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METHOD OF ELIMINATING FUSIBLE PATTERNS FROM DENTAL MOLDS

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2 Sheets-Sheet 1

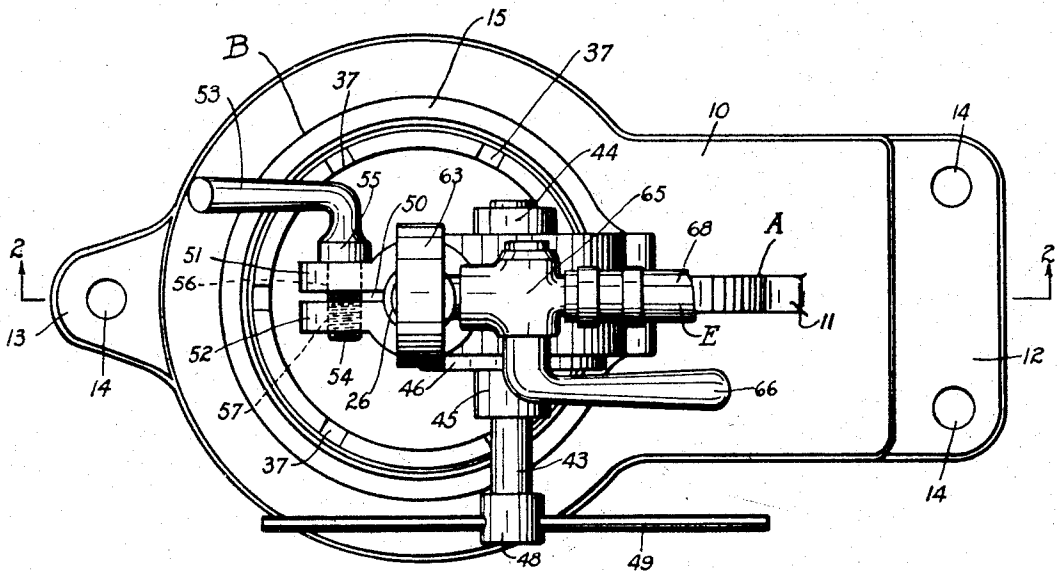


Fig. 1

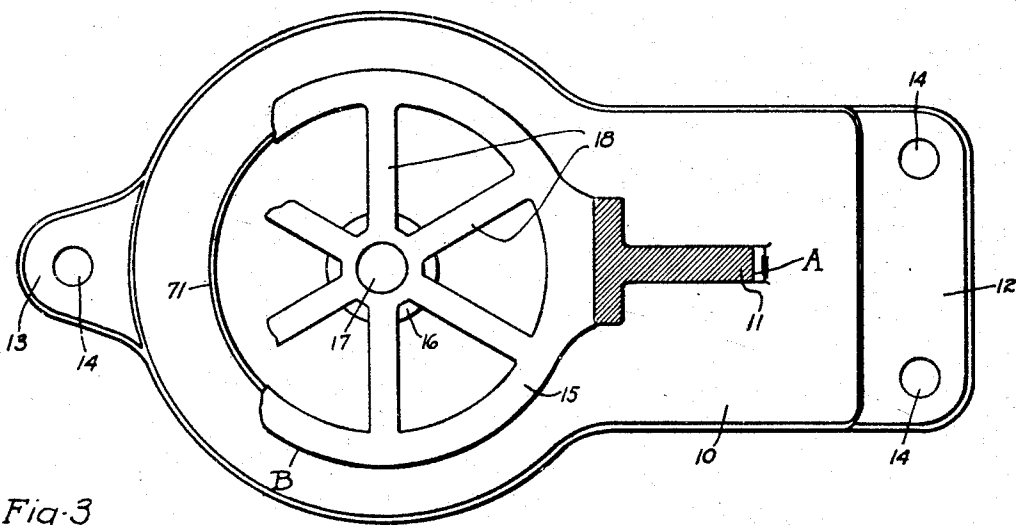


Fig. 3

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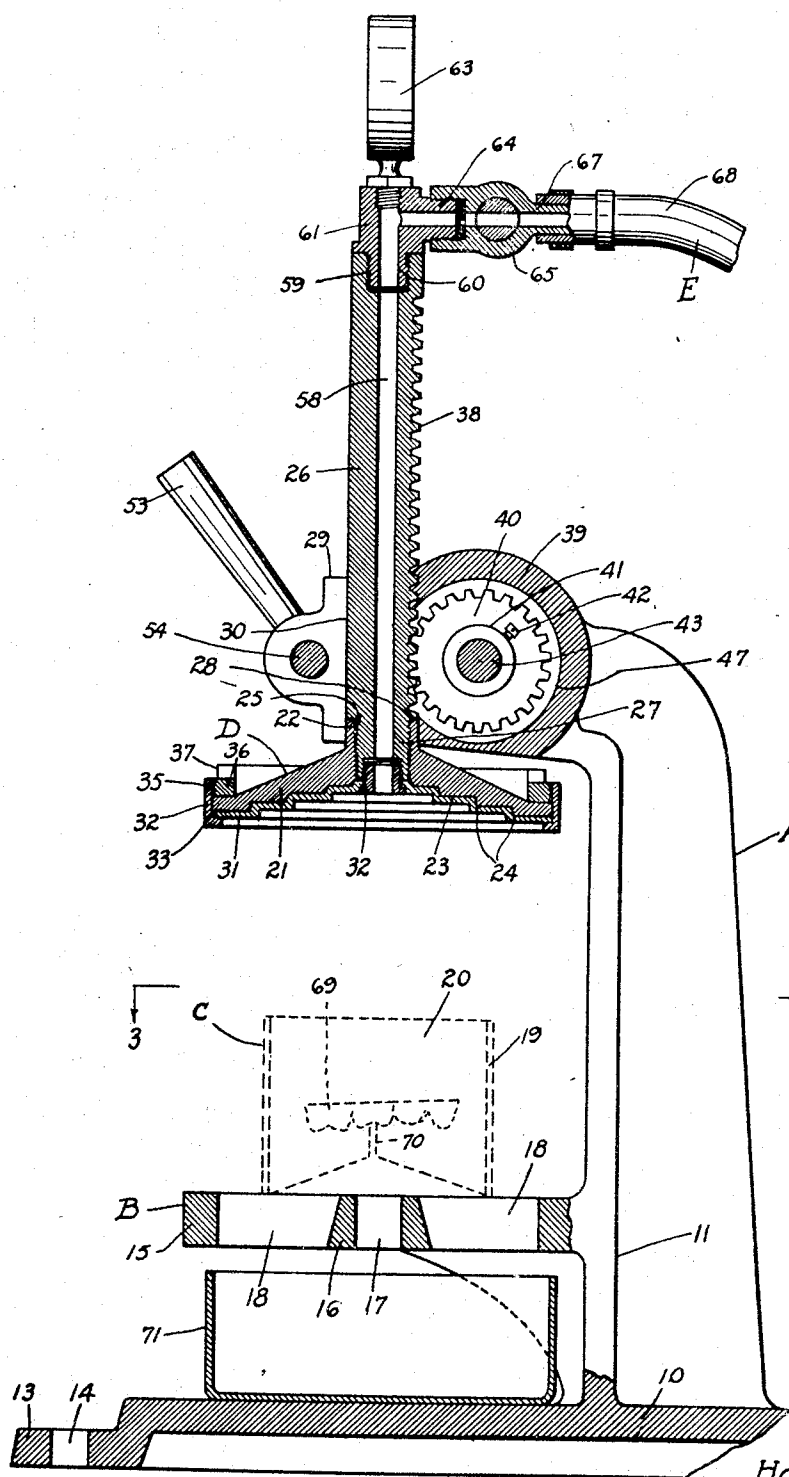


Fig. 2

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METHOD OF ELIMINATING FUSIBLE PATTERNS FROM DENTAL MOLDS

Application filed November 12, 1928. Serial No. 318,875.

My invention relates to methods of eliminating fusible patterns from dental molds, and has for its object to provide a method whereby the fusible patterns may be completely removed from the mold so as to leave a clean and true surface within the cavity of the mold in order to faithfully and exactly reproduce from the pattern a true and flawless casting.

