March 9, 1926. **1,575,688**

C. JOANNIDES

MANUFACTURE OF DENTAL PLATES AND APPARATUS THEREFOR

Filed Dec. 13, 1920 3 Sheets-Sheet 1

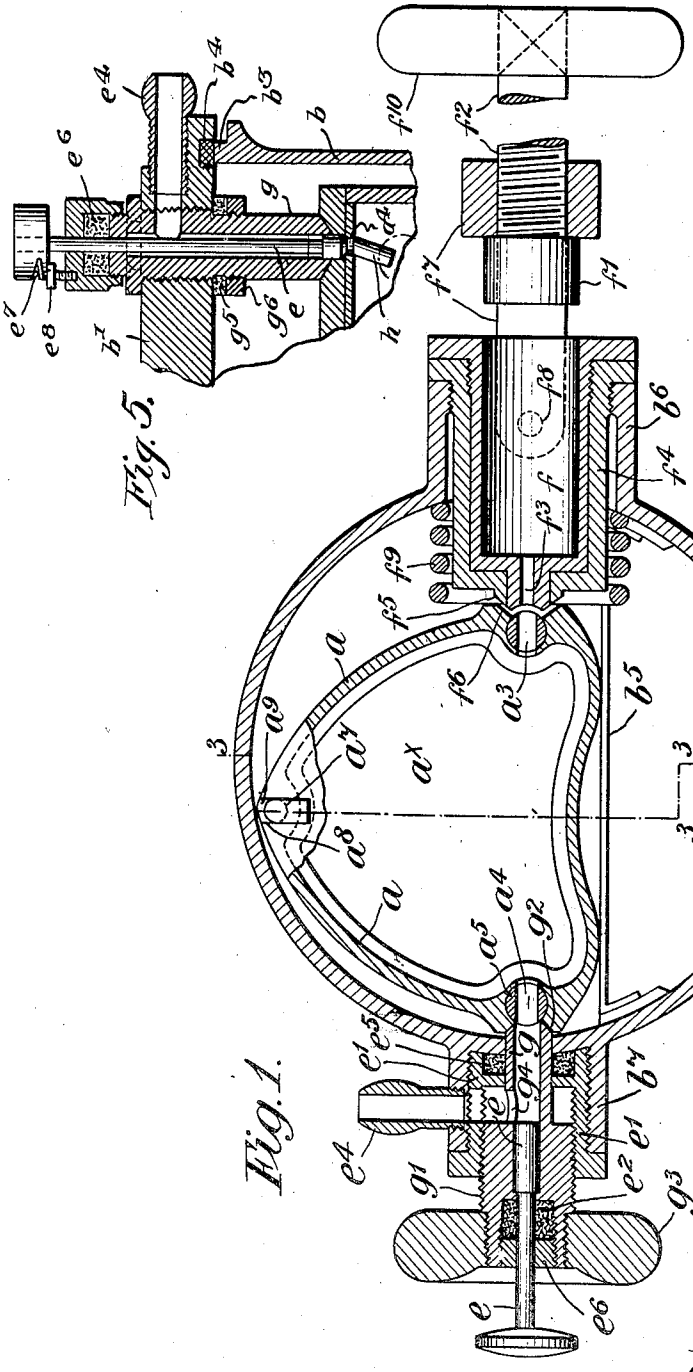


Fig. 5.

Fig. 1.

