

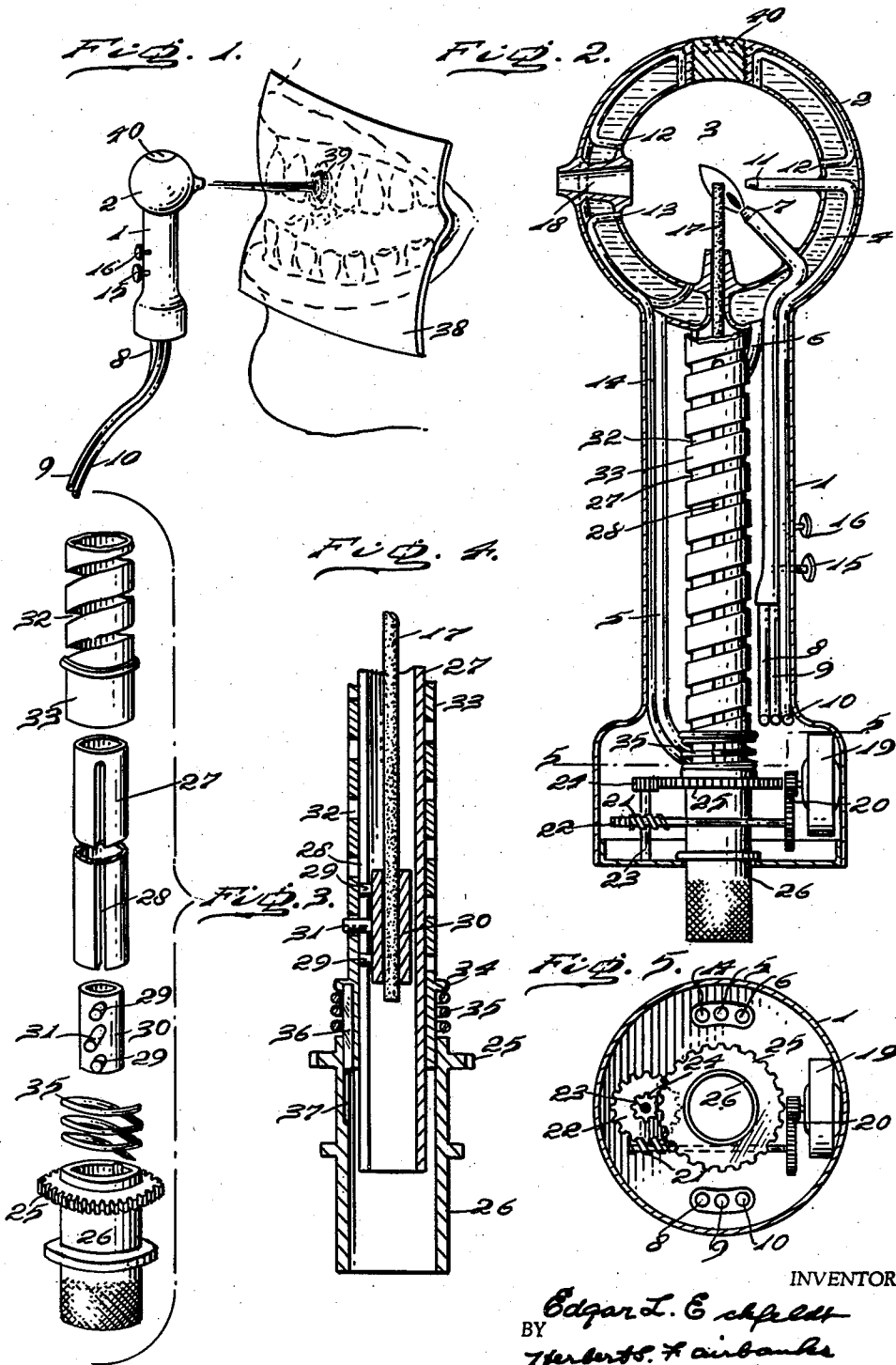
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METHOD OF AND APPARATUS FOR TREATING TEETH

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METHOD OF AND APPARATUS FOR
TREATING TEETH

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9 Claims. (Cl. 32-15)

Natural tooth enamel is the hardest substance present in the human body and its function is to protect the teeth.