Another object of the invention resides in the method of eliminating fusible patterns from porous dental molds which consists in exposing a portion of the mold to the atmosphere, in providing a drain from the pattern through the mold and communicating with the atmosphere through the exposed portion of the mold, in subjecting another portion of the mold to a fluid under pressure, and in simultaneously heating said mold.

Another object of the invention consists in utilizing steam under pressure for simultaneously heating the mold and for forcing the fusible pattern out of the mold.

In the drawings:

Fig. 1 is a plan view of a structure suitable for carrying out my invention.

Fig. 2 is a longitudinal elevational sectional view taken substantially on lines 2—2 of Fig. 1.

Fig. 3 is a plan sectional view taken on line 3—3 of Fig. 2 with a part of the supporting structure removed to illustrate the receptical beneath the same.

In the casting of restorations by the method heretofore commonly employed, it has been exceedingly difficult to produce accurate castings in which all of the corners have been completely filled out and which are free from shrinkage or expansion due to warpage or disfiguration of the mold occasioned by subjection intense for the removable of the fusible pattern, and which would fit the prepared teeth of the user without a considerable amount of fitting or swaging after the casting was completed.

It has furthermore required a considerable period of time to eliminate the pattern from the mold and with some of the methods employed considerable danger existed of injuring the mold as by warpage, shrinkage, ex-

plosion, disintegration and otherwise. My invention overcomes these difficulties by providing a method whereby the restorations may be accurately cast so that a true fit may be had between the casting and the prepared teeth or model on which the restoration is to be fitted and which requires a minimum amount of trimming and fitting.

A device, by means of which my improved method may be carried out, is shown in details in the drawings.

This device comprises a supporting structure A which includes a support B adapted to receive a dental mold C and to hold the same in proper position. The device further includes a cap D movable toward or from the mold C and adapted to cap the same so as to form a chamber communicating with a portion of the mold. A conduit E is directly connected with a steam generator or steam pipe and is adapted to bring steam under pressure into the chamber within the cap D. Each of these various parts will now be described in detail.

The supporting structure A comprises a base 10 which has issuing upwardly therefrom at the rearward portion thereof, an upright 11. Base 10 is constructed with ears 12 and 13 which are drilled at 14 to receive bolts or screws by means of which the structure may be rigidly attached to the table or counter upon which the device is being used.

The support B is preferably in the nature of a grating such as shown in detail in Fig. 3 and comprises an annular rim 15 which is integrally connected to the upright 11 and spaced therefrom in superimposed position above the base 10. At the center of the grating B is provided a ring 16 formed with an opening 17 therethrough which is connected to the rim 15 by means of a number of radial arms 18. The opening 17 in ring 18 serves to lead the discharge from the mold C away from the same as the device operates, while said opening and the openings in the grating between arms 18 bring the lowermost portion of the mold in communication with the atmosphere.

The mold C includes an annular tubular container 19 which is open at both ends and

which is adapted to receive the composition 20 from which the mold proper is made. This structure is adapted to rest upon the arms 18 of grating B so as to subject the lower portion of the mold to the atmosphere and to permit of the drainage of the fusible pattern from the bottom of the mold through the said support B.

The cap D consists of a circular plate 21 constructed at the center thereof with a boss 22. The face 23 of this plate is formed stepped as indicated at 24 for a purpose to be presently described, while the boss 22 is internally threaded at 25 to permit of the attachment of said plate to a spindle 26. The end 27 of the spindle 26 is reduced in diameter to form a shoulder 28 and externally threaded to screw in the threads 25 of boss 22. By means of this construction the plate 21 is rigidly attached to the end of said spindle. Spindle 26 is preferably of cylindrical form and is mounted for vertical reciprocation within a guide 29 formed on the upper end of the upright 11 which is bored at 30 to receive said spindle.

