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PATENTED APR 18 1871

Fig. 1.

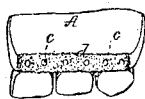


Fig. 2.

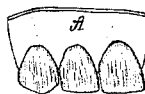


Fig. 3.



Fig. 4.

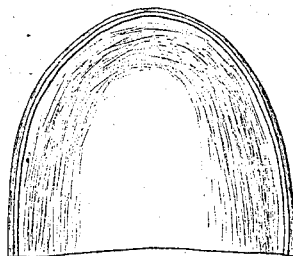


Fig. 5.



Fig. 6.

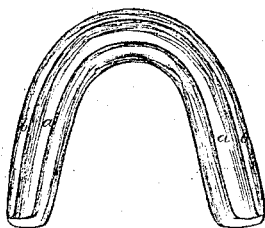


Fig. 7.

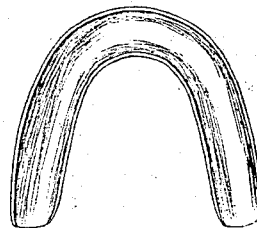


Fig. 8.

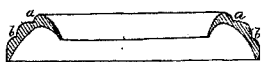
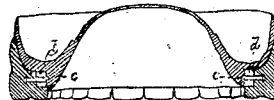


Fig. 9.



Witnesses

S. N. Peper  
J. R. Snow

Josephus Brockway

by his attorney

R. W. Brady

# UNITED STATES PATENT OFFICE.

JOSEPHUS BROCKWAY, OF ALBANY, NEW YORK, ASSIGNOR TO HIMSELF  
AND URIAL K. MAYO, OF BOSTON, MASSACHUSETTS.

## IMPROVEMENT IN THE MANUFACTURE OF DENTAL PLATES FROM PYROXYLINE.

Specification forming part of Letters Patent No. 113,736, dated April 18, 1871.

*To all persons to whom these presents may come:*

Be it known that I, JOSEPHUS BROCKWAY, of the city and county of Albany and State of New York, have invented a new and useful Improvement in Dentistry, or in the Preparation of Artificial Teeth, and in the Manufacture of Mouth-Plates or Supports therefor of Pyroxyline; and I do hereby declare the same to be fully described in the following specification and represented in the accompanying drawing, of which—

Figure 1 is a rear view, Fig. 2 a front elevation, and Fig. 3 a transverse section, of a tooth-block prepared for use in accordance with my invention. Fig. 4 is a top view, and Fig. 5 a back view, of an upper-jaw mouth-plate, as made and prepared in accordance with my invention, for the reception of artificial teeth. Fig. 6 is a top view, Fig. 7 a bottom view, and Fig. 8 is a transverse section, of a lower-jaw bar or mouth-plate as so made. Fig. 9 is a transverse section of the teeth and mouth-plate for an upper jaw, as combined, as hereinafter set forth.

With my invention I am enabled to effect a great change in the art of dentistry, whereby, with comparatively little labor and expense, I can make, in a very short period of time, a whole set or a part of a set of artificial teeth, of perfect fit and of great durability, as well as not liable to the inconveniences and objections of those made with metallic or vulcanite bases, the substance used by me in the manufacture being what is termed pyroxyline or soluble gum-cotton.

I need not expatiate on the great cost of, and the difficulty of making, artificial-teeth base-plates, as usually constructed of gold, silver, or other metal, or of the disadvantages of base-plates when composed of vulcanite, which usually contain mineral matters very detrimental to the wearers, the vulcanite plates being brittle and often liable to derangement, as such are well known to dentists and others, and it has long been a desideratum to find some good and proper substitute for such base-plates. I have succeeded in discovering a mode by which soluble cotton may be adopted as such substitute. So long ago as 1859 a patent, I believe, was secured in England for its use for dental plates. The shrinkage of

this material in drying is very great, it generally occupying but one-thirtieth of the space in a solid state to which it does as a liquid or in the state of collodion. This property of the prepared cotton prevented it from being successfully used. In this country attempts to so utilize it have been made by mixing it with mineral or other matters, but the mixture was rendered too brittle, and was objectionable in other respects. The hard collodion has been obtained and subsequently broken up, redissolved, and afterward pressed into a mold containing the tooth or teeth. As the material hardened it would shrink so much as to require great force to keep it in connection with the teeth, they often being broken by it. Besides, though dry or hard on the exterior, the interior of the plate often remained for months in a soft state, being subjected to constant shrinkage, all of which was fatal to it for the intended purpose.