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MANUFACTURE OF DENTAL PLATES AND APPARATUS THEREFOR

Filed Dec. 13, 1920 3 Sheets-Sheet 2

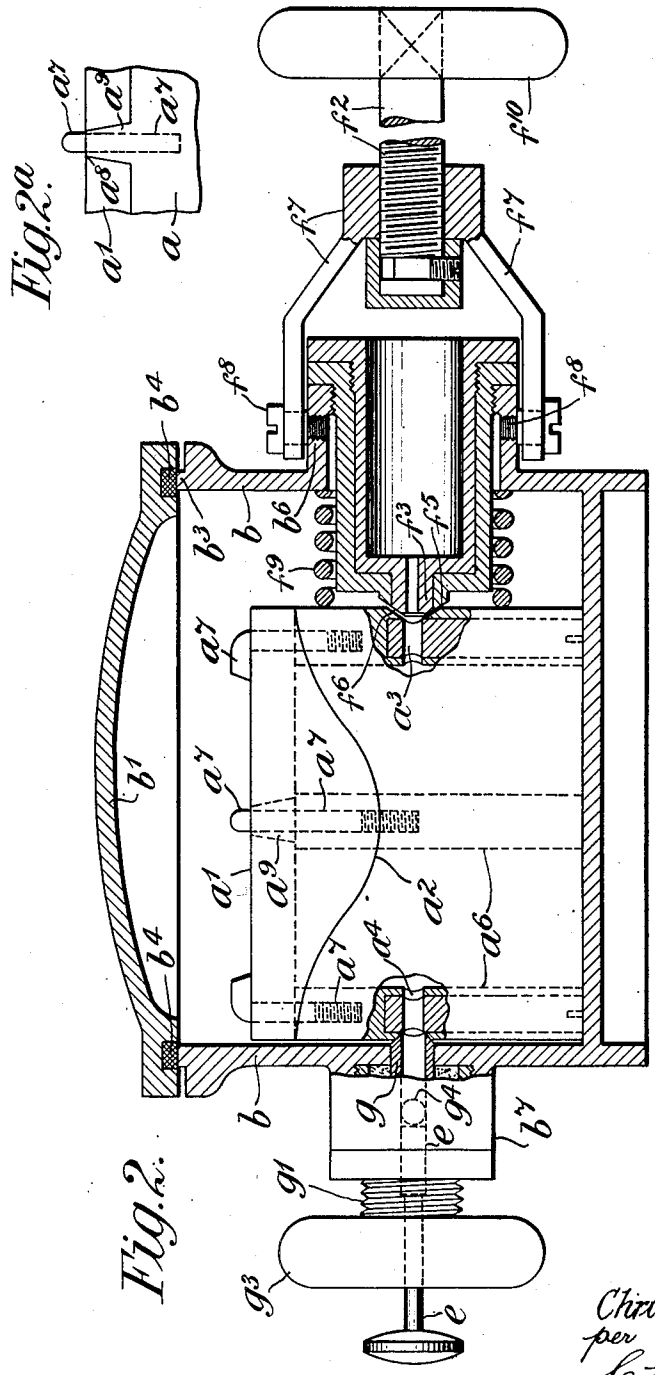


Fig. 2a.

Fig. 2.

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MANUFACTURE OF DENTAL PLATES AND APPARATUS THEREFOR

Filed Dec. 13, 1920 3 Sheets-Sheet 3

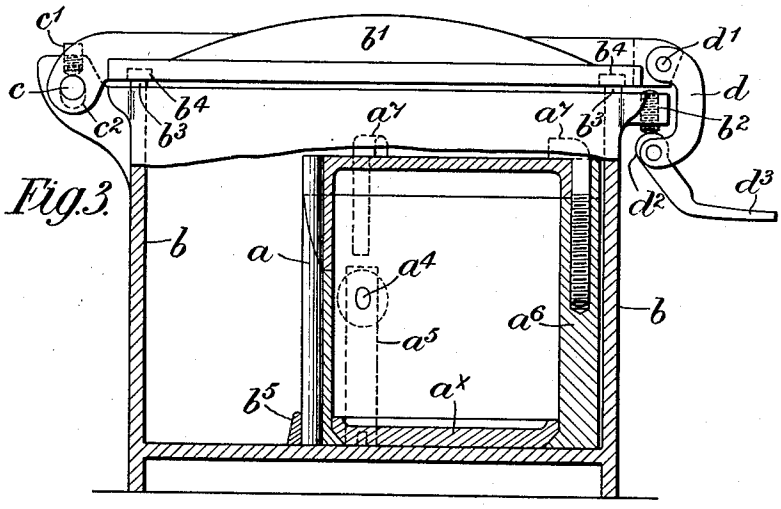


Fig. 3.

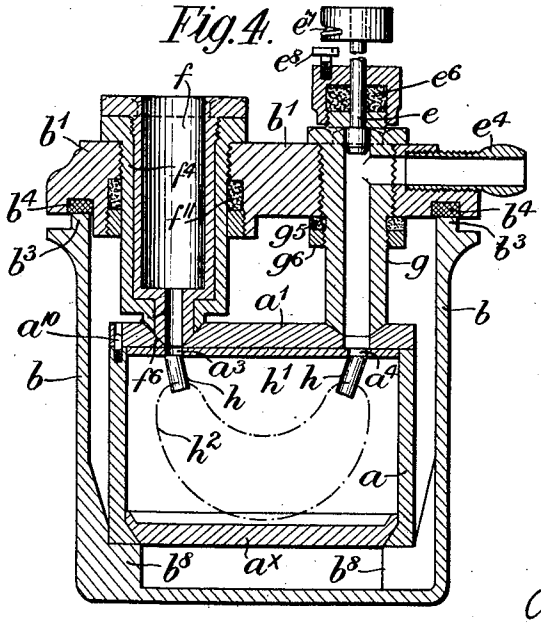


Fig. 4.

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Patented Mar. 9, 1926. 1,575,688

UNITED STATES PATENT OFFICE.

CHRISTE JOANNIDES, OF CONSTANTINOPLE, TURKEY.

MANUFACTURE OF DENTAL PLATES AND APPARATUS THEREFOR.

Application filed December 13, 1920. Serial No. 430,571.

To all whom it may concern:

Be it known that I, CHRISTE JOANNIDES, a citizen of the French Republic, of 36 Place de l'Ambassade d'Angleterre, Constantinople, Turkey, at present residing at the Regent Palace Hotel, London, W. 1, England, have invented certain new and useful Improvements in or Relating to the Manufacture of Dental Plates and Apparatus Therefor, of which the following is a specification.

This invention relates to the production of dental plates and more particularly has reference to the apparatus therefor.

An object of the invention is the provision of means for enclosing the model carrying the teeth in a single block of plaster.

Another object of the invention is the provision of means for the discharge of the wax from the mould without opening the flask.

Another object of the invention is improved means whereby rubber or similar material is injected into the mould of the flask.

A further object of the invention is the provision of means whereby a vulcanized dental plate is produced after the injection of the rubber without opening the boiler.

With these main objects in view and as are hereinafter described and many others which are incidental thereto, the invention primarily consists in the combination, construction and arrangement of the parts of a boiler for the production of a dental plate, having an inlet and an outlet opening and a flask with a corresponding inlet and outlet opening for positively controlling the filling of the mould and if desired for effecting the scouring out of the wax forcibly whilst the flask is in the boiler.

The invention further consists in the combination, the construction and arrangement with a boiler and a flask for the production of a dental plate of a removable cylinder for injecting the rubber or similar material under steam pressure, the parts being so constructed and arranged that after the injection vulcanization is followed with the flask in situ in the boiler without opening said boiler.