Dental trouble, in the majority of cases, commences when, for some reason, the continuity of the enamel is disturbed.

In so far as I am aware, no method has heretofore been devised for restoring the original value of a tooth in which the natural enamel has been broken through. Dental fillings help to restore the tooth but do not make a continuous surface with the surface of the tooth and a boundary is present where further decay tends to commence. The fillings as now employed have little, if any, adhesive action, and the cavity must be undercut to retain the filling in place.

The fillings in time must be replaced, necessitating further grinding and weakening of the tooth, and in some cases disease of the pulp.

A further disadvantage in present methods is that a filling formed of amalgam is often unsightly and it has a tendency to discolor the tooth or give to it a darker appearance.

With the foregoing in view, my invention comprehends a novel method of and apparatus for restoring imperfect teeth to their normal and esthetic functions.

It further comprehends a novel method of and apparatus for applying to a tooth by a spraying action, an enamel coating which will be as hard or harder than the natural tooth enamel. The enamel coating adheres firmly to the tooth, resists the action of bacteria and corrosive fluids in the mouth, and has substantially the same color and appearance as the natural enamel.

The enamel may be applied in thin coatings or built up in layers to any desired thickness and becomes continuous with the natural enamel of the tooth, thus restoring the tooth substantially to its normal condition.

Novel steps of the method and other novel features of construction and advantage will hereinafter appear in the detailed description and the appended claims.

For the purpose of illustrating the invention, I have shown in the accompanying drawing a typical embodiment of it, which, in practice, will give satisfactory and reliable results. It is, however, to be understood that the various instrumentalities of which my invention consists can be variously arranged and organized and my invention is not limited to the exact arrangement and organization of these instrumentalities as herein set forth.

Figure 1 is a perspective view of an apparatus

for fusing and spraying synthetic enamel, metal or the like on natural teeth, and illustrating a manner of practicing my novel method.

Figure 2 is a sectional elevation of the spraying mechanism.

Figure 3 is an exploded view of means for adjusting a synthetic enamel rod.

Figure 4 is a sectional elevation, on an enlarged scale, of a portion of the rod feeding and adjusting mechanism.

Figure 5 is a sectional view, the section being taken substantially on line 5-5 of Figure 2.

Similar numerals indicate corresponding parts. Referring to the drawing:

The natural enamel of the tooth is approximately ninety per cent calcium phosphate with a smaller percentages of calcium carbonate, magnesium phosphate, calcium fluoride and organic matter. Calcium phosphate melts at about 1600° C. and solidifies to form a glass like solid. In accordance with this invention, a salt such as calcium phosphate, or a mixture of salts which will form an enamel, or any suitable type of synthetic enamel, is fused and deposited on the tooth as a molten spray. A wide variety of synthetic enamels may be used and in some cases metals, for example gold, silver and the like.

The hardness, resistance to corrosion and other desired properties of the synthetic enamel can be controlled by varying the composition in accordance with the physical, chemical, and hygienic properties desired.

The color or tint of the synthetic enamel can be varied to match the natural enamel.

The physical form of the synthetic enamel before spraying depends on the design of sprayer employed.

Since it is necessary to heat the enamel to a high temperature to render it molten, radiation of heat from the molten material will be considerable, and one of the features of this invention is the control and disposal of heat from radiation.

Excessive heat must be removed in order to make possible oral manipulation and this can be successfully done by water or air cooling.

The enamel must be heated above its fusion temperature, and this can be accomplished in different ways, for example by gas torch, electrical resistance heating, electric arc or by an electrical high frequency method.

For the purpose of illustration, a gas torch method has been illustrated and will now be described.

