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PROCESS AND APPARATUS FOR CASTING METALS AND CERAMIC MASSES ACCORDING TO THE CENTRIFUGING METHOD

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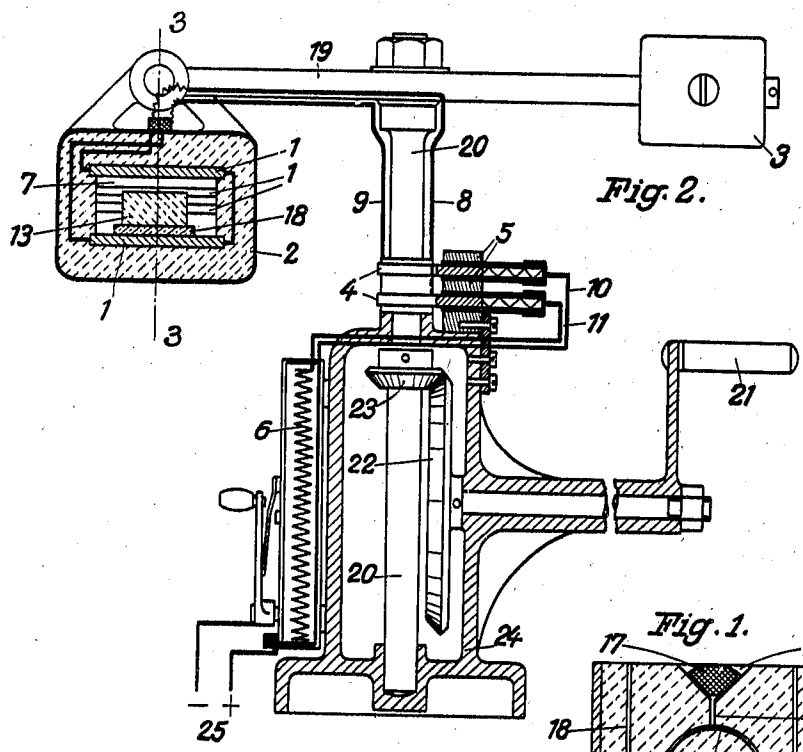


Fig. 2.

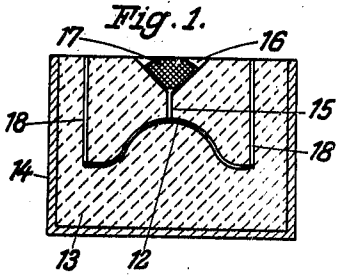


Fig. 1.

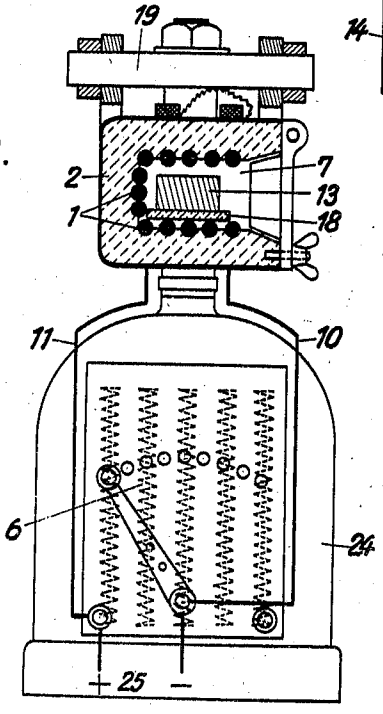


Fig. 3.

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PROCESS AND APPARATUS FOR CASTING METALS AND CERAMIC MASSES ACCORDING TO THE CENTRIFUGING METHOD

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Several inconveniences which hitherto could not be obviated are connected with the casting of all metals and ceramic masses in hollow moulds. The cast of metal is not sufficiently dense or homogenous. Blisters or funnels are formed and the contours of the work are not sufficiently sharp on the cast piece. These inconveniences are specially perceivable at precision casting of a body the surface of which is of complicated form or the wall of which is very thin.

As example of such a body to be cast the casting of a large plate for a set of artificial teeth may be mentioned, the thickness of which is only 0,1 mm. or even less, and which has to be cast from a not easily fusible metal. It is necessary that at the casting the contours of the plate for a set of artificial teeth are sharply formed, this being however not possible according to the commonly used methods. These commonly used methods consist in heating the material to be molten at the centrifuging process from above by a narrow flame or by an electric arc. The small quantity of casting metal or ceramic mass solidifies almost instantaneously. The casting material has no time to fill properly a complicated hollow mould or to flow properly into hollow moulds of quite narrow inner width. The thinner the article to be cast is, the more rapidly solidifies the molten material. As the air has sometimes not sufficient time to escape from the mould, pores are produced, and slag formations are sometimes enclosed by the suddenly solidifying molten material. Owing to the rapid solidifying of the material it is impossible that a homogenous structure of a cast body develops. The cast is brittle and of inaccurate and not sharp contours.