My invention also consists in the several arrangements and combination of parts and in the features of construction whereby the above and other objects are attained and particularly pointed out in the appended claims, and will be readily understood upon reference to the accompanying drawings in which I have illustrated a structure embodying the features of my invention in a preferred form.

Many are the features of my invention among which is the enclosing of the model carrying the teeth on the wax in a block of plaster. Another feature is the provision of means for effecting the discharge of the wax from the mould without opening the flask automatically by the stream of hot water or steam or both which by its pressure and friction ensure a perfect cleansing of the mould and the teeth.

Another feature of the invention is the provision of means for controlling positively the filling of the mould while under pressure without the risk of overcharging or defective charging.

A further feature of the invention is the provision of means for giving to the plate the desired degree of compression ensuring homogeneity of the injected material.

A still further feature of the invention is the provision of means for vulvanizing the plate after the injection with the flask in situ and without opening the boiler.

By the combination of the aforesaid features it becomes possible to flask one or more cases in a single block of plaster and if the case requires the application of pink rubber this is applied according to my co-pending applications Nos. 430,572 and 523,564, thus the whole operation of producing dental plates is greatly facilitated as all the operations after flasking such as the cleansing of the wax, the injection of the rubber, the positive controlling of the filling, the compression of same as desired to ensure homogeneity and the vulcanization become possible, thus reducing not only the time but the cost of production to the minimum. By the aforesaid process the risk of displacement of the teeth and compression of the mould is obviated as the material is plastic enough to be evenly spread over all parts of the mould and does not exert pressure on the teeth and on the plaster mould as happens with the ordinary method of packing which not only has the tendency to break the plaster and disturb the teeth but the plaster is liable to be also compressed owing to the insufficient plasticity of the rubber obtained by

the boiling water, thus giving a thicker plate than the wax model and changing the articulation, and in addition pieces of plaster and other impurities are liable to be incorporated when packing the rubber in small pieces by hand.

The flask is provided preferably with only a single inlet and a single outlet each corresponding to an inlet and outlet in the boiler itself and preferably in an horizontal position, and the apparatus is so constructed and the parts so arranged that it is easy to ensure effective charging or filling of the mould under steam pressure. Means are also provided whereby the flask inlet and outlet can be closed whilst the flask is in situ in the boiler. Hence after vulcanization the rubber plate is practically in its finished form although the apparatus has been closed all the time. According to the invention the flask containing the model embedded in plaster in a single block is placed directly in the boiler and the wax is melted and driven out by a rush of hot water, steam or both whereby the mould is scoured out clean and ready to receive the rubber or other material to form the plate or base. The filling process is then carried out by an injector or charging cylinder but this cylinder is made easily removable without opening the boiler.

As an example of the mode of making a plate according to the invention, a wax model (for the upper set of teeth for instance) is made in the ordinary way, but if the case requires it, at the part where the gum is to be space is left for the pink facing rubber which may be fastened in a strip form undulated or otherwise according to my copending applications Ser. Nos. 486,300 and 523,564 already referred to, space being left according to the thickness and contour of pink rubber facing desired.

The model is then placed in the flask, the inlet and outlet of which are open and have had suitable wax wires laid in them, and the flask is filled with the plaster preferably in a single block according to my copending application Ser. No. 536,926.

The said flask is then closed by means of its cover or lid and is placed bodily inside the boiler, the cover of which is adapted to be readily opened and closed. Opposite the inlet of the flask the boiler has a corresponding opening adapted to receive the removable charging cylinder or injecting device for forcing in the rubber composition. Similarly opposite the outlet of the flask the boiler has preferably a regulatable discharge outlet.

Inside the boiler the flask is directly immersed in the water and the arrangement is such that when the water is boiled and the wax melted, which can be ascertained either by the run out from the outlet of the wax or by the temperature registered on the thermometer or otherwise, a rush of hot water or steam or both can be allowed to pass into the mould and scour out thoroughly and eject all residual portions of wax through the boiler outlet. The boiler may have a safety valve or other pressure regulating arrangement.

After this the inlet of the flask is brought tight up to the injector device and the rubber or other material for the base is forced in and completely fills the mould, and this filling can be controlled whilst the flask and boiler are under steam pressure. The regulatable outlet above referred to permits the outflow of the material to be restricted if desired and thus any degree of compression can be obtained in the mould and proper filling, density and homogeneity of the plate ensured.

The flask is then ready for vulcanization but it can of course be vulcanized in the boiler itself, the arrangement being such that the removal of the injector cylinder does not uncover the inlet opening in the boiler to allow any steam or water to escape. The inlet and outlet of the flask being also closed without opening the boiler, vulcanization can be effected with the flask in situ in the boiler, so that the whole operation of producing the plate is carried out without opening the boiler whilst the flask remains in situ therein.

In order that the invention may be clearly understood and readily carried into effect reference will now be had by way of example to the accompanying drawings.

In these drawings:—

Fig. 1 is a horizontal section of one of my preferred forms of the said apparatus in which the inlet and outlet are opposite each other.

Fig. 2 is a vertical longitudinal section thereof.

Fig. 2^a is a fragmentary view illustrating the fixing device for the lid of the flask.

Fig. 3 is a transverse section, in the line 3—3 of Fig. 1, the upper part however being in side elevation.

Fig. 4 shows a modified construction hereinafter mention in which the inlet and outlet are in the cover of the apparatus.

