UNITED STATES PATENT OFFICE.

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DENTAL COMPOUND FOR PREVENTING PAIN.

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To all whom it may concern:

Be it known that I, HERBERT ENOS DENNETT, of Boston, in the county of Suffolk, State of Massachusetts, have invented a certain new and useful Improvement in Dental Compounds, of which the following is a description sufficiently full, clear, and exact to enable any person skilled in the art or science to which my invention appertains to make and use the same.

My invention relates to that class of dental compounds or preparations which are employed to prevent pain in filling teeth, or during the process of excavating or preparing the cavities to receive the filling; and it consists in a novel combination of ingredients, as hereinafter more fully set forth and claimed, by which a more effective article of this character is produced than is now in ordinary use.

As the structure or anatomy of the teeth is well understood by all practical dentists, a brief description of the same is all that is deemed necessary in order to show the nature of my improvement.

A tooth consists of three principal parts—viz., the enamel or outer coating, the dentine or body, and the pulp or center. Connected with the pulp and extending throughout the body are a series of minute and extremely sensitive nerves, which, when exposed to the air or brought into contact with foreign substances, cause more or less pain. Hence when decay takes place, and it becomes necessary to fill the cavity produced thereby, the pain caused by the instruments being brought into contact with the exposed nerves in excavating the cavity is sometimes very intense, and freqently interferes materially with the work of the dentist. To obviate this has long been the study of the profession, use having been made of a great variety of articles designed to produce deadening or anodyne effects on the nerves of the tooth, such as oil of cloves, creosote, camphor, spirits of nitric ether, borax, carbolic acid, laudanum, chloroform, alum, myrrh, tinctures of iron, chloral, morphia, carbonate of potassa, sulphate of zinc, chlorate of potassa, &c., and also compounds embodying more or less of these ingredients. Caustic preparations of arsenic, burnt alum, zinc, potash, acid, &c., have also been employed to kill or destroy the nerves; but, aside from the poisonous nature of some of the last-named articles and the great danger incurred in their use, it is now considered by nearly all scientific dentists very objectionable to destroy the nerves of the tooth when possible to avoid it.

In view of the foregoing I have for many years experimented constantly to discover a substance or compound that would produce, when directly applied, such an effect as to enable cavities to be properly excavated and filled without causing pain or killing or destroying the nerves of the teeth. These experiments have disclosed the following facts having direct relation to my present invention, viz: The body or dentine of the tooth is formed or built up of superposed layers composed of infinitesimal tubes, between which layers and in immediate contact with the nerves there are a series of exceedingly small flattened tubes or ducts filled with serum, or a thin watery fluid, and extending through from the enamel to the pulp. These ducts, while in their normal state, act as liquid telegraphs, so to speak, to convey along the line of the nerves the impulse or vibrations produced by the dental instruments used in excavating or preparing the cavity and filling the same, thus greatly increasing the sensitivity of the nerves, and rendering the operation much more painful.

By simply desiccating or drying the exposed surfaces in the cavity the pain may be lessened. It may also be reduced by means of powerful astringents and caustics; also, by the direct application of substances possessing obtundent properties, and by the use of anæsthetics or anodynes. As a desiccant, hot air has been employed with some success, being forced or injected into the cavity by means of a proper pump or instrument designed for that purpose; but as hot air can be brought into contact with the surface only, the relief afforded is not always certain and always but partial. For the same reason several of the substances hereinbefore enumerated may be properly termed "surface-desiccants," such, for instance, as burnt alum, carbonate of potassa, &c., their action being mainly superfi-

cial, as they possess very slight, if any, capillary or penetrative properties, their astringent or caustic action tending to greatly limit their absorbent action when used as indicated—an objection which applies with equal force to various other metallic and vegetable substances possessing absorbent, or absorbent and astringent, properties which have been tried for the same purpose.

