

UNITED STATES PATENT OFFICE.

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COMPOSITION FOR DENTAL MOLDS.

No Drawing.

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This invention relates to compositions for refractory molds for casting gold inlays and the like, which generally include plaster of Paris as a binder and subdivided silica as a more or less inert filling and heat resisting material. Previous compositions for this purpose had the great disadvantage that when the mold made therefrom was heated it underwent a certain degree of softening or weakening, as a result of which distortion took place which had the effect of producing an undesirable casting.

Investments comprising mainly plaster of Paris and silica, both in powdered form and mixed with water have been used in the making of dental and like castings, but the castings made therein have not been true replicas of the wax patterns used for obtaining the desired mold cavity. This could be controlled somewhat by a proper proportioning of the investment ingredients, but the castings obtained were invariably inaccurate in dimension and frequently so faulty that they could not be used. This was due primarily to the contraction of the gold upon freezing in the mold and to the contraction of the mold which takes place when the old type of investments were heated to casting temperature, and especially when the molds are permitted to cool before making the casting, and also to the softening effect of such temperatures which made the molds very fragile becoming abraded and distorted by the pressure of the gold when forced into the molds especially if the molds are permitted to cool before making the casting. The contraction of the molds upon heating may seem surprising as most substances expand upon the application of heat, but in the case of the usual dental investment after the initial heating which causes a slight expansion, contraction begins upon further heating to such temperatures as may be required in order to successfully make a casting of gold or its alloys.

My invention eliminates the combined effect of these fault producing conditions, resulting in an investment which has a continuously increasing expansion as the heat is raised up to the highest necessary casting temperature and a considerable expansion or enlargement of the mold cavity is produced, thereby compensating for the usual contraction of gold or its alloys, even if the mold is permitted to cool before casting. Further-

more no strength is lost upon heating the mold to any temperature suitable for casting gold or its alloys, and no material loss in strength is encountered if the mold is permitted to cool. My invention results in an investment the strength of which is so greatly increased that the distortion of the mold usually produced by casting into a weakened investment is eliminated. Furthermore the investment has such an increased porosity as compared with the usual investments that it permits of the easy displacement of the air in the pattern chamber without using vents, resulting in castings of better definition, greater density, and excellent surface smoothness in addition to dimensional accuracy made possible by the expansion of the mold to compensate for the contraction of gold and its alloys.

An object of my invention is the production of a refractory dental mold consisting essentially of plaster of Paris, or other cementitious materials of this type, of silica and of boric acid such as may be purchased on the market in varying amounts. The usual cementitious substantially dry mixture is made as heretofore and may include the plaster of Paris or similar cement, ground silica, inert coloring matter and a retarder or accelerator. The boric acid in suitable amount may be added and mixed in with this dry mixture which is then later to be moistened with water in the ordinary way, or the boric acid may be added to the mixture by first dissolving it in the water which is later to be added, or by a combination of both methods, as may be desired; the essential feature of my invention being the addition of boric acid or the equivalent thereof in suitable amount to the known cementitious mixture as used for dental mold purposes and the like, such for example as for supporting parts to be united by soldering and similar thermal operations.

I have found that good results are obtained by an addition of boric acid in the amount of 2% of the total weight of dry materials used; and I have also found that good results have been obtained with 5% or amounts in between these two, and I have furthermore found that good results are obtained with as little as $\frac{1}{2}$ % or considerably more than 5%, and for some purposes considerably higher percentages are distinctly advantageous, in some instances using as

high at 20% or more, any excess oozing or crystallizing out.

It is impossible to state any particular percentage of boric acid to be added as the most preferred in view of the fact that it is within the scope of my invention to add boric acid to compositions which vary not only in proportions of the ingredients used but also in the ingredients themselves, for example, various coloring matters or various retarders or accelerators being used which may have a different effect on the mold or support and the like, it being understood that as a rule where a retarder is used an accelerator is not used, although it has happened that it may be desirable to neutralize the effect to some extent of one or the other by a retarder or accelerator which may already be present in the mass, it of course being understood that the boric acid itself may have some slight retarding action on the setting of the cement. Various types of silica of varying physical characteristics may be used, the binder of the mass may be varied, and the results also may be varied for some purposes.

The addition of the boric acid overcomes the usual defects and by choosing the proper proportion of boric acid used with respect to the particular cementitious mass, the distortion and other inaccuracies of the casting which usually occur may be materially reduced or entirely eliminated, thus resulting in an important improvement in the production of dental castings, soldering operations, and the like, and in similar other industrial arts.

It must also be noted that the addition of boric acid to the type of refractory compound specified, in any suitable proportion, materially increases the porosity of the mold thus producing sounder and denser castings which in itself is a distinct and decided advantage.

In my co-pending application filed October 17, 1928, Serial No. 313,186, which is a division of this application, I claim my new composition specifically wherein the boric acid is wholly or partially dissolved in the water which is added to the dry mix to make it plastic.

Having described my invention, what I claim is:

1. A composition for molds for making

dental and like castings comprising plaster of Paris and boric acid.

2. A composition for molds for making dental and like castings comprising plaster of Paris, silica, and boric acid.

3. A composition for molds for making dental and like castings comprising plaster of Paris and boric acid, in dry powdered form.

4. A composition for molds for making dental and like castings comprising plaster of Paris, silica, and boric acid in dry powdered form.

5. A composition for molds for making dental and like castings comprising plaster of Paris and boric acid, the amount of the boric acid being about $\frac{1}{2}\%$ to 20% of the total solids present.

6. A composition for molds for making dental and like castings comprising plaster of Paris, silica, and boric acid, the amount of the boric acid being about $\frac{1}{2}\%$ to 20% of the total solids present.

7. A composition for molds for making dental and like castings comprising plaster of Paris and boric acid, the amount of the boric acid being about 2% to 5% of the total solids present.

8. A composition for molds for making dental and like castings comprising plaster of Paris, silica, and boric acid, the amount of the boric acid being about 2% to 5% of the total solids present.

9. A composition for molds for making dental and like castings comprising plaster of Paris and boric acid, in dry powdered form, the boric acid amounting to about $\frac{1}{2}\%$ to 20% of the entire mass.

10. A composition for molds for making dental and like castings comprising plaster of Paris, silica, and boric acid, in dry powdered form, the boric acid amounting to about $\frac{1}{2}\%$ to 20% of the entire mass.

11. A composition for molds for making dental and like castings comprising plaster of Paris and boric acid, in dry powdered form, the boric acid amounting to about 2% to 5% of the entire mass.

12. A composition for molds for making dental and like castings comprising plaster of Paris, silica, and boric acid, in dry powdered form, the boric acid amounting to about 2% to 5% of the entire mass.

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