The face 23 of plate 21 is preferably lined with a gasket 31 which is stepped to correspond with the steps 24 of said plate and fits snugly along the face of said plate. This gasket is held attached to the plate 21 at the center thereof by means of a flanged bushing 32 which is screwed into the end of the portion 27 of the spindle 26 and which firmly clamps the inner edge of the gasket 31 against the extreme end of the said spindle 26. The outer edge of gasket 31 is held attached to the plate 21 by means of a flanged ring 32 which is adapted to clamp the outer margin of said gasket against a flange 33 formed on the plate 21. Ring 32 is internally threaded at 35 to receive an annular burr 36 which lies against the flange 33 and forces the flange of the ring 32 toward said flange 33. This burr is constructed with a number of notches 37 extending radially across the outer face thereof in which a suitable tool may be inserted to rotate the same and clamp the gasket 31 in place.

As previously stated, the spindle 26 is reciprocable along the guide 29 to raise and lower the cap D. The said spindle may be reciprocated as follows: Along the rearward surface of said spindle, the same is formed with rack teeth 38 which extend substantially throughout the length thereof. Immediately in back of the guide 29 and formed in the upright 11 is a case 39 which incloses a pinion 40 adapted to mesh with the rack 38. This pinion is formed with a boss 41 which is threaded to receive a set screw 42 by means of which the said pinion may be securely attached to a shaft 43. The shaft 43 is journaled in a boss 44 formed on the case 39 which provides a bearing therefor, and in a second boss 45 formed on a flange 46 which

is adapted to be screwed into a circular bore 47 forming the interior of the case 39 and providing the second bearing for said shaft. Shaft 43 extends outwardly beyond the boss 45 and terminates in a head 48 which is drilled to receive an operating handle 49. By moving the handle 49, pinion 40 may be rotated so as to raise and lower the cap D in a manner to be presently described.

For the purpose of locking the cap D from movement when in capping position, the guide 29 is slit longitudinally as indicated at 50 in Fig. 1 and is formed with two ears 51 and 52 extending outwardly therefrom adjacent the slit 50. The ear 51 is drilled at 56 while the ear 52 is correspondingly threaded at 57. A handle 53 is formed with a threaded spindle 54 and a shoulder 55, said spindle being adapted to extend through the hole 56 and to screw into the threaded portion 57 of ear 52. Upon the turning of said handle 53, the shoulder 55 thereof is caused to force the ears 51 and 52 together to rigidly clamp the spindle 26 within the guide 29 and restrain the same from movement along the bore 30.

For the purpose of supplying steam to the cap D the spindle 26 is formed with a longitudinal passageway 58 which extends completely through the same and through the bushing 32. The upper end of spindle 26 is threaded at 59 to receive the boss 60 of a casting 61 in the nature of a T which is provided with a branch 62 adapted to receive a pressure gauge 63 and with a second branch 64 adapted to be connected to a steam generator. A valve 65, formed with an operating handle 66, is attached to the branch 64 and terminates in a nipple 67 to which a flexible hose 68 may be attached. This hose may be connected to any suitable source of steam such as a pipe line connected with a steam boiler or to a steam generator.

My improved method is carried out as follows: The tubular container of mold C is first placed upon a table formed with an upwardly extending conical projection. The wax pattern which I have indicated at 69 in Fig. 3 is next supported upon a sprue pin attached to the said projection or sprue base at the apex thereof. A suitable plastic substance, such as investment or other material employing plaster of Paris as a base may then be poured about the pattern to form a mold completely enveloping the said pattern except for the aforementioned sprue pin on which the same is supported. The plastic material forming the mold is then permitted to set, after which the mold may be removed from the table and the sprue base thereon, and the sprue pin supporting the pattern withdrawn from the same to leave a passageway 70, bringing the pattern proper in communication with the atmosphere. The method of making such molds being well

known in the casting art, I have not illustrated the structure and apparatus used in conjunction therewith in particular detail in this application. It is to be understood, however, that the molds of which the mold C is an example, can be constructed by the method above outlined, or by any other suitable method.