I have found, therefore, that in excavating and filling teeth an article designed to produce insensibility to pain by direct application to the cavity should, in order to accomplish the desired results, possess qualifications which do not pertain exclusively to any of the substances named, or to analogous substances or their compounds. I have also found that at least three elements, acting wholly or in a measure independently of each other, and producing somewhat different results, are essential in a compound or preparation of this character, and also that a fourth may sometimes be employed to advantage as auxiliary to the others, to wit: first, a desiccant; secondly, an obtundent; thirdly, an astringent; and, fourthly, an anodyne. These elements should also have certain peculiarities of their own, viz: The desiccant should possess few or no astringent properties, and should not act as a caustic or escharotic. It should also be of such a nature as to readily penetrate the tubes or ducts of the dentine and absorb the fluids contained therein. The obtundent should be strictly what its name indicates, deadening sensibility by coating and sheathing the exposed nerves, producing at the same time a soothing demulcent effect. The astringent should be purely of an astringent nature without caustic properties, and the anodyne one that will have a prolonged action, or not be readily evaporated or dissipated in use. It is also equally important that none of these elements should, either by themselves or when combined, operate to injuriously affect the teeth or health.

My improved compound is believed to possess in a marked degree all of the essential features mentioned, and is prepared as follows: Take of glycerine one fluid ounce; tannic acid, two drams; chloral, four grains. Mix thoroughly by rubbing up all of the ingredients in a mortar or other suitable vessel, after which they must be strained or filtered until clear. The glycerine should be of the very best quality, free from water, lime, butyric acid, chlorine, chloride of calcium, lead, sulphuric acid, sugar, and all other adulterations or impurities. The tannic acid should also be pure and of full strength, the white being best, as it usually contains less gallic acid than the yellow.

The proportions given in the above formula may be varied, as desired, without departing from the spirit of my invention, although I prefer in all cases to use a saturated solution of tannin and glycerine, the relative proportions of the last-named ingredients in such a solution being substantially as stated, or about four parts of glycerine to one of tannin. The amount of ordinary chloral required for one and one-fourth ounce of the compound is one grain; but I sometimes omit the anodyne entirely, and at others increase this quantity to five grains or more, or use butyl chloral instead where a stronger anodyne is indicated. Acetate of morphia and some other anodynes may be substituted for the chloral, or used in varying proportions therewith, but simple chloral is deemed preferable. I also sometimes employ camphor in place of chloral, as well as in combination with the same and the other ingredients, the camphor and chloral being used in nearly equal quantities. The tannic acid may also be substituted by sulphate of zinc, sulphate of cadmium, and various other astringents; but the tannin is far superior in every respect to any similar article with which I am familiar, being very powerful and entirely harmless.

As glycerine possesses remarkable capillary or penetrative powers and has an intense affinity for water, its peculiar value as a desiccant in this connection will be readily appreciated. It rapidly penetrates the dentine, absorbing the contents of the tubes or ducts, and also all moisture from the cavity, at the same time serving as a perfect obtundent by sheathing or coating the exposed nerves, thus combining in itself two very essential features or elements of my invention—to wit, an obtundent and a desiccant. The glycerine also acts as a vehicle by means of which the astringent and anodyne are brought more speedily and effectually into contact with the sensitive portions of the tooth than is possible by any other agent with which I am familiar.

Other oils or oily compounds may be used in place of the glycerine, but are far less effectual in nearly every respect. For instance, the hydrocarbon oils, both light and heavy, either alone or in combination with oils of a different nature, while possessing some of the characteristics of glycerine, produce very unsatisfactory results, so far as my observation and experience have extended.

The method of using my improved compound will readily suggest itself to any dentist without explicit instructions in that respect. It may be conveyed to the cavity as often as required before and during the operation of excavating by means of a small piece of punk or cotton saturated in the solution and held in any proper implement, or it may be applied in any other manner most convenient, using about one drop at each application. When prepared in accordance with the formula the compound is too strong for use in making the first applications to the tooth, and should be diluted with distilled water until reduced to the proper strength to be borne by the patient, the undiluted compound being used for the later and final applications.

It will be obvious that the compound may be employed to prevent pain not only in preparing the cavities and filling the same, but in numerous other operations on the teeth; also, that on account of its transparency it will not interfere with a free inspection of the work being done—a very essential feature in an article of this character.

Having thus explained my invention, what I claim is—

In a dental compound for preventing pain in excavating and preparing teeth for filling, the combination of glycerine, tannic acid, and chloral, substantially as set forth and specified.

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Witnesses:
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