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N. F. EGLER

HOT TOP FOR MOLDS

Filed April 15, 1927

FIG. I.

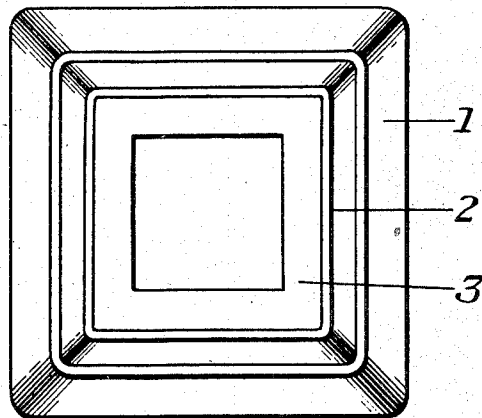


FIG. II.

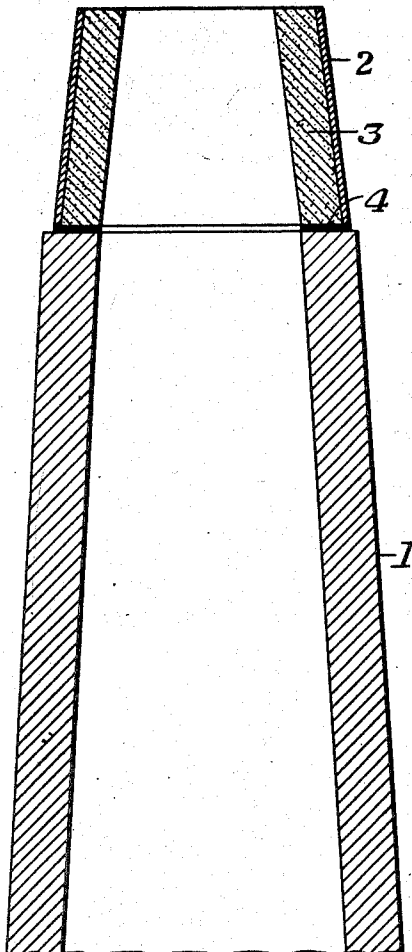
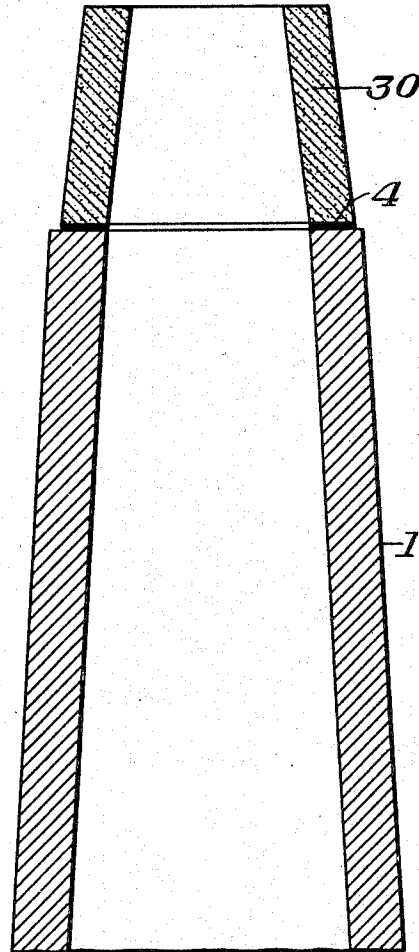


FIG. III.



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HOT TOP FOR MOLDS.

Application filed April 15, 1927. Serial No. 183,976.

My invention relates to hot tops for molds, and, specifically, to hot tops for ingot molds, and consists in a hot top compounded of material which includes and is characterized by a particular substance; in consequence, the hot top of my invention may be used to advantage, affording a casting of excellence; the material is readily and cheaply available; and no inconvenience nor embarrassment follows upon its use, and upon its inevitable presence in the soaking pit.

This application is in part a continuation of an application for Letters Patent, Serial No. 98,810, filed March 31st, 1926.

In the accompanying drawings Fig. I is a view in plan from above, and Fig. II is a view in vertical and medial section of an ingot mold equipped with the hot top of my invention. Fig. III is a view corresponding to Fig. II and illustrating a modification.

In these drawings the walls of the ingot mold are indicated at 1. The ingot mold itself will be understood to be a two-part structure consisting of heavy iron castings.

There is a base part, not shown in the drawings, and upon the base part the casting which defines the side walls of the mold cavity stands. This is the part which in Figs. II and III bears the reference numeral

1. It is open-ended; it defines a columnar space, ordinarily square in cross-section, with rounded corners, and this columnar space tapers. The mold part 1 stands vertically upon the base part and the base part closes the otherwise open end of the mold part 1; it is the smaller open end of the mold part 1 which in this instance is uppermost, and into this open end the molten metal is poured. The hot top is an upward extension

of the approximately vertical walls of the mold part 1. Within that upward extension impurities rise from the teemed-in molten metal; there a somewhat frothy porous condition of the metal develops, because of gases rising to escape, and, in a word, within the hot top the blemishes in the solidifying column of molten metal are concentrated. This blemish containing upper end of the cast ingot is called the sink head. Subsequently this sink head is cut away. It is important then that the blemishes be concentrated and collected within the hot top, and that the ingot throughout the remainder of its extent shall to the fullest attainable

degree consist of sound and solid metal. The hot top must be formed of material which will endure the conditions of service, and a material which is heat-insulating, to the end that the metal immediately within it shall continue in molten condition while the body of the ingot is solidifying, both in order to correct tendencies to piping and to continue to allow the escape of gases. In addition to these essential characteristics, the material of which the hot top is formed should be such that its provision will not add appreciably to the cost of ingot production, and it should be such as not on other account to cause difficulty in mill operation.