After the mold has been permitted to set for a length of time in the vicinity of $\frac{1}{4}$ hour, the pattern 69 within the same, may be eliminated by my improved method. This is accomplished as follows: The mold C is placed upon the support or grating B with the passageway 70 extending downwardly and directed above the opening 17 in said grating. The handle 53 is next operated to release the spindle 26 and handle 49 rotated to bring the cap D in engagement with the top of the mold C. The upper edge of the tubular receptacle 19 of this mold is then brought into engagement with a portion of the gasket 31 so as to effect an air tight closure therebetween, and to provide a space or chamber above said mold communicating with the passageway 58 in spindle 26. When such closure has been effected, the handle 53 may be manipulated to lock the cap D from movement so as to retain the desired seal. The handle 66 of valve 65 is next manipulated to turn on the steam which is maintained at a pressure preferably in excess of two or three pounds per square inch. The apparatus is then permitted to remain with the steam turned on for a period of five minutes or more during which time steam penetrates the porous mass of the plastic material of the mold and serves to heat and melt the fusible pattern 69 without any damage to pattern chamber. The lower portion of the mold being open to the atmosphere through the passageway 70 causes the fusible pattern to be extruded from the mold through said passageway by the agency of the steam pressure upon the upper portion of the mold. Due to the fact that the mold is more or less porous, the steam rapidly reaches the wax pattern and melts the same so as to permit of the drainage of the molten pattern through the passage way 70. Due to the pressure of the steam upon the uppermost portion of the mold and due to the subjection of the lowermost portion of the mold to the atmosphere, the pattern is completely and rapidly extruded from the mold. Most of the pattern escapes through the passageway 70, while the remainder of the pattern is forced through the body of the mold by the pressure of the steam and the heat therefrom. When the pattern has been completely eliminated from the mold by the above process, the mold is absolutely clean and as free from traces of the pattern as is possible. A casting can then be cast within the mold which is absolutely true and which conforms micrometrically as to size of the pattern from which it is cast.

Restorations constructed in accordance with this process may be made to fit precisely and exactly upon the teeth or model to which they are to be applied without swaging, so that the labor of applying the restorations is greatly reduced and the service and fit of the restoration is greatly enhanced.

If desired, a cup or other receptacle as indicated at 71 in Figs. 2 and 3, may be employed to receive the discharge from the pattern 69 as the extrusion of the same progresses. This receptacle may be constructed detachable as shown, or may be constructed integral with the supporting structure A if desired.

My invention is highly meritorious in that it provides a simple method for forming dentures and similar castings where a high degree of accuracy in the reproduction of the pattern is desired. The process can be carried on without danger of injury to the mold and without constant attention of the attendant. With my invention, considerable time is saved to the attendant in the eliminating of the pattern so that the restorations may be constructed in less time than heretofore, enabling the user to obtain accurate castings quickly.

Changes in the specific steps of my invention, as herein disclosed, may be made within the scope of what is claimed without departing from the spirit of my invention.

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

1. The method of eliminating fusible patterns from porous molds which consists in arranging the mold with a downwardly extending drain, and in simultaneously heating and applying a fluid under pressure to the mold from above.

2. The method of eliminating fusible patterns from porous molds which consists in arranging the mold with a drain from the bottom of the mold, capping the top of the mold to form a chamber thereabove, introducing within said chamber a fluid under pressure and simultaneously heating the mold.

3. The method of eliminating fusible patterns from porous molds which consists in arranging the mold with a drain from the bottom of the mold, capping the top of the mold to form a chamber thereabove, introducing within said chamber a gas under pressure and simultaneously heating the mold.

4. The method of eliminating fusible patterns from porous molds which consists in arranging the mold with a drain from the bottom of the mold, capping the top of the mold to form a chamber thereabove, introducing within said chamber steam under pressure to simultaneously heat the pattern and force the same out of the mold cavity.

5. The method of eliminating fusible patterns from porous molds which consists in

providing the mold with a portion thereof
under atmospheric pressure, in forming a
chamber communicating with another por-
tion of said mold, in providing a drain com-
5 municating with the fusible pattern and the
portion of the mold subjected to atmospheric
pressure, and in applying steam under pres-
sure to said chamber to simultaneously heat
the mold and drive the pattern through said
10 drain and out of the mold.

In testimony whereof I have affixed my
signature to this specification.

HARRY C. HAGMAN.

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