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METHOD OF DRYING WAX MODELS

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1 Claim. (Cl. 22—196)

This invention relates to methods of drying wax models coated with a moist layer of a suspension of fine ceramic material, devices for carrying out such methods and products obtained by such methods.

As is well-known, in precision casting, the casting moulds are obtained by applying by pouring a ceramic paste to models made up of wax, which paste hardens after some time. The wax is removed from the resultant mould by melting, whereafter the mould is dried and burnt to form a porous stone, into which the molten metal is introduced. During casting, the stone must satisfy several conditions, viz:

(1) It must be resistant to the casting material;

(2) It must be porous for sufficient discharge of occluded air and liberated gases;

(3) The molten metal must not penetrate the pores or possibly cracks;

(4) It must be strong enough to resist the pressures which occur during casting;

(5) The inner wall of the mould requires a smooth surface so that the casting also acquires a smooth surface.

The contradictory requirements mentioned sub (2) and (3) are usually fulfilled by first coating the wax model with a thin layer of a very fine mass, behind which a material coarser but more porous is provided. This first thin layer is applied to the wax models by immersion or spraying with a suspension of fine ceramic material containing a binder, which is subsequently dried, whereafter the moulds are obtained by pouring a coarser suspension onto these wax models.

The object of the invention is to provide means of obtaining great constancy in the dimensions of castings.

According to the invention, the drying process takes place at a temperature maintained constant at a value such that the wax does not soften and also with a high relative humidity of the ambient air.

Since wax has a high coefficient of expansion, differences in temperature may result in variations of the dimensions.

However, it has been found that maintaining a constant or substantially constant temperature during these treatmetns is not sufficient, but that especially after the first coating with the fine suspension a constant and high relative humidity of the air is of much greater influence.

When such wax models covered with the moist layer of the fine suspension are dried, then according to the

invention, a high relative humidity of the ambient air of from about 80% to 90% is of utmost importance for obtaining a good product. In fact, with a lower relative humidity, this thin layer dries rapidly and as a result of the heat of evaporation of the water contained in the layer, the temperature of the outer layer and of the underjacent wax model is considerably decreased. At room temperature and with a low relative humidity of, for example, from 40% to 50%, the cooling could be up to 10° C. As a result thereof, the wax model contracts and has smaller dimensions at the moment when the ceramic covering layer becomes dry and solid. When, subsequently, the whole assumes the ambient temperature, the wax again expands, with the result that the ceramic layer must necessarily crack and/or blister. This loose layer is deteriorated or may partly be rinsed away during the subsequent treatment, the pouring out of the coarse suspension. Consequently, the liquid of the coarse suspension may penetrate between the covering layer and the wax, causing the smooth surface to be roughened, or during pouring in the molten metal this may penetrate the coarse mass of the mould, so that the casting then also becomes unserviceable.

It has been previously suggested to add glycerine or other substances to the fine suspension in order to avoid cracking, but jellification of the liquid added thus becomes incomplete or is even completely prevented so that an adhering ceramic covering layer is not obtained.

The mean cubic coefficient of expansion of most kinds of wax between 20° and 30° is $\alpha=6\times10^{-4}$, which is a factor 10 higher than that of most metals.

A 10° C. variation in temperature of the wax model thus results in a variation in volume of 0.6%.

What is claimed is:

A method of making a precision ceramic mold comprising the steps of applying a thin layer of a liquid suspension of a relatively finely-comminuted ceramic material over a wax model, drying the layer of finely-divided material on the wax model in an atmosphere having a relative humidity of about 80 to 90% and a temperature below the softening point of the wax, applying over the dried thin layer of finely-comminuted material a layer of relatively coarse ceramic material, and melting the wax to remove the same from the mold.

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