The material of which the hot top of my invention is formed is essentially carbon. I conveniently and preferably employ pulverized coke combined with a suitable binder, shaped while in plastic condition, and then hardened to a degree sufficient to render the structure serviceable.

In Figs. I and II of the drawings 2 indicates a flask or container formed preferably of cast iron (it might be formed otherwise; of plates of iron or steel, for example, suitably united and bound together), and of proper shape and size, and this flask supports and affords backing for a body 3 of the essential material indicated above, shaped and hardened within it. When the hot top formed in the manner indicated is applied to the ingot mold 1, the seam between the meeting edges may be faced at 4 with a plastic mixture such conveniently as that of which the body 3 is formed, which after the assembly has been made will dry and harden, and afford a tight joint.

Speaking more specifically of the composition of the body 3, coke and burned lime may be reduced to a pulverized mixture, and worked with water to plastic condition. In plastic condition the mixture may be applied to and packed within and shaped within the flask 2.

Ordinarily the material will be rammed in the manner usual in mold-making, in a cavity formed by and between the flask 2 and a core of the shape and size of the ultimate sink head, placed temporarily within. When the material has been rammed to place, the core will be withdrawn. The so formed hot top is allowed to set before it is used.

The ratio of lime to coke in the mixture

mentioned need not exceed 10%, and if the coke be finely divided it need not exceed 7% or 8%.

In place of lime, another binder may be used. Silicate of soda, for instance will serve, and the plastic mass may be formed with silicate of soda and water in the manner sufficiently familiar in the refractories industry. There is a product of the sap of spruce trees, soluble in water, and known as lignin liquor. Its characteristics are set forth in the specification of Letters Patent 1,525,328, granted February 3, 1925, on the application of James E. Sheaffer. This lignin liquor is a by-product of paper making; it may be had from the paper mills either in desiccated and finely divided condition or in concentrated aqueous solution. It also is suitable as a binder for the finely divided coke in the practice of my invention.

The materials preferably employed, coke dust and lime, are by-products in steel plants and are available in adequate quantities, and accordingly the invention may in such situations be practiced without added cost, so far as concerns the essential materials.

In the practice of the invention the body 3 formed essentially of carbon is non-conductive of heat, and on that account the hot top serves well its intended end; the flask 2 which contains it is strong to sustain the weight of molten metal within and to prevent disruption of the hot top; and the seam between hot top and mold wall 1 is secure against leakage.

When an ingot has been cast within a mold equipped with the hot top of my invention, and when after cooling the mold is to be stripped away, preparatory to the removal of the ingot to the soaking pit, the flask 2 of the hot top is first raised and set aside. In this removal of the flask 2 the body of material 3 breaks and disintegrates. It ordinarily is serviceable once and does not continue as an integral body for successive casting operations. The body 3 will break and crumble somewhat with the removal of flask 2, and more or less of its substance may remain adherent to the ingot. Neither the

condition of the ingot nor the economies of operation admit of any cleaning of the ingot before it goes to the soaking pit. And here a further advantage of my invention becomes apparent. It is true of certain materials which have been used in the formation of the hot tops that the unintended but unpreventable carrying of them over into the soaking pit has caused trouble. Those other materials, under the high temperatures which there obtain, attack the brick walls of the soaking pit and cause rapid destruction. Not only are the materials of which my hot top is formed inert, so that, carried into the soaking pit, they have no destructive effect there, but accidentally present, they are beneficial. The floor of the soaking pit is ordinarily formed essentially of carbon and requires replenishment. The accumulation on the floor of the soaking pit of the material used in the hot top of my invention is in effect a replenishment of the floor with essentially the desired material, and such replenishment renders unnecessary the shoveling into the soaking pit of material of the same general sort.

It is not essential that a flask 2 be employed. The composition described is coherent and moldable. It may be molded as bricks are molded, and when molded it may be withdrawn from the mold and dried. It may be dried in the open air or in an oven. When dry it will be found to be so far self-sustaining that it is serviceable in its separate condition, without a supporting flask. In Fig. III such a self-sustaining molded hot top is indicated at 30.

I claim as my invention:

1. A hot top for a mold formed of finely divided carbon integrated with a binder.
2. A hot top for a mold formed of coke dust integrated with a binder.
3. A hot top for a mold formed of finely divided carbon integrated with a binder within a sustaining shell.

In testimony whereof I have hereunto set my hand.

NICKLAS F. EGLER.