Fig. 5 illustrates the closing of the apparatus after completion of the injection and prior to vulcanization.

Referring more particularly to Figs. 1 to 3.

a is the moulding flask, which as shown is three cornered and is shaped somewhat like the letter **D**, its circumferential or segmental convex part being curved preferably approximately to the shape of the jaw. It is provided preferably with a removable bottom a^x and a detachable lid or cover a^1.

This flask is fitted in the boiler or heater b which has a lid or cover b^1 hinged at c and provided with safety-valve (not shown), and a locking or clamping device for fixing it

down tightly. In the present instance this locking device comprises a movable piece or loop d with its top end hinged at d^1 to a projection on the edge of the cover. At its lower end the loop d carries an eccentric or cam-shaped piece d^2 provided with a lever d^3 for turning it. This cam is adapted to bear against an adjustable screw pin b^2 in a projection of the flange of the heater b, and by this means a very powerful closing pressure can be applied to the lid. Said pressure can however be instantly released by turning the cam lever d^3 in the counter direction, and then the loop d can be turned back out of the way to allow the lid or cover b^1 to be opened.

The body b of the boiler has an upstanding rim b^3 which abuts against a packing ring b^4 let into the lid b^1, and thus renders the boiler steam tight when the lid is closed.

To assist this action the pivot or hinge pin c can itself be further screwed down by a set-screw c^1, the hole in which the pin c fits is deepened as in dotted line at c^2 to permit of such downward movement. In this way the side of the lid b^1 opposite the fastening device can be given an extra compression to further ensure proper steam tightness all round. Moreover any other suitable arrangement may be used for closing the lid especially when the apparatus is to be used for vulcanizing as for instance any one used in the ordinary vulcanizers or otherwise.

In addition to this, to facilitate the placing of the flask in position a strip or ledge b^5 is provided across the bottom of the boiler so that the flask will just fit easily between it and the shell of the boiler, as indicated in Fig. 1.

The flask has an inlet opening a^3 and an outlet a^4. Each of these openings or orifices a^3 a^4 may be controlled by a rotary plug or tap a^5 fitted in a thickened part of hollow vertical rib a^6 in the wall or shell of the flask or by any other arrangement.

There is one such rib in each of the three corners of the flask and they serve also to receive the screw devices a^7, by which the lid a^1 is clamped down on to the body part a of the flask. These devices a^7 are bent or hooked over at the top, and pass through slots or gaps a^8 in the corners of the lid or in any other suitable manner. On the edge of the flask (see Fig. 2^a) are upstanding projections or teeth a^9, which fit in and close these slots or gaps, and act as supports or stiffeners for the tops of the screw hooks a^7. It will be noticed that there is a screw a^7 above both the inlet and outlet, and these have been found to be effectual in withstanding the internal pressure in the flask. The inlet orifice a^3 is intended to serve for the entry of hot water and steam into the flask as well as for the introduction of the rubber whilst the wax steam and water escapes through the opposite outlet orifice a^4 which is provided with a movable plug or wire e mounted in the outer casing of the boiler. This indicator e may be removable if desired.

At the first or inlet orifice a^3 is situated the charging cylinder or pump f for the forcing in of the rubber, and opposite this orifice (viz, at the other side of the flask where the orifice a^4 is situated) is a tubular pressure piece or supporting plug g to fix or clamp the flask in position and serves as a means for connecting the outlet of the flask to the outlet of the boiler.

The charging cylinder or injector pump f is provided with a piston f^1 and screw plunger f^2 to force the contents through the nozzle f^3 into the inlet a^3 of the moulding flask. The said piston f^1 is free to turn on the end of the screw, and is connected therewith by a pin and groove connection.

The aforesaid plunger or feed screw f^2 is provided with a knob or hand wheel f^{10} and is mounted in a yoke piece f^7 pivoted at f^8, which can be swung downwards or sidewards or otherwise to leave the cylinder f open when required. Such injector cylinder f is also provided with a casing, jacket or sleeve f^4 into which it is screwed as shown. The said casing can be omitted when the boiler is intended to be used for packing only, and not as a vulcanizer. The flanges of the cylinder f and casing or jacket f^4 are provided with washers to secure tight joints. The casing f^4 is fitted or screwed into a tubular projection or neck b^6 on the shell or casing of the heating chamber or boiler b, and has a nozzle f^5 tapered or bevelled to fit in a funnel or mouth piece f^6 round the inlet aperture a^3. Moreover an annular steam space may be left between b^6 and f^4 for jacketing purposes. In addition to this around the sleeve or cylinder f^4 is fitted a fairly powerful coiled spring f^9. The said spring serves to press against the adjacent corner of the flask and force the latter slightly away from the charging cylinder when the screw g at the opposite side is slacked back, thus opening the aperture a^3 by withdrawing the mouth piece or funnel f^6 slightly from the concentric nozzles f^3 f^5 as shown. Moreover, any other suitable arrangement may be made to open the aperture to allow water to pass into the mould. At the opposite or outlet side, the boiler has another tubular projection or neck b^7 in which is screwed a liner or cylinder e^1. This liner has screwed into it a plug g^1 from which extends forward the tube or plug g whose extremity projects into the boiler. Said extremity is tapered or conical or otherwise to fit in a funnel-shaped mouth or seating g^2 round the outlet orifice a^4 analogous to the arrangement at the inlet-orifice opposite.