The spraying device shown has a casing 1, ter-

minating in a head 2 having an atomizing chamber 3, surrounded by a chamber 4 to receive a cooling medium—for example, water,—which passes from a source of supply through the inlet passage 5 and is discharged through the passage 6. A torch 7 in the atomizing chamber 3, is supplied with fuel by a passage 8 and with oxygen by a passage 9. Air under pressure is supplied by a passage 10, to a nozzle 11 in the atomizing chamber. The head is provided with passages 12 and 13 opening into the atomizing chamber for condensate water which is withdrawn through a suction discharge passage 14.

The supply of fuel and oxygen is controlled by a valve 15, and the supply of air by a valve 16, said valves being of any desired or conventional construction.

A rod of synthetic enamel 17 is fed, in any desired manner, into the flame of the torch where fusion of the enamel takes place locally and the atomized enamel passes from the atomizing chamber through the coned discharge opening 18. The rod 17 of synthetic enamel may be fed by a clock work, an air turbine, an electric motor or other device. I have illustrated the drive as an electric motor 19 which through a reducing gear arrangement 20 drives a worm 21 which drives a gear 22 on a shaft 23 having a pinion 24 which drives a gear 25 on a cylinder 26 which revolves but is prevented from longitudinal movement by the manner in which it is mounted in the casing 1. An inner cylinder 27 is fixed to the casing and has a longitudinal slot 28 into which pins 29, fixed to a rod carrier 30, extend.

The rod carrier 30 is in the form of a sleeve having a pin 31 which extends into a spiral slot 32 in a rotatable cylinder 33 having a shoulder 34 at its lower end, between which and the cylinder 26, a spring 35 is interposed. The cylinder 34 has a fixed spline 36 which extends into a longitudinal groove 37 in the cylinder 26 so that the cylinder 26 may be pushed upwardly sufficiently to disengage the gear 25 from its driving pinion 24 when a quick adjustment of the rod 17 relatively to the torch 7 is desired.

The rod may have a friction fit in its carrier or secured therein in any desired or conventional manner.

The discharge opening 18 and the atomizing chamber are water cooled so that excess heat will be absorbed, thus making it practicable to work, if necessary, inside the patient's mouth. The condensate due to combustion is withdrawn through discharge passage 14 which is connected with a conventional suction creating device not shown.

A fire resisting shield 38 is preferably used on a tooth 39 to be treated so as to expose to the sprayer only the area to be coated. This shield serves to catch excess spray, to deflect any residual heat and air from the interior of the mouth, and to protect the patient from any contingency arising in conjunction with the use of the device.

The method of operation will now be clear to those skilled in this art and is as follows:

The cavity or surface to be treated is cleaned to remove any decayed region, and the surface may be roughened if desired. A suitable substance may be applied to the cavity or surface to increase adhesion and to prepare the tooth for the coating of synthetic enamel. The area to be coated is carefully dried, the shield placed in position and conventional means employed for removing saliva.

In cases where it is necessary to work close to the gums, or the tooth is sensitive, local anesthesia

may be used to deaden the area to pain, and if a patient is excessively nervous general anesthesia may be administered. The synthetic enamel is sprayed on the area and adheres very strongly to the tooth, blending with the natural enamel surrounding the area treated. The synthetic enamel is built up to the proper depth, and, in case of a cavity, a plug of proper composition may be inserted to partially fill the cavity to reduce the volume of spray necessary to complete the tooth, or the entire cavity may be filled with enamel, thereby materially strengthening the tooth.

After the synthetic coating has been applied, its surface in many cases will be satisfactory without further treatment, but the contour can be adjusted by grinding and polishing.

In some cases, the natural enamel of the teeth is faulty, and not only gives an unsightly appearance but also endangers the teeth. This condition can be readily corrected by my method by applying a smooth synthetic enamel coating to the teeth. Molars having deep fissures in which decay commences can be coated so that there will be no crevices for bacteria.

My method also provides for restoring broken or worn-down teeth. A tooth which has been broken off may be built up to its original shape with synthetic enamel, and the contour adjusted by grinding.

