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H. T. SMYTH

2,247,318

METHOD OF CASTING REFRACTORY BLOCKS

Filed Jan. 3, 1939

Fig. 1.

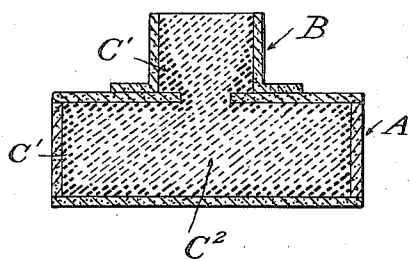


Fig. 2.

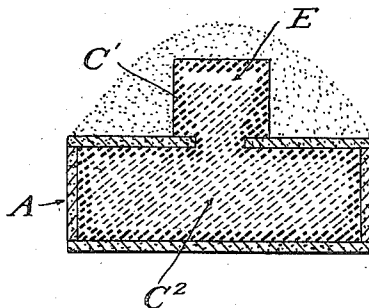


Fig. 3.

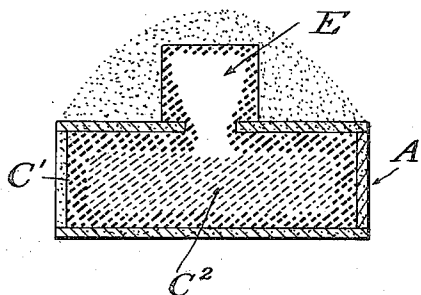


Fig. 4.

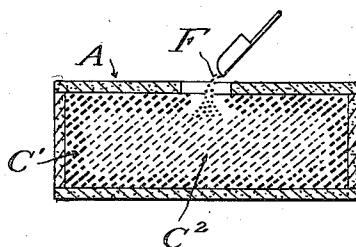


Fig. 5.

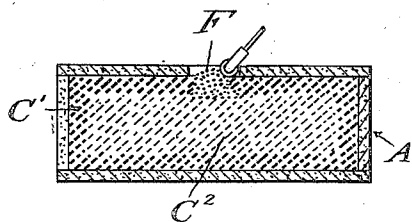
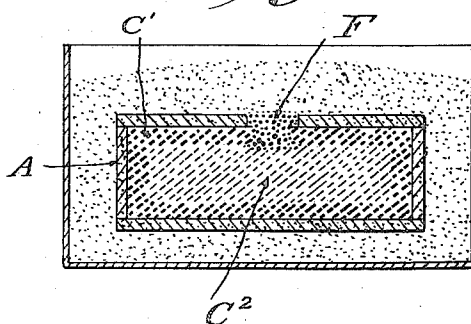


Fig. 6.



Inventor
HAROLD T. SMYTH

By *Wm. Cole Jones*

Attorneys

UNITED STATES PATENT OFFICE

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METHOD OF CASTING REFRACTORY
BLOCKSHarold T. Smyth, Louisville, Ky., assignor to Cor-
hart Refractories Company, Louisville, Ky., a
corporation of Delaware

Application January 3, 1939, Serial No. 249,123

3 Claims. (Cl. 49—79)

In the melting of blocks for furnaces from molten refractory materials the contraction of the molten materials in solidifying in the mold results in the formation of a cavity under the font in spite of the use of font molds of large capacity. These cavities are objectionable in that they permit the entrance into the interior of the block of the material melted in the furnace, thus affording a point of attack.

I have discovered that these cavities may be sealed against entrance of fluxing material by packing them prior to the complete solidification of the block with refractory grains having such a composition that they sinter at a temperature lower than the melting point of the cast material and insulating the packed block, whereupon the residual heat in the block will sinter the grain material.

Referring to the accompanying drawing in which corresponding parts are designated by corresponding marks of reference:

Figures 1, 2, 3, 4, 5 and 6 represent successive steps in carrying out my invention.

In Figure 1 the mold A and its font mold B have been filled with the molten refractory material, and a sufficient interval has elapsed for partial solidification to have taken place, the solidification being in the form of a skin C¹ along the inside of the mold and font walls, leaving a central pool C² of still molten material.

In Figure 2 the font mold B has been removed and the mold and the font casting covered with insulating material such as silocel. Solidification has proceeded with thickening of the solid walls and the creation of a void E at the top of the font casting.

In Figure 3 solidification has further progressed and the void E, which before was only in the font, has progressed until it extends into the body of the block.

In Figure 4 the insulating material over the mold has been removed and the font has been broken off. Grain F is being poured into the mold.

In Figure 5, the void after being filled with the grain is being packed down and smoothed as by a roller.

In Figure 6, insulating material has again been placed over the mold and packed down and the sintering of the grain is taking place.

As a specific example of material suitable for carrying out the above process, but without limiting myself thereto, the molten material may be of the character disclosed in the Fulcher Patent No. 1,615,750, namely, an alumina-silica

compound having a high percentage of alumina, consisting essentially of mullite and/or corundum crystals united by a high melting point glass. The grain used in packing may be the product resulting from crushing such compound. The melting temperature of the mixture is over 1700°, but the glass softens below that temperature and as a result grain of the character stated sinters at a temperature well below its melting point. This sintering point, as I have found, is below the temperature which will be imparted to the grain used in packing when the latter is applied at a sufficiently early stage of the cooling of the casting and the heat in the casting is conserved, as it is in annealing the casting, so that the temperature of the grain is raised to the sintering point.

The sealing of the cavity by the method described is an advantage even when the surface of the block having the cavity is not in contact with molten glass in that it provides a smooth and unbroken surface.

Having thus described by invention what I claim and desire to secure by Letters Patent in the United States is:

1. The hereinbefore described process of producing refractory blocks which comprises pouring the block from molten material, permitting the casting to cool until a cavity is formed therein, packing the cavity with grain of a refractory material having a sintering temperature lower than that attained by the grain during the subsequent cooling of the casting, and sintering the grain by the heat of the casting.

2. The hereinbefore described process of producing cast refractory blocks which comprises pouring the blocks from molten material, permitting the casting to cool until a cavity is formed therein, packing the cavity with grain of a refractory material having a sintering temperature lower than that attained by the grain during the subsequent cooling of the casting, heat insulating the casting, and sintering the grain by the heat of the casting.

3. The hereinbefore described process of producing heat cast refractory blocks, which comprises forming the block with a font, permitting the casting to cool until a cavity is formed in the body of the block, removing the font casting, packing the cavity in the block with grain of a refractory material having a sintering temperature lower than that attained by the grain during the subsequent cooling of the casting, and sintering the grain by the heat of the casting.

HAROLD T. SMYTH.