The signal pin or indicator plug e slides axially through the tubular plug g g^1, and works in a stuffing box e^2 which keeps it steam tight. Another stuffing box e^5 in the front of the liner e^1 serves to keep the tube or plug g steam tight, whilst a nipple or nozzle e^4 serves for the ultimate discharge of the wax etc. Any suitable device such as a set screw may be used to fix the plug e in its innermost position to close the outlet when vulcanizing for instance.

The said holding-up screw plug g is tubular and has a central passage as shown for the outflow of the wax and the water leading to the nipple e^4. It is also provided with the aforesaid signal or indicator pin, wire or plug e which is adapted to be displaced by the red or base rubber composition or similar material and so warn the operator that the flask is full. This indicator pin works in the stuffing box e^2 and the latter has an adjustable screw plug or gland e^6 to alter the pressure on the packing and so hold the pin or wire of the plug more or less tightly according to the pressure desired to be set up on the rubber in the flask. Moreover the pressure can be further increased as desired by pressing the plug by hand.

The indicator pin can also be used to completely close the outlet a^4 when vulcanizing for instance. Besides its longitudinal passage, the plug g g^1 has a port or aperture g^4 leading to the nipple e^4 (which may be connected for instance to a suitable waste pipe as stated) and is provided with a knob or hand wheel g^3 for turning it. The outlet of the boiler as above described is the preferred form but a simple opening on the boiler connecting the outlet of the flask may be sufficient for the purpose.

The orifices of the flask may be provided with any suitable devices for closing them after removal of the flask from the boiler. In the example shown these devices a^5 are simply perforated plugs (acting like those of gas taps) fitted in the thickened corners of the flask across the orifices, and in line with the screws a^7 for holding the cover a^1 in place, or a clamp may be used provided with two nipples screwed in the corresponding parts of the inlet and the outlet of the flask on the clamp.

In the manufacture of a dental plate according to the invention the tough pink rubber facing may be first applied to the teeth and wax model and kneaded on to them with the fingers, or with hot instruments if desired, for instance in my applications Nos. 486,300 and 523,564. The model is then ready to be placed in the flask and embedded in the plaster.

Before however the flask is filled with plaster, fusible pieces are placed in the two orifices a^3 a^4 which extend to the end of the wax model, or metal wire may be used, which of course has to be taken out after the setting of the plaster thus leaving passages.

After the flask is placed in the boiler and has become heated, these pieces melt and leave the apertures clear for the outflow of the wax, for the free passage of the hot water or steam to scour out the mould, and for the introduction of the base rubber composition, celluloid or the like.

The boiler or heater is made of such a capacity as to hold an ample quantity of water to keep the flask at the desired temperature.

When the wax model begins to melt and drip from the discharge nozzle e^4 the pressing screw or holding up plug g^1 is drawn back by turning the knob g^3 and the spring f^9 pushes back the flask slightly so that the hot water steam or both can enter the now open orifice a^3 and displace the melted wax in the flask, the rush of such completely scouring out the mould and freeing it from any residual particles of wax. When this has been effected, the flask is again forced by the holding up screw or plug g against the cylinder nozzles f^3 f^5 so shutting the water and steam spaces off from the inlet a^3 ready for the forcing in of the red or base rubber by the piston or plunger.

After the mould is charged, the injector cylinder f is unscrewed and drawn back, leaving the casing f^4 however still in position with its nozzle f^5 closing the funnel f^6 and preventing escape of steam from the boiler. A closing plug of the same shape as f^3 but solid carried by a screw block which fits the thread in the casing f^4, may then be inserted in its place to close the inlet a^3. This arrangement is of great importance when the apparatus is to be used as a vulcanizer and will maintain the temperature of the boiler and avoid the necessity of developing steam or using a separate steam boiler to allow the withdrawal of the injector. Moreover any other suitable means may be used for the purpose.

The temperature of the boiler can then be raised as desired for the purpose of vulcanizing the plate in the flask without removing the latter from the boiler. The taps a^5 can be omitted in apparatus which is intended for vulcanizing in the way just described. Moreover any suitable means may be provided to turn the tap or taps a^5 from the outside whilst the flask is under steam pressure.

Owing to being able to expel the wax forcibly and thoroughly and to introduce the rubber mechanically in the manner referred to, it becomes possible to make the plaster mould all in one piece or block in the flask, insteam of in two parts or halves. This enables the base rubber to be always

formed to the exact thickness desired, viz, to the precise thickness of the wax, and any interference with the articulation or the setting of the teeth (owing to variation in thickness which may occur with two-part moulds) is avoided. Moreover there are no edges or seams, such as are liable to be broken off when filling or packing in of the composition, and hence fragments are not liable to become embedded in the latter, and damage the same.

The employment of a safety valve in the lid or cover b^1 enables the pressure and temperature to be regulated easily and with certainty.

The same apparatus can also be used for celluloid work, the mode of taking out the wax being similar. The celluloid becomes softened in the cylinder by the heat of the apparatus, either steam or dry heat, and is then forced into the flask by means of the charging cylinder in the same way as the rubber.

In the modified form shown in Fig. 4 the same letters of reference refer to corresponding parts. The spring f^9 is dispensed with and the orifices a^3 a^4 are formed in the top of the flask which is supported by rests or bearers b^8 in the bottom of the boiler. The cover a^1 of the flask slides in dovetail grooves in the body thereof or by having holding down screws. The plug g may be cast in one with the lid b^1 of the boiler, and the nipple e^4 may be secured in said lid. These arrangements dispense with most of the outlet parts at the left of Fig. 1. The arrangement may however be similar to that in Fig. 1, in which case, as the cover is held in position by the pressure of the outlet and inlet, the dovetail grooves may be dispensed with and the cover held in position in any convenient manner or any suitable arrangement may be used to determine the position of the cover.