Teeth that have worn down have the soft dentine exposed and a coating of synthetic enamel gives such a tooth a hard grinding surface and restores the contour of the original tooth.

If the teeth have an unattractive color, the color can be changed by spraying on synthetic enamel, and this method can be used where the color of one or more teeth do not match the other teeth.

Substances may be added to the enamel to act as a medicant, and special agents added to correct mouth infection.

If desired, a controllable manhole 40 can be provided in the head 2, to facilitate removal of the rod 17.

Any desired form of spray tip may be inserted in the discharge opening to direct the spray at a desired angle.

The fuel and oxygen pipes may be controlled at their sources of supply to provide the desired fuel mixture or each pipe may have its own independent valve, as will be clear without illustration to those skilled in this art.

The synthetic enamel may be flush with and blend with the natural enamel of the supporting tooth.

It will be apparent that the application of synthetic enamel, having the characteristics of the natural enamel, to a tooth in the mouth of patient is radically different from the methods heretofore employed.

The synthetic enamel is in a molten condition and not in the form of a dough-like mass or plastic. The enamel in a molten condition is atomized to the part of the tooth to be treated, and a very thin surface can be applied or it can be built up to any desired thickness.

Since the synthetic enamel has the same characteristics as that of the natural enamel, it will blend with the natural enamel without showing a dividing line.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. The method of restoring the enamel of natural, imperfect teeth, in the mouth of a patient,

which consists in fusing in a confined space a synthetic enamel having substantially the characteristics of the natural enamel of the tooth, and atomizing within said confined space the fused synthetic enamel and passing the fused enamel in an atomized condition from said space to impinge against the surface of the tooth which is to be restored.

2. The method of treating natural teeth, which consists in cleaning out and drying a cavity in the tooth, fusing in a confined space a synthetic enamel, and atomizing within said confined space the fused synthetic enamel and passing the fused enamel in an atomized condition from said confined space into the cavity to fill the cavity and form a flush surface with the natural enamel of the tooth.

3. The method of treating natural teeth, which consists in cleaning out and drying a cavity to be filled, fixing a plug in the cavity to partially fill it, and then covering the plug by fusing and atomizing in a confined space synthetic enamel and passing the fused enamel in an atomized condition from said confined space over the plug to form a surface of synthetic enamel flush with the natural enamel of the tooth.

4. The method of treating natural teeth, which consists in cleaning out a cavity in a tooth, and fusing and atomizing synthetic enamel into the cavity, and shielding the mouth of the patient from the heat of the spray and confining the spray to the cavity.

5. The method of restoring an imperfect, natural tooth to its original condition, which consists in building up the tooth to substantially its orig-

inal contour by fusing and atomizing in a confined space synthetic enamel and impinging the fused enamel by the action of atomization on the tooth.

5 6. The method of treating natural teeth, which consists in fusing synthetic enamel in a chamber, cooling the chamber, and atomizing within the chamber the fused enamel to cause it to pass by the action of atomization from the chamber
10 upon the tooth to be treated.

7. The method of treating natural teeth, which consists in fusing synthetic enamel in an atomizing chamber, atomizing within the chamber the fused enamel and passing the spray from
15 the chamber, and cooling the walls of the chamber and the atomized spray during its passage from said chamber.

8. The method of treating teeth in the mouth of a patient, which consists in fusing a suitable material for treatment of a tooth, atomizing the fused material upon the tooth to be treated
20 and shielding the mouth of the patient and portions surrounding the tooth being treated from the heat of the atomized material.

25 9. The method of treating natural teeth, which comprises fusing synthetic enamel in a chamber, atomizing within the chamber the fused enamel, passing the atomized enamel from the chamber, cooling the walls of the chamber and the atomized spray during its passage from the chamber,
30 directing the atomized enamel upon the tooth to be treated, and shielding the mouth of the patient and portions surrounding the tooth being treated from the heat of the process.

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