

UNITED STATES PATENT OFFICE.

CARL WITTENSTRÖM, OF STOCKHOLM, SWEDEN.

FACING OR MOLDING MATERIAL FOR MOLDS FOR CASTING METAL.

SPECIFICATION forming part of Letters Patent No. 317,062, dated May 5, 1885.

Application filed April 15, 1884. (No specimens.)

To all whom it may concern:

Be it known that I, CARL WITTENSTRÖM, engineer, a subject of the King of Sweden, residing in Stockholm, in the Kingdom of Sweden, have invented a new and useful Improvement in Sand Molds for Castings, of which the following is a specification.

In using sand molds in the production of castings from metals having a high melting-point, as iron or steel, and especially from iron nearly free from carbon, the sand plays a prominent part in obtaining a good and fine product. A facing-sand in every way suitable has never, to my knowledge, hitherto been produced. It should satisfy many important requirements. It should be infusible and not stick to the casting, nor act in any way injuriously upon the latter—as, for instance, it should not contain any carbonaceous matter, which may tend to make the castings harder. After many experiments I have found that ground hard-burned fire-clay—as, for instance, fire-bricks—is the most suitable material. Old furnace-bricks of good fire-clay, well cleaned from glaze or the like, give the best and cheapest sand. The clay, however, ought to be of the most fire-proof kind, and be as free from other ingredients as possible.

I would here state that burned fire-clay has sometimes been used as an ingredient in facing-sand employed in the production of fine art castings in bronze, but always in admixture with silicious sand, and usually with powdered charcoal. Such admixtures do not produce facing-sands suitable for use with metals requiring very high temperatures in the casting operation. The silicious sand fluxes the clay, causing the sand to adhere to the face of the casting, and powdered charcoal, by combining with the metal, tends to alter and deteriorate the face of the casting, especially if of comparatively pure iron or steel, and its ash also tends to render the facing-sand less refractory.

My facing-sand is prepared in the following manner: One volume pure pulverized sugar is dissolved in about two volumes pure water and strained, and then one-eighth volume of kerosene or like hydrocarbon oil is added. Twenty-four to thirty volumes powdered hard-burned fire-clay is moistened with the foregoing solution, and the mass is passed through

a coarse sieve several times, so as to be rendered equally moist throughout. As this facing-sand ought to be as moist as common facing-sand, more water should be added, if necessary. Instead of sugar, other binding substances can be used, such as molasses, gum, glue, &c.; but I prefer sugar, because it is clean and of even quality, and may be had everywhere.

Thus my facing-sand differs from every other facing-sand known to me in the following, viz: First, it is practically infusible, and does not, therefore, stick to the castings, which lie perfectly loose and clean when the mold is opened, and require but insignificant cleaning; second, it does not carburate the castings; neither will it make them porous or brittle, as the silicon facing-sand seems to do; the castings will preserve the nature of wrought-iron or steel completely, according to their percentage of carbon, &c.; third, it gives to the castings an exceedingly beautiful light-blue glossy surface; and, fourth, it is cheap and easy to obtain at most iron-works where fire-bricks are used.

Although fire-clay may have been before used as an ingredient in facing-sand, the same results that are now obtained have never before been attained, which may be attributed to the following reasons: The fire-clay has not been burned sufficiently. The fire-clay has been mixed with other substances—as silica and carbon in different shapes, &c.—which have made the sand fusible and caused sticking to the surface of the castings. The fire-clay has not been sufficiently pure and free from alkalis. The fire-clay has not been sufficiently fire-proof for some other reason. Blacking has been used on the surface of the molds, whereby the castings have been made hard on the surface.

As to the results, which have never been attained by anybody else, there may be mentioned that with the new facing-sand it is possible to make castings of mild steel, and even of the softest wrought-iron, the castings retaining their quality of mild steel or soft iron without any kind of annealing or other treatment, the castings being practically solid and their surface perfectly smooth and of a beautiful appearance.

The pattern is first covered with this fac-

ing-sand to the depth of a quarter or half an inch, depending on the thickness of the castings, and afterward the flask is filled up with other coarser sand, which ought to contain a sufficient percentage of clay or other binding substances to become firm after drying. A coarser sand should be selected, because it dries quicker and does not crack, and is more penetrable for the air and gases during the casting. The runners are not made larger than for cast-iron, but so placed that the castings will be cast in vertical position. For hollow castings, the cores are made of the above-described facing-sand. All larger cores must be hollow.

The molds are usually made after the manner of ordinary sand-molding in the common flasks, having a cope and a drag, and the flasks are preferably of metal. The molds having been made in the flasks are then dried therein.

The drying of the molds is best done in furnaces heated with gas, or in furnaces heated with hot water or steam passing through a system of pipes in the bottom and walls of the furnace. The heat is easier to regulate in all these cases than in other kinds of drying-furnaces. To avoid cracks in the molds, the heat should be increased gradually up to the boiling-point of water, but not much above, as then the binding material will be destroyed and the mold made useless. These furnaces are also free from dust and absolutely free from ashes, which easily fastens to the wet mold, and as they cannot afterward be re-

moved they destroy the surface of the castings, and also make them porous.

The molds can certainly be dried in furnaces fired with solid fuel; but the furnace should then be a so-called "muffle-furnace." Should the fire-place be situated within the furnace the molds must be covered and the fire well attended to, all which causes much trouble.

I hereby disclaim being the first to employ hydrocarbon in admixture with the previously-known sands, loam, and other materials employed by molders in casting.

What I claim is—

1. A facing or molding material consisting of hard-burned ground fire-clay and a binding material in quantity sufficient to impart firmness to the molding material after being dried in the mold form, the whole being free from any substance containing any substantial quantity either of silica, lime, magnesia, or like matter of a fluxing nature, or of carbonaceous material, as set forth.

2. A facing or molding material consisting of hard-burned ground fire-clay, kerosene or other hydrocarbon oil, and a binder, the whole being substantially free from fluxing or hardening substances, as specified, for the purposes set forth.

CARL WITTENSTRÖM.

Witnesses:

ALBERT NILSSON,
J. F. BACKLUND,
Both of Stockholm.