To ensure a tight joint round the lower end of the outlet plug g, an adjustable packing ring g^5 and screw collar g^6 are provided, whereby the packing ring can be set in such a position that it will make an effective joint against the lid a^1 when the cover b^1 of the boiler is closed.

The casing or sheathing f^4 of the charging device works through a stuffing box f^{11} and can be screwed down tight into the funnel or seating f^6. As the cover a^1 is a sliding one a special arrangement is provided for inserting the usual wax wires h connected with the inlet and outlet orifices a^3 a^4. To this end these wires are secured as shown, to a metal strip or flat bar h^1 laid on top of the plaster and having holes coresponding to said orifices, thus holding the wires properly in place, ready for the cover to be slid into position transversely across said strip h^1. The wax model into which the wax wires h^1 lead, is indicated by the dotted line h^2.

The indicator rod e in this case works through a stuffing box e^6 and is so arranged that in its innermost position its plug or inner end closes the outlet orifice a^4. To secure it in this position its knob has a curved or spiral slot e^7 adapted to engage or hook over a screw stud e^8 on the stuffing box e^6 or other suitable arrangement.

In other respects the action of this arrangement resembles that first described. The injector piston f^1 (not shown) is arranged above the removable cylinder f and when the latter is taken out after the charging of the mould with red or base rubber or the like, the orifice a^3 is closed by a screw plug adapted to screw into the casing or sheathing f^4 or by turning a tap which may be on the cover, from outside the boiler by any suitable means, whereupon the apparatus is ready to be used as a vulcanizer simply by raising its temperature to the desired degree.

The flask for either of the boilers can be constructed either for one or more cases, for example an upper and a lower set of teeth and either the boiler can be constructed for one or more flasks. For two cases, the models may be connected end to end by wax wires which after melting, leave a passage or passages through the plaster so that the material shall be forced first through one and then through the other case, or they may be connected in parallel between a single inlet and outlet. In fact as the filling of the rubber is easily controlled when the flask and cylinder are under steam pressure from outside the boiler, and as the flask is uniformly heated throughout, it is feasible to fill two or more cases in one flask, as the rubber is fluid enough at the temperature of the flask to penetrate into the most intricate parts of the mould.

Moreover in this arrangement the flask remains stationary in position, and the nozzle of the cylinder is screwed back or moved away from the inlet of the flask, to allow the steam or water or both to enter and pass through the latter. Any other suitable arrangement for allowing the water to pass through the mould, may however be employed.

The fixing of the flask in position can be effected in any other convenient way. For instance the outlet can be fixed and the flask can be held rigidly in position by the charging cylinder as in the modification shown in Fig. 4.

An apparatus as above described not only reduces the time of flasking to the minimum as there is a great difference of flasking for one case between the usual process of flasking in two parts and that of the present, but offers a great advantage of flasking more

than one case in the same flask. Further not only is a saving of time effected in the boiling of the flask and clearing of the wax to the minimum, but the cleaning of the wax is more perfectly effected by the friction of the hot water and steam or both which also has the advantage of cleaning more than one case in one operation.

Furthermore not only the time of packing is reduced to the minimum compared with the ordinary method which requires repeated operations for one case only, but has the great advantage of packing more than one case in one operation without disturbing the teeth or compressing the plaster as is the case with the ordinary method.

Again not only is the time of vulcanization reduced to the minimum as when the flask is filled with the rubber the temperature is almost raised and requires but a few minutes only to raise same to the required degree, but offers the great advantage of vulcanizing more than one case thus avoiding the use of large vulcanizers, besides ensuring that two or more cases are vulcanized under the same pressure and the same general conditions and thus attain the same degree of hardness.

I claim:

1. Apparatus for producing dental plates, comprising, in combination, a container, means for closing said container, said container being adapted to hold a mould, a vessel adapted to be tight and inclosing said container, a rubber injecting apparatus, and directly a passage between said injecting apparatus and said mould container, and another passage between the interior of said mould container and the exterior of said vessel.

2. Apparatus for producing dental plates, comprising, in combination, a container, means for closing said container, said container being adapted to hold a mould, a vessel adapted to be rendered tight and enclosing said container, a rubber injecting apparatus projecting through the wall of said vessel so as to be directly connected to said container and having its greater portion disposed within the interior of said vessel, a passage between said injecting apparatus and said mould container, and another passage between the interior of said mould container and the exterior of said vessel.

3. Apparatus for producing dental plates, comprising, in combination, a container, means for closing said container, said container being adapted to hold a mould, a vessel adapted to be rendered tight and enclosing said container, a rubber injecting apparatus, a passage between said injecting apparatus and said mould container, and means for establishing a communication between the interior of said vessel and the interior of said container, whereby the interior of said container may be scoured by a heated agent produced within the interior of said vessel.

4. Apparatus for producing dental plates, comprising, in combination, a container, means for closing said container, said container being adapted to hold a mould, a vessel adapted to be rendered tight and enclosing said container, a rubber injecting apparatus, said apparatus being mounted within the wall of said vessel and so as to directly contact with said container and having its greater portion disposed within the interior of said vessel, a passage between said injecting apparatus and said mould container, and means for establishing a communication between the interior of said vessel and the interior of said container whereby the interior of said container may be scoured by a heated agent produced within the interior of said vessel.

