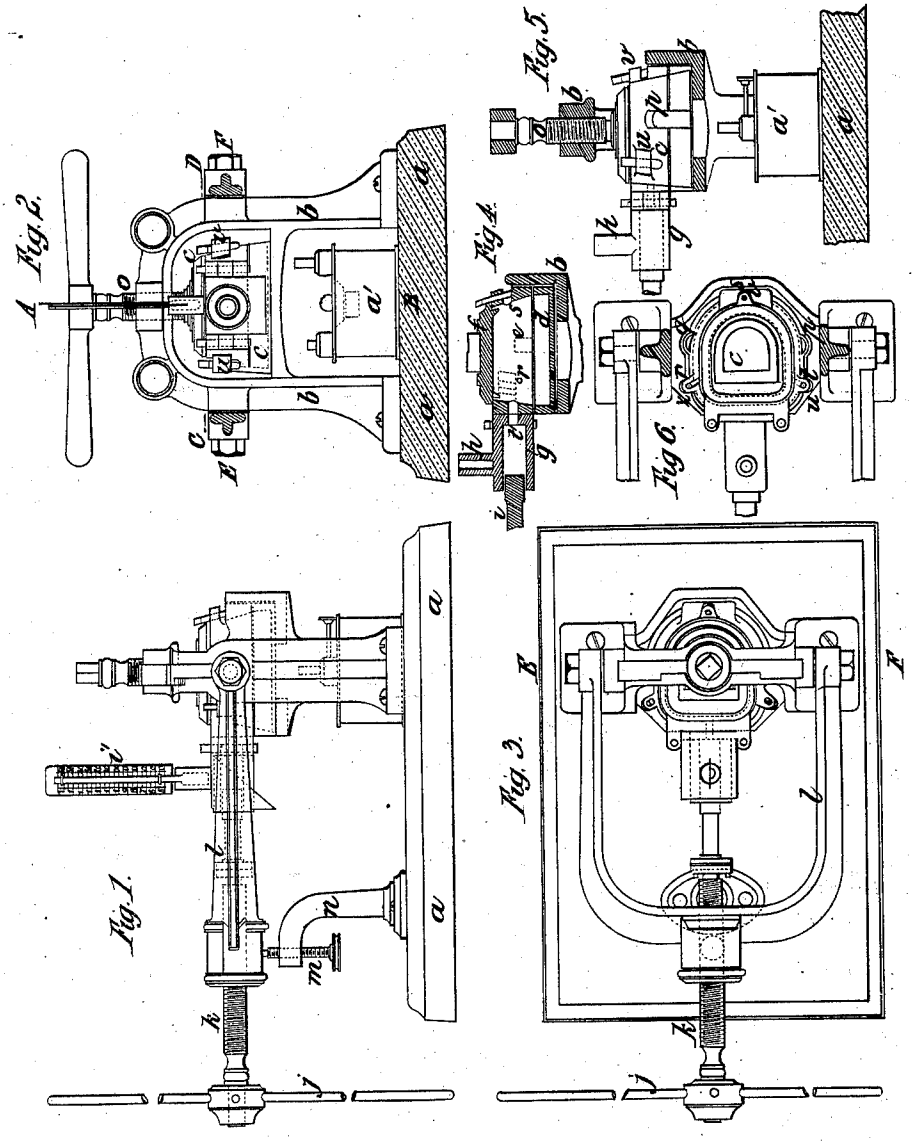
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Process and Apparatus for the Manufacture of Dental-Plates.

No. 216,250. **Patented June 3, 1879.**



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IMPROVEMENT IN PROCESSES AND APPARATUS FOR THE MANUFACTURE OF DENTAL PLATES.

Specification forming part of Letters Patent No. **216,250**, dated June 3, 1879; application filed February 14, 1879; patented in England, January 14, 1879.

To all whom it may concern:

Be it known that we, LUIGI NOËL WINDERLING, GUSTAVO NOËL WINDERLING, and LUCIANO NOËL WINDERLING, all of Milan, Italy, have invented an Improved Process and Apparatus for the Manufacture of Dental Plates, which process is fully set forth in the following specification, reference being had to the accompanying drawings.

This invention relates to an improved process for the manufacture of dental plates or plates for artificial teeth, and to apparatus for carrying the same into practice.

The said improved process is carried into effect as follows—that is to say: A dental plate having been made of wax in the ordinary manner is placed within a heater or heating-box of suitable construction by the aid of small cylinders of wax, which pass through the walls of the heating-box in different places. Then plaster or similar material is poured in until the space between the wax model and the interior walls of the heating-box is quite full. After a certain time the plaster becomes solid, and will have received the shape of the wax model and the said small wax cylinders. Then by suitably heating the heating-box the wax will melt and escape through the holes corresponding with these cylinders. The teeth, which were previously held together by the wax, will now be held by the plaster, which must therefore surround them and enter the interstices between them. This preparation is made for the reception of the substance or material which is to be employed for permanently fixing the teeth together, and which is to form the base or plate for the set of teeth. When plastic material, such as celluloid or caoutchouc, is employed for this purpose this material may be pressed into the interior of the plaster mold through one of the apertures provided in the walls of the heating-box by means of any suitable apparatus, so as to entirely fill the spaces left by the melting of the wax. When the substance or material to be employed is soluble, or is liquefied by fusion, or mixed with a liquid, and is capable of being hardened by evaporation or by other means, it is poured into the plaster molds through the aforesaid apertures in the heating-box.

In order to finish or complete the dental plate it is only requisite to disengage it from the plaster, and to polish it after having cut away the parts corresponding to the said small wax cylinders which served to fix it in the heating-box.

