating to a temperature which is insufficient to cause injury or discomfort in use thereof. Furthermore, when heated to such temperature the elasticity of the material is greatly increased.

It has been found advantageous to use certain specific ingredients in certain approximate proportions, as hereinafter described, but it will be understood that the invention in its broader aspects is not restricted to these specific ingredients and proportions.

The approximate proportions in which the above ingredients are preferably used in making the composition of our invention are as follows:

1. Oil—2 1/2 to 4 1/2 parts by weight, preferably consisting of substantially equal parts by weight of mineral oil and drying oil.

2. Waxy material—1 1/2 to 2 1/2 parts by weight, preferably consisting of approximately equal parts by weight of beeswax and paraffin.

3. Insoluble metallic soap—2 1/2 to 3 1/2 parts by weight.

When material containing rubber, gutta, or balata, is used as a further ingredient of the composition, it is preferable to use an amount of such material containing between zero and 1/16 part by weight of rubber, gutta or balata. Such material may be added in the pure state, suitably milled so as to render it capable of intermixture with the other ingredients, but the best results are obtained, in general, by adding such material in the form of a suspension or emulsion in water or other suitable liquid, and preferably in the form of latex, that is to say, either a rubber-containing latex, a gutta-containing latex, or a balata-containing latex, or any two of such latices, or all three in combination.

Furthermore, when using the additional ingredients above mentioned it is preferable to employ the same in approximately the following proportions:

	Parts by weight
Starch	1/2 to 1 1/2
Glycerol	0 to 1/8
Sulphur	1/8 to 3/8
Shellac	0 to 1/16
Cotton lint or other finely divided fibrous material	0 to 1/50
Flavoring and scenting material	0 to 1/50

The following is a description of a specific embodiment of this invention using what is considered to be the preferred specific ingredients, the most advantageous approximate proportions thereof, and the preferred method of mxing such ingredients together, in order to provide a material combining to a high degree all of the above mentioned desirable properties. According to this embodiment the following ingredients are first mixed together: 4 gallons (approximately 28 pounds) of paraffin oil, 4 gallons (approximately 28 pounds) of boiled linseed oil, 16 pounds of beeswax, 16 pounds of paraffin having a melting point of 38 to 40°.

These materials are heated together to about 260 to 300° F. and thoroughly mixed. Then add 48 pounds of aluminum stearate and continue the mixing, while heating to maintain a temperature of about 300° F. The mixing of these ingredients is preferably continued for several hours, for example from 1 to 6 hours. Particularly good results have been obtained by heating and mixing these ingredients for about 3 or 4 hours. Then add 1¼ pounds of glycerol and 16 pounds of starch and continue the heating and mixing, still at a temperature of between 260 and 300° F., for a further period of several hours for example from 1 to 6 hours. In this case also an additional mixing period of about 3 or 4 hours may be used to good advantage. In case sulphur is used, about 4½ pounds thereof may be added to the above mixture, either along with the glycerol and starch or at any time during the subsequent mixing period.

The above mixture, in itself, has advantageous properties, and may be used as an impression material without further treatment, but it is preferable to add other ingredients thereto, for example, as follows: To 4 pounds of this base material add about 1 pound of rubber-containing latex (or other latex of the group above named), 8 ounces of dry shellac and ¼ ounce of cotton lint, and mill this mixture thoroughly, for example, in a heated milling apparatus of suitable type such as a Banbury mixer, for a period of about ten minutes. Just before the end of

this milling period add 4 drams of oil of cassia.

It will be understood, of course, that the exact temperatures and times of mixing and milling given above, as well as the specific proportions of ingredients, are not to be construed as limiting the invention thereto, but merely as indicating the general method used in preparing this material.

