F. H. NIES.

INLAY CASTING MACHINE.

APPLICATION FILED MAR. 3, 1910.

1,004,185. Patented Sept. 26, 1911.

Fig. 1.

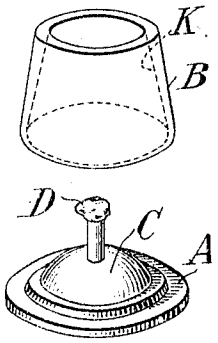


Fig. 2.

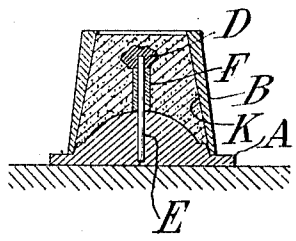


Fig. 3.

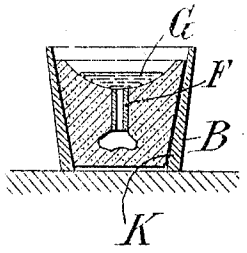


Fig. 4.

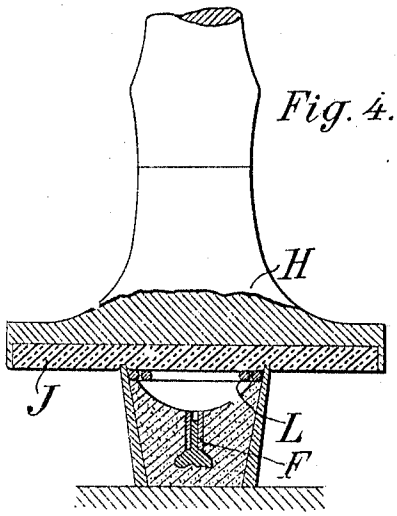
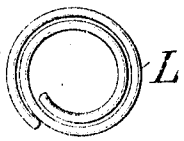


Fig. 5.



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INLAY-CASTING MACHINE.

1,004,185. Specification of Letters Patent. Patented Sept. 26, 1911.

Application filed March 3, 1910. Serial No. 547,068.

To all whom it may concern:

Be it known that I, FREDERICK H. NIES, a citizen of the United States, residing in the borough of Brooklyn, county of Kings, city and State of New York, have invented certain new and useful Improvements in Inlay-Casting Machines, of which the following is a specification.

In the casting of inlays of gold or other material for dental work there are sometimes losses of castings or failures, the cause of which is not clear. According to this invention the casting is effected in such a way as to practically eliminate such losses or failures, or at least to reduce them to a minimum. While there may be other causes which contribute at different times, or several causes at one time, to the losses or failures of the castings, I have discovered that a cause of many such losses or failures is the escape of a large part of the pressure which is depended upon to force the molten gold into the mold.

The principal features of my invention are concerned with the prevention of such losses of pressure and the generation of a large supply of pressure fluid.

The accompanying drawings illustrate the use of an apparatus according to the invention.

Figure 1 is a perspective view of the parts of the apparatus used in making the mold. Fig. 2 is a sectional view of the same with the investment material of which the mold is composed cast in place. Fig. 3 is a sectional view of the parts in the position for the casting of the inlay. Fig. 4 is a sectional view showing the actual casting operation. Fig. 5 is a plan of a supplementary heating element.

Referring to the form of the apparatus illustrated the flask in which the mold is made comprises a base A and one or more rings B of suitable sizes adapted to rest endwise on the base. The base is provided at the center with an upwardly projecting portion C for forming a hollow in what is eventually the top of the mold for the receipt of the molten gold. An impression of the cavity of the tooth is taken with wax or other suitable material, as indicated at D. This wax impression is then mounted on the end of the pin E which fits into a small hole in the base. A quill F is introduced about the part of the pin E which is adjacent to the impression piece D so as to hold the latter at the proper height and to form in the investment material a sufficiently large sprue or gate. The impression piece and the flask, being properly positioned, as in Fig. 2, the investment material is poured in the top to nearly or approximately fill the flask. Various compositions are in use as investment materials. A good example is plaster of Paris, two parts, French chalk, two parts, and Portland cement, one-half part. When this has had time to set the flask ring is removed from its base and the pin is withdrawn. The flask ring, with the investment material therein, and the impression piece, are then heated. The wax impression piece is melted out leaving an exact mold of the inlay. The investment material should be thoroughly heated to make it porous so that it will permit dispersion of the air in the mold when the molten gold is introduced therein, and so that it should not chill the molten gold as the latter passes through the sprue into the mold cavity; and so as to avoid the subsequent formation of steam in the investment material which, forcing its way out through the sprue, would retard the entrance of the molten metal and cause the formation of imperfect edges. Generally speaking, within the limit of such heat as might fuse the investment material the mold should be very thoroughly and uniformly heated and the casting should be made while the mold is very hot. This heating and drawing out of the investment material causes a substantial shrinkage thereof. Likewise the heating causes a substantial expansion of the flask ring which is ordinarily of metal. Thus there is a space not always perceptible to the eye formed between the investment material and the flask ring. Then when pressure is introduced to force the molten metal into the mold the pressure is liable to be dissipated to a substantial extent through the space between the investment material and the flask ring.