The construction of the said apparatus may be varied. It may be of any suitable form and dimensions, and of any suitable material; but the construction preferred is shown in the accompanying drawings, which we will now proceed to describe.

Figure 1 is a side elevation of said apparatus or injector. Fig. 2 is an end view, and Fig. 3 is a plan, of the same. Fig. 4 is a section of the heating-box detached. Fig. 5 is partly an elevation and partly a vertical transverse section on the line A B, Fig. 2. Fig. 6 is a horizontal section on the line C D, Fig. 2.

Like letters indicate corresponding parts throughout the drawings.

A strong frame, *b*, fixed or formed on the plate *a* supports the furnace *c*. The latter is formed of three separate pieces—namely, the base or bottom *d*, the body *e*, and the cover *f*, as clearly shown in Fig. 4.

The mouth-piece *g*, connected with the body *e*, is fixed thereto by means of two pins or bolts, and is provided with a tube, *h*, within which is placed the bulb of a thermometer, *i'*. There is also a piston, *i*, which enters the said mouth-piece. The forward-and-backward motion of this piston is effected by means of the lever *j* through the medium of the screw *k*, which works in a female screw or nut fixed or formed in the arm *l*, movable around the axis E F. This arm is held in its horizontal position by the screw *m* in the support *n*. Another screw, *o*, which works in a nut fixed at the upper part of the frame *b*, is provided to exert strong pressure on the cover *f* of the heating-box *c*, in order to offer sufficient resistance to the internal pressure caused by the entrance of the aforesaid plastic or other material into the heating-box, which material is forced therein by means of the piston *i*. The bottom or base of the heating-box *c* is joined to the body *e* by means of two projections, *p q*, one of which is clearly shown in Fig. 5.

The body *e* is provided with four apertures,

three of which, *r s t*, may be closed outside by means of pins or bolts passing through eyes *z v u* on the body *e*. The fourth aperture, *t'*, communicates with the mouth-piece *g*. The spirit-lamp *a'* serves to heat the said heating-box and the mouth-piece *g*.

After the above description of the said apparatus the manner of using the same may be easily explained.

After having removed the heating-box from the frame and detached the mouth-piece *g*, the cover *f* is raised, and the dental plate made of wax is placed in the center of the body *e*, being fixed securely thereon by means of the four small wax cylinders, which pass through the apertures *r s t t'*. The body *e* having been united with the base or bottom *d*, then the soft plaster or other like material is poured into the body *e*, and is allowed to harden, the heating-box being closed by its cover *f*. When the plaster has become hard the closed heating-box is placed within a receptacle filled with water, which is kept boiling. This operation causes the wax inclosed within the plaster to melt and to rise to the surface of the water, having escaped through the apertures *r s t t'*, while the teeth which were in the wax model or impression remain in the plaster, which leaves uncovered those parts only that were originally in contact with the wax. Then the mouth-piece *g* is attached to the heating-box, which is placed upon the frame *b*, care being taken that the said mouth-piece is in the proper position with regard to the piston *i*, so that the latter will readily enter into and recede from the mouth-piece when the screw *k* is turned by means of the wheel or lever *j*. The screw *o* is then operated to exert a strong pressure on the cover *f* of the heating-box. Then a cylinder of the celluloid or other plastic material to be used is placed in the mouth-piece *g*, the latter having been suitably heated. This substance or material, which is pressed into the heating-box *e* by the piston *i*, gradually fills the spaces left in the plaster by the melting of the wax.

The thermometer *i'* placed in the tube *h* indicates the temperature which should be given to the plastic material to facilitate its introduction within the heating-box. The apertures *r s t* serve to indicate to the operator when the spaces left by the melting of the wax have been sufficiently filled by the plastic material. When it is seen during the operation that the plastic material is about to escape through one of the apertures *r s t*, this aperture is closed with the pin or bolt resting in the corresponding eye, to cause the material to fill up any space not yet filled. If, however, the material is seen simultaneously through all three of the apertures it is not necessary to use the pins or bolts.

I desire it to be understood that I may modify the construction of the aforesaid apparatus or press with regard to the details of arrangement, shape, and dimensions of the parts thereof, and the material of which they are formed, to any extent which will not impair its efficiency for the purposes of this invention.

The chief advantages to be obtained by the use of the said invention are as follows—that is to say, by means of the above-described process and apparatus, celluloid may be used for the manufacture of dental plates in a manner that has not been heretofore practicable, for the reason that it was necessary to have recourse to existing plates, molds, and dimensions, whereas I am enabled to mold the celluloid to any desired form.

The dental plates manufactured as above described are very strong, as it is impossible for solutions of continuity to exist within the mass of caoutchouc, as is frequently the case with dental plates manufactured by ordinary means. Great accuracy is insured, and the manufacture is very rapidly effected.

We claim as our invention—

1. The manufacture of dental plates by the process and in the manner above described, of any suitable plastic material, such as celluloid or caoutchouc, by the aid of plaster and wax or similar materials, and in any suitable apparatus or machine, the chief characteristic features of which process are the providing of a plaster mold in one piece, and keeping the heating-box closed during the whole of the operation.

2. The heating box or furnace *c*, constructed of the base or bottom *d*, the body *e*, and the cover *f*, the walls of the said body being provided with apertures, substantially as shown, for the purposes set forth.

3. The combination of the mouth-piece *g* and piston *i* with the heating-box *c*, for introducing the plastic material into the latter, and causing the material to adapt itself to the teeth, substantially as and for the purposes set forth.

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