The higher the smelting point of the casting material, the more serious becomes the above mentioned inconveniences, this being the reason why many metals possessing high smelting points cannot be used for casting dental articles.

The metal to be cast is commonly molten by the open narrow flame in the casting funnel, the hollow mould under the funnel remaining much colder so that the inconveniences mentioned occur at the moment of the casting.

I have discovered, that the fact that the hollow mould is cold is a cause for all said inconveniences, as all commonly used casting methods are based on the principle to heat the material for casting as strongly as possible and then to cast the same into a hollow mould which is always considerably colder than the heated material.

According to the invention the centrifuging of the molten material is carried out in a room heated to uniform temperature and only then when the molten material, the casting implements, i. e. the casting box, the embedding material, the hollow mould, the casting funnel, the casting hole and the like, have been heated to the same temperature, the cooling of the heated casting utensils being effected uniformly after the casting by accordingly regulating the electric heating current.

An apparatus for carrying out the improved method is illustrated by way of example in the accompanying drawings in which:

Fig. 1 shows the casting mould in elevation.

Fig. 2 is a longitudinal section through the apparatus.

Fig. 3 is a section on line 3—3 of Fig. 2.

The article 12 to be cast is modelled as usual in wax, this model being embedded in a refractory mass 13 contained in a box 14 (Fig. 4). The casting channel 15 communicates with the casting funnel 16 containing the material 17 to be cast. Air channels 18 are provided. The mould 13 is placed in an electric muffle furnace. This muffle furnace consists of a chamotte muffle 2. On the bottom, the ceiling and, if necessary, on the side walls of the muffle 2 electric resistance heating bodies 1, for instance silicium rods, are arranged. The heating bodies on the bottom of the furnace are covered by a plate 18, for instance of porcelain, on which the mould 13 is placed. The electric heating bodies might be arranged vertical or circular. The main condition is, that the hollow space 7 in the furnace 2 is uniformly heated by the electric heating bodies.

The furnace 2 is fixed on the end of an arm

19, the other arm of which carries a counterweight 3. The arm 19 is adapted to be rotated around the axle 20 of the centrifuge, said axle being rotated in a suitable manner, for instance by a crank handle 21 and bevel wheels 22 and 23. 24 designates the frame or foot of the centrifuge.

The axle of the centrifuge might be horizontal in which case the arm holding the furnace 2 is vertical.

In order that during the rotation of the furnace 2 the current supply to the electric heating resistances 1 be not interrupted, collector rings 4 are arranged on the axle 20 from which the current is supplied to the heating bodies 1 through leads 8, 9. The current is supplied to the collector rings 4 by means of brushes 5 to which it is supplied from a source of current 25 through an adjustable resistance 6 and wires 10 and 11.

The material 17 in the funnel 10 is heated until it is thinly liquid, the mould 13 being heated to the same temperature. The muffle furnace 2, the hollow mould 12 in the same and the casting utensils 13, 14, 15 are rotated around the stationary axle 20, the electric heating being not interrupted so that the thinly liquid material has sufficient time to flow into the narrow hollow spaces of the mould 12. The electric heating is gradually reduced and then shut off, the muffle furnace continuing for some time to be centrifuged until the cast material has gradually solidified.

The cast body cools gradually in the closed muffle furnace.

According to the method described castings from any metals can be produced which are castable, as it is possible to obtain in the closed muffle furnace any casting temperature. The same is valid for ceramic masses. This possibility has hitherto not existed.

When the electric heating is only quite gradually cut out malleable castings are obtained such as could hitherto not be obtained by the commonly used dental casting methods.

The method described is specially adapted for dental castings like plates for sets of artificial teeth, fillings, crowns, bridges, regulating work and the like.

The method described is also adapted for other purposes, requiring precision casting, for instance for articles of art and articles for use or parts of such, specially for small size articles having a complicated surface and very accurate contours.

I claim:

1. A method of casting metals and ceramic masses consisting in simultaneously and uniformly heating the casting utensils and material to be cast, in centrifuging the material when fused into said heated utensils having the same temperature as the fused material, and in uniformly cooling said utensils together with the material therein by gradually cutting off the electric heating current.

2. An apparatus for carrying out the casting method specified in claim 1, comprising in combination with a centrifuge consisting of a stationary frame and of a rotatable arm, an electric muffle furnace on said arm having a central space, a two part mould arranged on the bottom of the central space concentrically to the center axis of said electric furnace and having in its upper part a central funnel shaped charging aperture adapted to accommodate the material to be melted, electric resistance heating bodies on the bottom, ceiling and side walls of said furnace around said mould adapted to uniformly heat said central space and therefore said mould and the material in the funnel shaped aperture of the upper part of said mould, collector rings on the shaft of said centrifuge, leads connecting said collector rings with said electric heating bodies, a source of current, brushes for supplying current to said collector rings, wires connecting said brushes with said source of current, and an adjustable resistance in said wires.

In testimony whereof I affix my signature.

CURT FRITZSCHE.