The completed material is solid at ordinary temperatures, but has a certain yielding or resilient property which enables impressions formed therefrom to be removed from the teeth under conditions such as above mentioned, even after chilling to atmospheric temperature or below. At such temperatures, however, the material is not readily susceptible to permanent deformation at ordinary pressures and is adapted to return to its original position when any force causing resilient deformation thereof is removed. The material has a good property of cohesion at all temperatures at which it is to be used and has a satisfactorily tenacious body or consistency which causes it to hold together while making impressions and after removal thereof from the teeth. The material has a fusing or softening point between 35 and 55° C. (softening temperatures below 48° C. being preferred since they are less apt to cause injury or discomfort to the patient). At these temperatures the material softens and becomes readily plastic and adapted to flow under pressure and fill all recesses, crevices, and small indentations in the teeth and gums when pressed into engagement therewith. A further important property of the material is its ability to chill and solidify quickly throughout after it has been heated to the above temperatures and the impression has been taken. This material in its preferred form has a chilling time, from its fusing or softening temperature to a temperature at which it is adapted to retain its form, of from one to five minutes, upon application of ordinary cold water of about 15 to 30° C. thereto. The material also has a pleasant odor and taste.

The method of using this material is, in general, similar to the impression materials now in common use. The material is preferably softened or rendered plastic by placing a quantity thereof in cold water, and bringing the water to a boil in about four or five minutes. The material may then be removed from the water and is sufficiently soft and plastic throughout to permit it to be placed in the usual tray or mold and inserted in the mouth and pressed against the teeth and gums in the usual manner. At the time the material is actually inserted in the mouth, the temperature thereof may be about 45° C. or say between 40 and 50° C. The compound is pressed firmly into contact with the teeth and gums and is then permitted to cool. The cooling may be facilitated by chilling through application of cold water or cold air to the surface of the impression material, and by this means the material may be cooled sufficiently in about one to five minutes to become sufficiently solid for removal of the impression. The material also exhibits exactly the requisite amount of contraction upon cooling in this manner, so as to bring it in tight engagement with the teeth and gum at all points. When the material is in this condition it is sufficiently rigid to prevent permanent deformation or loss of shape, provided ordinary care is exercised in removing the same from the mouth, but is still quite resilient, so that it will yield sufficiently to permit undercut, wedged, or dovetailed portions thereof to be readily removed and to then spring back to their original position. Upon further cooling and standing for a period of one hour or more, after removal from the mouth, the material acquires a somewhat more solid and permanent set, so that it may be used for the casting or molding of reproductions in plaster or other material. The material is of such nature as to produce very clean cut reproduction and to produce extremely smooth surface casts in plaster or other material. Even in this state, however, the material has a certain amount of resilience and ability to yield, which property may be advantageous for certain purposes. For example, this permits the impression to be more easily removed from the cast or reproduction formed therewith, so that the impression may be preserved for further use. Also, it facilitates removal of the impression from the tray or from the plate of an articulator or other apparatus with which it may be used.

We claim:

1. A dental impression material comprising an intimate mixture of an oleaginous material, a waxy material and a water insoluble metallic soap, said impression material being solid at ordinary temperatures and having a softening temperature between 35 and 55° C., and being resilient.

2. A dental impression material comprising oleaginous material; waxy material; a water insoluble metallic soap; and a substance selected from the group consisting of rubber, gutta and balata; said impression material being solid at ordinary temperatures and having a softening temperature between 35 and 55° C., and being resilient.

3. A dental impression material comprising the production obtained by intimately mixing and heating oleaginous material; waxy material; a water insoluble metallic soap; and latex selected from the group consisting of rubber-containing latex, gutta-containing latex, and balata-containing latex; said impression material being solid at ordinary temperatures and having a softening

temperature between 35 and 55° C., and being resilient.

4. A dental impression material comprising oleaginous material, waxy material, water insoluble metallic soap, and starch, in intimate mixture, said impression material being solid at ordinary temperatures and having a softening temperature between 35 and 55° C., and being resilient.

5. A dental impression material comprising the product obtained by intimately mixing and heating oleaginous material, waxy material, water insoluble metallic soap, starch and glycerol, said impression material being solid at ordinary temperatures and having a softening temperature between 35 and 55° C. and being resilient.