As instances of attempts to use pyroxyline for dental and other purposes, reference may be had to the British patent No. 536, of 1868, to Newton; the American or United States patents Nos. 88,288, 89,253, and 89,254 of Streeter; and 77,304, 90,765, 90,766, and 96,132 of McClelland.

In carrying out my invention I do not press the material in a mold upon or against the tooth or teeth placed therein in order to fix it or them to it and give shape to the material, but I condense the material in a mold and indurate the molded mass so as to reduce it to a shape closely approximating to such as may be desirable—as, for instance, I make it for an upper-jaw plate of the form as shown in Figs. 4 and 5, or for a lower-jaw plate as shown in Figs. 6, 7, and 8. In case of the blank for the upper-jaw plate, I make it to cover such part of the jaw, or of such and the roof of the mouth, as may be desirable. The blank for the lower-jaw plate is to be of the form required, and to have grooves *a b* disposed in its exterior, in manner as shown, such being to serve as supports to the teeth and their backing.

To fully dissolve the gum cotton so that it would flow into a form or mold would not only render it brittle when in a dried state, but more or less filled with bubbles. To cut or dissolve the cotton with either alone, or with

too little alcohol, renders it too sticky or tacky for removal from a mold. Hence, in order that the fiber may retain its full strength, it should be cut with alcohol and ether, taking care to employ as nearly as possible the largest amount of alcohol and the least of ether that can well be used to effect the desirable plastic condition of the solution. After the plastic material may have been produced it is to be put into a cylinder or vessel provided with one or more sieves, and having a piston arranged so that, by pressure on it to force it into the cylinder, the plastic material may be expelled through the said sieve or sieves, and to be strained thereby. Next, the piston should be subjected to heavy pressure—say, about ten tons,—(a screw generally being employed,) so as to drive the plastic material through the strainer or strainers, and thence through a conduit or cock into a mold made of the necessary form and size. This mold I usually form with or of a series of elliptical or oval cavities arranged with their longer axes parallel, and provided with passages, so as to conduct the material from one matrix into the other, the whole being that the material, after being molded and removed from the mold, may have the appearance of flat elliptical or oval cakes, each, after being divided transversely, serving for the making of two dental plates.

The material so compressed and formed will be about eight times the bulk which it is to have when finally reduced to an indurated state. It is next to be removed from the mold, when it will be found to have the consistence of an ordinary buckwheat-cake. The next part of the process is the seasoning for "boarding," of the material so molded. To accomplish this the cakes or masses may be exposed, for about twelve hours, on a bench or board, to the atmosphere, occasionally turning them over. I prefer to do this before subjecting them to the boarding of them or next part of the process, although it is not essential to my invention so to do. The object of thus exposing the masses to the atmosphere is to dry their outer surfaces, so as to prevent adhesion of them to the boards used in the boarding of them; also to allow them to generally contract a little.

The masses or molded portions of the material are next to be laid between flat boards, a stack or pile of the boards and masses alternately arranged together being made, weights being placed on the upper or cap board, so as to press the boards and masses together. The object of thus boarding the masses is to keep them in their flat state, or prevent them from warping, while they may be contracting. They are to be suffered to remain between the boards about two days, or until they may have become sufficiently hardened to be capable of being pressed in dies without being abraded or cracked thereby.

The next part of the process consists in pressing each of the plates of the material in or between dies, so as to condense it, and give

to it a form approximating to that it is to finally have. After this has been done, the plates are to be stacked together, one placed on the other, with its convex side within the concave side of the next one.

