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MANUFACTURE OF FACING COMPOSITIONS
FOR METAL CASTING MOLDS

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This invention relates to the production of a composite carbonaceous base for facing compositions, such as employed in the casting of iron, bronze and the like.

The principal objects of the invention comprise the expeditious and economical production of products of the aforesaid character, all of which are adapted to effectively prevent the fusion of sand particles in the surfaces of molds containing such products with the metal that contact with such surfaces during a metal casting operation. Other objects of the invention are hereinafter set forth.

As is well known, most facing compositions for metal-casting molds, whether formed of sand or metal, have as their principal ingredient some form of carbon, such as graphite or gas-house carbon, coke breeze and the like, and such compositions are either dusted or sprayed on the molds in an attempt to create an insulating layer between the surface of the mold itself and the incoming molten metal which will serve during the casting operation to protect the molten metal from fusing with the sand or metal surface of the mold employed. These facing compositions are relatively expensive since they all contain from about 70% to 90% of carbon, and they must be ground extremely fine so as to render them capable of passage through a dust bag or spray nozzle.

My investigations have led to the discovery that it is not essential that the carbon particles in mold-facing compositions shall be of solid carbon throughout, but that the same may consist of nuclei of powder-like refractory particles pre-coated with a thin coating or layer of carbon in the form of coke or soot deposited thereon in situ as a result of the decomposition of heavy hydrocarbons which are capable on heating in the substantial absence of air of producing voluminous quantities of colloidal soot.

In the production of an improved substitute for carbon ingredient of the facing composition disclosed in the Reissue Patent No. 19,396 and other facings comprised principally of carbonaceous ingredients, I preferably proceed as follows:

200 parts of silica flour or fly ash or like powdered refractory base material, desirably of 125 mesh or finer, capable of withstanding a temperature of at least about 800° C. without fusion and of a degree of fineness preferably such that the same will pass a 115 mesh screen, are introduced into a mixer and then 40 parts of a carbonaceous, soot-producing substance, desirably finely pulverized solid coal tar pitch, is admixed with said refractory material, in the cold, with

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constant stirring. Then, while still constantly stirring the mass, sufficient heat is applied, indirectly to the same, to melt the carbonaceous ingredient and to thereby effect the even coating of all particles of the refractory base material therewith. The pitch-coated particles are then subjected, in the substantial absence of air, to sufficient additional heat while constantly stirring the mass to coke the pitch-like, soot-producing substance and produce voluminous sooty fumes which deposit an enveloping layer of soot on the base particles. An especial advantage of this coking action resides in the fact that substantially all the volatiles are driven off and, consequently, during the casting stage a minimum of gases will be evolved in the mold cavity. The mixture is then allowed to cool off and when cold is again reduced to a fine powder, desirably as stated of a degree of fineness such that it will pass through a 115 mesh screen. The resultant product is a perfect substitute for the carbon, graphite or coke ingredient of the facing composition in said Reissue Patent No. 19,396 since such coke will function as a heat insulating medium and effectively prevent any fusion of the metal with the sand particles whereby any so-called burn-in of the said particles is prevented.

Several layers of the pitch or other carbonaceous or carboniferous coating material may be deposited, if desired, on the refractory base powder and consequently the thickness of the film of carbon deposited on such base may be controlled.

Other powder-like refractory bases which may be advantageously employed in addition to those above set forth, are zircon sand, kaolin, fly ash and stack dust. In fact, almost any refractory base fusing above about 650° C. and of a fineness of at least about 100 mesh is suitable, provided it is not objectionably chemically active.

For the carbon-producing or soot-yielding component of my improved products, I preferably use coal tar pitch as above stated, but other substances such as asphalt, gilsonite, rosin, pitch, anthracene oil and naphthalene are excellent substitutes therefor since all of them readily decompose and yield voluminous sooty fumes when contacting molten metal heated above 650° C. As set forth in the technical work by Herbert Abraham entitled "Asphalt and Allied Substances," fifth edition, 1945, vol. 1, published by D. Van Ostrand, Inc., the fusion point of coal-tar pitch ranges from about 80° F. to 300° F. or even higher, (page 405), that of asphalt, both natural and residual petroleum asphalts, between 80° F. and 225° F. (page 496), that of gilsonite between

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about 270° F. and 400° F. (page 251) and that of rosin pitch between about 100° F. (page 329).

Another advantage possessed by facings prepared with my improved composite base material is that the nascent, colloidal soot that is deposited in situ on the refractory particles thereof is extremely reactive chemically and unites with the oxygen in the mold during the casting stage to create a reducing atmosphere therein whereby the formation of black iron oxide or so-called scale on the casting during the solidification thereof is minimized.

This application is a continuation-in-part of my abandoned application Ser. No. 643,466, filed January 25, 1946, which was co-pending, until abandoned on October 5, 1946.

Various changes in and modifications of the foregoing procedures and products, within the scope of the appended claims, may be made without departing from the spirit of my invention.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. The method of making a composite base material for facing compositions for metal-casting molds, which comprises mixing together a major portion of a refractory, finely comminuted substance of a degree of fineness of at least about 100 mesh which is infusible below about 700° C., and an amount of a heavy hydrocarbon belonging to the group consisting of a solid, a semi-solid and a normally non-volatile liquid that is sufficient, if melted and stirred into the refractory substance, to evenly coat the particles thereof, heating the mixture while constantly

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stirring the same until the hydrocarbon is melted and the particles of the refractory substance have been evenly coated therewith, then while still constantly stirring the mass applying sufficient additional heat, but with but little access of air to the mass being heated, to drive off the volatiles therefrom and produce soot-like fumes which deposit as coke on the particles of the mass being treated and then discontinuing the heating and when the mass is cool recovering the resultant product in the form of a fine powder.

2. The method as claimed in claim 1, wherein the heavy hydrocarbon employed is pitch.

3. The method as claimed in claim 1, wherein the heavy hydrocarbon employed is asphalt.

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