The method of completing the work is indicated by Figs. 3 and 4. The flask ring B is inverted upon the table and the gold G is placed in the hollow upper end thereof and melted. Pressure is then applied in any one of various ways. The commonest way is by means of a so-called pressure plunger H having a face J of asbestos or other fibrous fireproof material. This fibrous face is wet and brought down by hand upon the upper edge of the flask. The heat of the flask, the molten gold, and the hot invest-

ment material, converts the water in the fibrous material into steam and generates this steam under substantial pressure and in quantities sufficient to fill the space in the top of the investment material and flask ring, and to force the molten gold into the mold. The quantity of steam is limited and with such an apparatus it is especially important to take precautions against the loss of any of the pressure fluid.

According to one feature of my invention the space formed by heating between the investment material and the flask ring is so tightly closed as to substantially prevent any escape of pressure by this way. Various means may be provided for this purpose. The simplest is probably that illustrated in which the inner portion K of the flask ring is tapered, the smaller diameter being preferably at the lower end (calling the end through which the gold is introduced the upper end). In using such a ring the investment material is introduced so that it comes nearly to the bottom edge of the flask ring (which is uppermost at the time), as in Fig. 2. After thorough drying and heating a space will be left which is indicated by a heavy line in Fig. 3 and the investment material may be pushed so tightly into the ring that any air, gas or steam or other pressure fluid will be effectually prevented from escaping between the ring and the investment when the casting is made, as in Fig. 4. This close fit of the investment in the ring also affords stability and support for the former and prevents it from being split asunder by too great a pressure in casting as is sometimes the case with apparatus of previous styles. This is especially true in making large castings, in which case the investment material needs to be supported firmly on all sides to prevent its being broken to pieces. The conserving of the pressure by closing the space between the investment material and the ring makes very much easier the casting of full plates, which must be thin and light enough to be worn, and the casting of which would otherwise be a difficult task; and this conserving of the pressure also secures better castings with sharper and more perfect faces and edges than can be secured in the old way. The invention is applicable not to merely the casting of inlays for single teeth, but also to the various analogous operations required in dentistry, such as the casting of plates or pieces of gold, aluminum or other materials.

An additional feature which I have invented relates to the generation of pressure in increased quantity as compared with previous methods. This is done by providing an additional heating element to act upon the wet pad. With previous apparatus the asbestos pad has been brought down so that it contacted only with the comparatively narrow edge of the flask ring and received the greater part of its heat by this contact. I propose to provide within the ring an additional heating element preferably consisting of a metal ring or coil L shown separately in Fig. 5, and which is of a suitable size to be placed easily in the top of the ring upon the edge of the investment material so as to fill the space between the latter and the steam generating pad, and to heat the latter by direct contact. It is not safe to permit the investment material to come into contact with the comparatively cold pad (even where it has been heated with hot water), because the unequal contraction caused by the sudden chilling of the investment will sometimes crack it. Nor is it advisable to allow the molten nugget to give up its heat for the generating of steam. The use of the additional heating element tends to save the investment material and the nugget from these objectionable incidents. The heating element L should be placed on top of the investment as soon as the gold is softened, all the parts being then heated together, ordinarily with the oxy-hydrogen blow-pipe. The coil is made red hot and provides a large steam-forming surface. The heating element may be of various metals, nickel being preferred where an oxy-hydrogen blow-pipe is used.

What I claim is:—

1. An inlay casting apparatus including a flask ring adapted to receive the investment material, a pad adapted to be moistened and brought down upon the edge of said ring to generate steam for pressing the metal into the mold, and an additional heating element adapted to increase the heating surface in contact with the pad.

2. An inlay casting apparatus including a flask ring adapted to receive the investment material, a pad adapted to be moistened and brought down upon the edge of said ring to generate steam for pressing the metal into the mold, and an additional heating element comprising a metallic ring-shaped piece fitting within the edge of the flask ring and adapted to rest upon the investment material and to come into contact with the pad when the latter is brought down, to increase the steam-generating surface.

In witness whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

FREDERICK H. NIES.

Witnesses:
D. Anthony Usina,
Fred White.