5. Apparatus for producing dental plates, comprising, in combination, a container, means for closing said container, said container being adapted to hold a mould, a vessel adapted to be rendered tight and enclosing said container, a rubber injecting apparatus, a passage between said injecting apparatus and said mould container, another passage between the interior of said mould container and the exterior of said vessel, a communication between the interior of said vessel and said passage, and means for opening and closing said last named communication.

6. Apparatus for producing dental plates, comprising, in combination, a container, means for closing said container, said container being adapted to hold a mould, a vessel adapted to be rendered tight and enclosing said container, a rubber injecting apparatus, said apparatus being disposed so as to project through the wall of said vessel, and having its greater portion disposed within the interior of said vessel, a passage between said injecting apparatus and said mould container, another passage between the interior of said mould container and the exterior of said vessel, a communication between the interior of said vessel and said passage, and means for opening and closing said last named communication.

7. Apparatus for producing dental plates, comprising, in combination, a container, means for closing said container, said container being adapted to hold a mould, a vessel adapted to be rendered tight and enclosing said container, a rubber injecting apparatus, a passage between said injecting apparatus and the interior of said mould container, another passage between the interior of said mould container and the exterior of said vessel, and within said second named passage a slidably mounted member adapted to yield to any medium flowing through

said passage and thereby indicate the state of filling of the interior of any mould within said container.

8. Apparatus for producing dental plates, comprising, in combination, a container, means for closing said container, said container being adapted to hold a mould, a vessel adapted to be rendered tight and enclosing said container, a rubber injecting apparatus, said apparatus being directly connected to said container and projecting through the wall of said vessel so as to be charged from without of said vessel and having its greater portion disposed within the interior of said vessel, a passage between said injecting apparatus and the interior of said mould container, another passage between the interior of said mould container and the exterior of said vessel, and within said second named passage a slidably mounted member adapted to yield to any medium flowing through said passage and thereby indicate the state of filling of the interior of any mould within said container.

9. Apparatus for producing dental plates, comprising, in combination, a container, means for closing said container, said container being adapted to hold a mould, a vessel adapted to be rendered tight and enclosing said container, said container being movable within said vessel, a rubber injecting apparatus directly connected to said container and disposed so as to be charged from without of said vessel, a passage between said injecting apparatus and said mould container, another passage between the interior of said mould container and the exterior of said vessel, said second passage being axially movable, means for moving said second named passage in conjunction with said container, whereby a communication with the interior of said vessel may be produced within said first named passage.

10. Apparatus for producing dental plates, comprising, in combination, a container, means for closing said container, said container being adapted to hold a mould, a vessel adapted to be rendered tight and enclosing said container, a rubber injecting apparatus, a passage between said injecting apparatus and said mould container, said rubber injecting apparatus being composed of two parts both of which partake in the formation of said first named passage in such a way that said passage may be maintained tight towards the interior of said vessel when one of said parts is being removed.

11. Apparatus for producing dental plates, comprising, in combination, a container, means for closing said container, said container being adapted to hold a mould, a vessel adapted to be rendered tight and enclosing said container, a rubber injecting apparatus, said apparatus projecting through the wall of said vessel so as to directly connect to said container and having its greater portion disposed within the interior of said vessel, a passage between said injecting apparatus and said mould container, said rubber injecting apparatus being composed of two parts both of which partake in the formation of said first named passage in such a way that said passage may be maintained tight towards the interior of said vessel when one of said parts is being removed.

12. Apparatus for producing dental plates, comprising, in combination, a container, means for closing said container, said container, being adapted to hold a mould, a vessel adapted to be rendered tight and enclosing said container, a rubber injecting apparatus, a passage between said injecting apparatus and said mould container, said rubber injecting apparatus being composed of two parts both of which partake in the formation of said first named passage in such a way that said passage may be maintained tight towards the interior of said vessel when one of said parts is being removed, and means whereby a communication may be temporarily established between the interior of said vessel and said passage.

13. Apparatus for producing dental plates, comprising, in combination, a container, means for closing said container, said container, being adapted to hold a mould, a vessel adapted to be rendered tight and enclosing said container, a rubber injecting apparatus, said apparatus projecting through the wall of said vessel so as to directly connect to said container and having its greater portion disposed within the interior of said vessel, a passage between said injecting apparatus and said mould container, said rubber injecting apparatus being composed of two parts both of which partake in the formation of said first named passage in such a way that said passage may be maintained tight towards the interior of said vessel when one of said parts is being removed, and means whereby a communication may be temporarily established between the interior of said vessel and said passage.

14. Apparatus for producing dental plates, comprising, in combination, a container, means for closing said container, said container being adapted to hold a mould, a vessel adapted to be rendered tight and enclosing said container, said container being movable within said vessel, a rubber injecting apparatus, a passage between said injecting apparatus and said mould container, another passage between the interior of said mould container and the exterior of said vessel, said second passage being axially movable, means for moving said second named passage in conjunction with said container, whereby within said first passage a communication may be produced with the in-

terior of said vessel, said rubber injecting apparatus being composed of two parts both of which partake in the formation of said first named passage in such a way that said passage may be maintained tight towards the interior of said vessel when one of said parts is being removed.

15. Apparatus for producing dental plates, comprising, in combination, a container adapted to hold a mould, another container for said first named container, and a passage leading from the interior of said first named container and opening to without said second named container.