A pile of the plates having thus been made is to be placed between two male and female retaining-dies corresponding in shape with the plates, and the whole are to be firmly pressed together in a screw-press, or by other suitable means, and are to be suffered to stand exposed for about four days to the atmosphere, at ordinary temperature, the object being to allow the escape of the solvent or solvents and the gradual contraction of the mass, and the retaining of each plate in the general form required. Were it not for this treatment of the plates they would curl in various ways out of shape.

The plates thus produced may be next exposed to the atmosphere so as to thoroughly dry them, it being preferable to press each plate in dies occasionally while it may be drying, in order to further condense it and preserve it in shape as it may contract.

It will be observed that what I term the base-plate is to have, first, the necessary approximate shape to fit the superior or inferior alveolar ridge of either the upper or lower jaw, the fitting it to the ridge being a subsequent matter, and effected as follows: This is to be done by cutting or reducing it by tools to a closer fit, and finally dusting upon the surface a quantity of the material in a comminuted or powdered state, and pouring upon the quantity so dusted a sufficient quantity of ether or other suitable solvent, so as to reduce it to a plastic state. In this condition the plate is to be pressed upon the plaster cast or counterpart of the jaw, or the portion thereof to be fitted, and there firmly held by means of elastic clasps or a press until sufficiently dry or set.

Next, the tooth or blocks of teeth, prepared with a backing or backings, as hereinbefore explained, is or are to be affixed to the base-plate B, they first being articulated in a manner well known to dentists.

Having thus been properly arranged on the base, each tooth or block is to be fastened in place thereon by putting or filling into the joints and about the backing a small amount of the powdered material, and next applying thereto ether or other proper solvent, so as to reduce the mass to a cementing state, whereby, when dry, it will effect the adhesion of the teeth to the base-plate.

That part of the base-plate which is to fit to the alveolar arch may be in a piece separate from the portion to fit to the alveolar ridge, and be connected thereto by means of the powdered material reduced by a solvent, as described, the whole being so as to form the part either with or without one or more air-chambers or suction-spaces, such as are usually formed in the upper surface of the arch.

In making a plate in this way the old method of using dies to fit it to the mouth is dispensed with, thereby effecting a saving of a large amount of labor, expense, and time, and being advantageous in other respects.

Dental plates of pyroxyline, as made previous to my invention, and by processes well known or described in various patents secured both in this country and in Great Britain, have generally been failures, owing to the difficulty experienced in producing good plates, being due to the attempts made to mold the plate from the plastic mass before suitable shrinkage of it had taken place.

Such patents are British patents No. 2,249 of 1860, 536 of 1868, 2,359 of 1855, and the United States patents Nos. 77,304, 90,765, 90,766, and 96,132 of John A. McClelland; also, the United States patents 88,228, 89,253, and 89,254 of Leander R. Streeter; also, the United States patents 79,261 of Charles A. Seeley; 93,086 of Asa Hill; 88,633 of John W. Hyatt, Jr.; 89,582 of John W. Hyatt, Jr., and David Blake; 91,341 of John W. Hyatt, Jr., and Isaiah S. Hyatt; 91,377 and 91,378 of Daniel Spill; 91,393 of Edward O. Whitehouse; and 65,267 of William H. Pierson—most, if not all of which have reference to the treatment of pyroxyline, or its conversion into dental plates or various other articles.

The advantage of my process of making a plate is due, in a great measure, to the intermediate step of boarding, which is not described in either of such patents, and which allows the mass to lose its bulk, so that the final forming is effected in dies but a little larger than the finished plate.

The plate, when first subjected to such dies, has shrunk to such an extent as to retain but little of the solvent—only enough to prevent fracture of it, and enable it to conform to the die or dies, so that when the plate is finished the disparity between it and the die or dies is but trifling.

I make no claim to any of the subjects, things, or processes described in either of the British or United States patents hereinbefore enumerated.

I claim as my invention—

A dental plate of pyroxyline, made by first forming the sheet by molding it, as described, and next boarding, and finally pressing and shrinking it, all substantially as hereinbefore specified.

JOSEPHUS BROCKWAY,

Witnesses:

R. H. EDDY,  
J. R. SNOW.