6. A dental impression material comprising the product obtained by intimately mixing and heating oleaginous material, waxy material, water insoluble metallic soap, starch glycerol and sulphur, said impression material being solid at ordinary temperatures and having a softening temperature between 35 and 55° C. and being resilient.

7. A dental impression material comprising oleaginous material; waxy material; water insoluble metallic soap; a material selected from the group consisting of rubber, gutta and balata; and starch, in intimate admixture.

8. A dental impression material comprising oleaginous material; waxy material; water insoluble metallic soap; a material selected from the group consisting of rubber, gutta and balata; starch; and glycerol in intimate admixture.

9. A dental impression material comprising the product obtained by inimately mixing and heating oleaginous material; waxy material; water insoluble metallic soap; latex selected from the group consisting of rubber-containing latex; gutta-containing latex, and balata-containing latex; starch; glycerol; and sulphur.

10. A dental impression material comprising oleaginous material, waxy material, water insoluble metallic soap, starch, glycerol, and shellac, in intimate admixture.

11. A dental impression material comprising oleaginous material, waxy material, water insoluble metallic soap, starch, glycerol, and finely divided fibrous material, in intimate admixture.

12. A dental impression material comprising oleaginous material, waxy material, water insoluble metallic soap, starch, glycerol, a resin-like substance having properties similar to shellac, and finely divided fibrous material in intimate admixture.

13. A dental impression material comprising oleaginous material, waxy material, water insoluble metallic soap, and a flavoring and scenting material, in intimate admixture.

14. A dental impression material comprising oleaginous material; waxy material; water insoluble metallic soap; a material selected from the group consisting of rubber, gutta and balata; starch; glycerol; and shellac in intimate admixture.

15. A dental impression material comprising oleaginous material; waxy material; water insoluble metallic soap; a material selected from the group consisting of rubber, gutta and balata; starch; glycerol; and finely divided fibrous material in intimate admixture.

16. A dental impression material comprising 2 1/2 to 4 1/4 parts by weight of oleaginous material, 1 1/2 to 2 1/2 parts by weight of waxy material, and 2 1/2 to 3 1/2 parts by weight of water insoluble metallic soap.

17. A dental impression material comprising the product obtained by intimately mixing and heating 2 1/2 to 4 1/2 parts by weight of oleaginous material; 1 1/2 to 2 1/2 parts by weight of waxy material; 1 1/2 to 3 1/2 parts by weight of water insoluble metallic soap; and material containing not more than 1/16 part by weight of rubber, gutta or balata.

18. A dental impression material comprising the product contained by intimately mixing and heating 2 1/2 to 4 1/2 parts by weight of oleaginous material; 1 1/2 to 2 1/2 parts by weight of waxy material; 2 1/2 to 3 1/2 parts by weight of water insoluble metallic soap; and latex selected from the group consisting of rubber latex, gutta latex, and balata latex, and containing such rubber, gutta or balata in an amount equal to not more than 1/16 part by weight.

19. A dental impression material comprising a product obtained by intimately mixing and heating 2 1/2 to 4 1/2 parts by weight of oleaginous material consisting in part of mineral oil and in part of drying oil; 1 1/2 to 2 1/2 parts by weight of waxy material consisting in part of beeswax and in part of paraffin; 2 1/2 to 3 1/2 parts by weight of aluminum stearate; not more than 1/16 part by weight of a material selected from the group consisting of rubber, gutta and balata; 1/2 to 1 1/2 parts by weight of starch; and not more than 1/8 part by weight of glycerol.

20. A resilient dental impression material, solid at ordinary temperatures, having a softening temperature between 35° and 55° C. and containing a waxy material and a water insoluble metallic soap intimately incorporated therein.

In testimony whereof we have hereunto subscribed our names.

LAURENCE E. HARRISON.
STANLEY E. NOYES.