16. Apparatus for producing dental plates, comprising, in combination, a container adapted to hold a mould, another container for said first named container, each of said containers being adapted to be closed tight, a passage leading from the interior of said second named container through the interior of said first named container and opening to without said second named container, and means for controlling said passage, whereby any mould in said mould container may be scoured out forcibly by any hot medium contained in said outer container.

17. Apparatus for producing dental plates, comprising, in combination, a container, means for closing said container, another container within said first named container and adapted to hold a mould, means for closing said second named container, a passage between the interior of said inner container and the exterior of said outer container, said passage being adapted to conduct a filling material into a mould held within the interior of said inner container, another passage between the interior of said inner container and the interior of said outer container and adapted to conduct a scouring medium from the interior of said outer container through a mould held within said inner container, and means for controlling said second named passage.

18. Apparatus for producing dental plates, comprising, in combination, a container, means for closing said container, another container within said first named container and adapted to hold a mould, means for closing said second named container, a passage between the interior of said inner container and the exterior of said outer container, said passage being adapted to conduct a filling material into a mould held within the interior of said inner container, another passage between the interior of said inner container and the interior of said outer container and adapted to conduct a scouring medium from the interior of said outer container through a mould held within said inner container, means for controlling said second named passage, and a third passage leading from the interior of said inner container to without said outer container and adapted to serve as an outlet for any agent protruding through said last named passage, whereby the state of filling may be controlled.

19. Apparatus for producing dental plates, comprising, in combination, a container, means for closing said container, said container being adapted to hold a mould, a vessel adapted to be rendered tight and enclosing said container, said container being movable within said vessel, a rubber injecting apparatus directly connected to said container and disposed so as to be charged from without of said vessel, a passage between said injecting apparatus and said mould container, another passage between the interior of said mould container and the exterior of said vessel, said second passage being axially movable, means for moving said second named passage in conjunction with said container, a communication with the interior of said vessel may be established within said first named passage, the parts forming each of said passages being shaped so as to automatically center each other when either of said parts is caused to move, and means for guiding said container during its movement within said vessel.

20. Apparatus for producing dental plates, comprising, in combination, a container adapted to hold a mould, another container adapted to contain said first named container, a passage leading from without said second named container to the interior of said first named container, and another passage leading from within said first named container to without said second named container.

21. Apparatus for producing dental plates, comprising, in combination, a container, means for closing said container, another container adapted to be placed within said first named container, said inner container being further adapted to hold a mould, means for closing, said second named container, an injecting apparatus directly communicating with said inner container and disposed so as to be charged from without of said outer container, said injecting apparatus comprising an injecting cylinder adapted to be removed after injection, and closing means adapted to close the communication to said inner container prior to vulcanization.

22. Apparatus for producing dental plates, comprising, in combination, an outer container adapted to be closed, another container disposed inside said outer container and adapted to be closed, said inner container being further adapted to hold a mould, an injecting apparatus directly connected to the interior of said inner container and disposed so as to be charged from without said outer container, a passage leading

from the interior of that outer container, through the interior of said inner container and adapted to conduct a scouring agent through the interior of said inner container, said injecting apparatus comprising a removable injecting cylinder and closing means adapted to close the communication to said inner container prior to vulcanization.

23. An apparatus for the production of dental plates comprising a boiler with an opening to receive a removable cylinder having a nozzle, a flask having an inlet opening corresponding with said nozzle and an outlet opening to correspond to the outlet opening of the boiler operatively connected with said inlet and outlet openings of the apparatus.

24. An apparatus as in claim 23 in which the outlet of the flask is adapted to be engaged with a tubular pressure screw in order to press the inlet of the flask tight up to an injector nipple when required, a spring being fitted to act upon the flask which is adapted to force the flask slightly in the opposite direction when said pressure screw is turned back, thus allowing a space permitting by the pressure of the steam developed in the boiler the scouring out of the wax through the outlet of the boiler.

25. An apparatus for the production of dental plates having an outlet opening connecting the outlet opening of the flask an indicator or push rod being provided for indicating when the mould in the flask is filled with rubber or similar material by the pressure of the protruded material acting on the indicator.

26. In an apparatus for producing dental plates, a container adapted to hold a mould, said container comprising a tubular body part, a removable bottom, and a removable cover.

27. In an apparatus for producing dental plates, a container adapted to bold a mould, said container comprising a tubular body part, a removable bottom, a removable cover, means for retaining said bottom in operative position, and means for retaining said cover in operative position.

28. In an apparatus for producing dental plates, a container adapted to hold a mould, said container comprising a tubular body part, a removable bottom, a removable cover, means being of such a structure as to allow a removal of said bottom by subjecting said bottom in one direction, and means for retaining said cover in operative position.

29. In an apparatus for producing dental plates, a container adapted to hold a mould, said container comprising a tubular body part, a removable bottom, a removable cover, means for retaining said cover in operative position, said means being of such a structure as to allow a removal of said cover by subjecting the same to a sliding movement in one direction, and means for retaining said bottom in operative position.

30. In an apparatus for producing dental plates, a container adapted to hold a mould, said container comprising a tubular body part, a removable bottom, a removable cover, means for retaining said cover in operative position, said means being of such a structure as to allow a removal of said cover on subjecting said cover to a sliding movement in one direction, and means for retaining said bottom in operative position, said means being of such a structure as to allow the removal of said bottom by subjecting said bottom to a sliding movement in one direction.

In testimony whereof I affix my signature.

CHRISTE JOANNIDES.