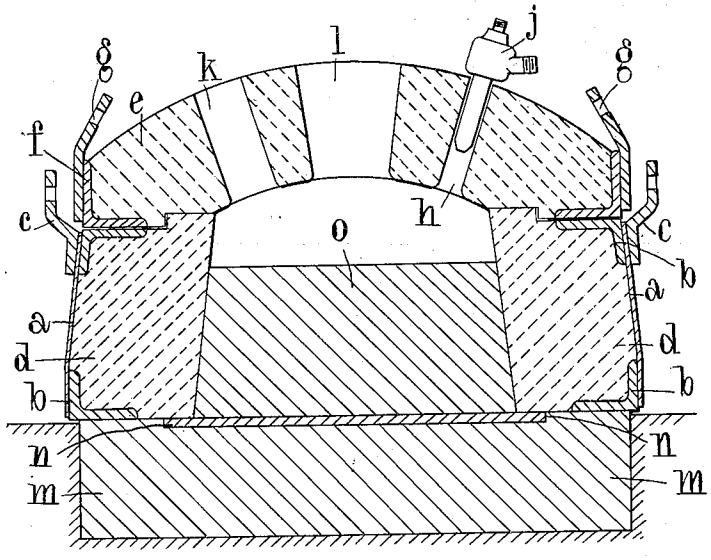
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CASTING OF INGOTS

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CASTING OF INGOTS.

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The invention relates to the casting of steel ingots.

In casting steel ingots, difficulties arise in connection with the segregation of certain elements such as carbon, sulphur and phosphorus and also in connection with the looseness of structure about the central axis of the ingot and the main object of the present invention is to overcome or assist in overcoming such difficulties so as to secure ingots of greater homogeneity and soundness.

With the object indicated:—

The invention consists in a process of casting steel ingots comprising pouring the molten metal into a mould having its longitudinal dimensions greater than its vertical, thick refractory material covering the sides of said mould and a bottom chill of large dimensions preferably of metal, preheating the mould to a high temperature of the order of molten steel before pouring the metal therein, and continuously supplying heat to the upper surface of the molten metal after casting so that the upper layer is the last to solidify.

The invention also consists in the process of casting steel ingots to be hereinafter described or indicated.

The accompanying drawing shows a diagrammatic sectional elevation of one structural form of the invention by way of example.

In carrying the invention into effect according to this form, the mould consists of a strong sheet steel casing, *a*, slightly conical in form as shown and reinforced by heavy angles, *b*, top and bottom. The casing is lined with shaped firebrick quoins, *d*, closely fitted together and to the outer casing and is preferably provided with lifting eyes, *c*, riveted to the sides.

The cover, *e*, is likewise made of suitably shaped firebrick quoins fitted together and into a massive steel angle ring, *f*, which retains them. The cover, *e*, may be lifted by the eyes, *g*, riveted to the ring, *f*.

In the cover one or more suitable holes, *h*, are provided for the insertion of gas or oil burners, *j*, and also one or more suitable vent holes, *k*, to allow the hot gases to escape. These burners are used for applying heat to the surface of the metal after pouring to keep the top layer molten until the last, while the mould is preheated by placing it with its cover in place on the top of an adjoining firebrick table containing suitable gas or oil burners delivering flame upwards. If desired the burners, *j*, may be used for preheating the mould.

The cover is also provided with a hole, *l*, for use when pouring.

The chilled block, *m*, may be of cast iron or steel formed of one or more pieces fitted together and preferably protected on its upper surface against the wash of the molten steel by a thin steel plate, *n*, which is easily renewable.

The chill block may be artificially cooled in any well-known way such as by gills, or supporting ribs, cast on the underside and integral with the block, and traversed by artificial airblast.

It is evident that by varying the duration and intensity of heating and the thickness and insulating quality of the firebrick of the mould, any desired rate of cooling of the sides of the ingot can be obtained and that further in some cases it may be found desirable to thicken the firebrick and form heating flues and burners within it or provide other means of heating such as electrically heated coils.

The internal surface of the mould must be kept as smooth as possible with any suitable wash, such as clay, graphite, carborundum or the like, so as to part freely from the ingot after it has sufficiently cooled and contracted.

According to the form shown in the drawing, the breadth or diameter of the ingot, *o*, is twice the height, but this ratio may be varied according to the size of the ingot, the facilities available for forging it and the final characteristics desired in the finished forging.

By means of the apparatus described, cooling of the ingot due to the heat capacity of the massive metal base, *m*, and the use of the burner or burners, *j*, takes place from the bottom upwards with the isothermals lying approximately in horizontal planes.

When the ingot is sufficiently set the mould is removed by a crane in the ordinary way, leaving the ingot standing on the block.

By virtue of the invention the segregates are distributed more evenly throughout the ingot while in addition, due to the molten

metal solidifying more nearly at the same time throughout the cross section of the ingot, axial weakness or looseness of structure is considerably diminished and in certain cases may be entirely eliminated.

Thus, in an actual case, a steel ingot weighing 2 tons 14 cwt. cast in accordance with the methods above described by help of a base block weighing 10 tons, was found on examination to be sound throughout and of great chemical homogeneity.

Having now described our invention, what we claim as new and desire to secure by Letters Patent is:—

A process of casting steel ingots which comprises preheating the walls of a mold to a high temperature of the order of molten steel before pouring the metal therein, while maintaining the mold chill relatively cool, pouring the molten metal into the mold to form a pool having its longitudinal dimensions greater than its vertical, and continuously supplying heat to the upper surface of the molten metal after casting so that the upper surface is the last to solidify.

In testimony whereof we have signed our names to this specification.

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