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FOUNDRY FACING AND METHOD OF MAKING SAME

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This invention relates to the production of facing compositions for use in the casting of metals in sand molds and has for its particular objects the production of an inexpensive, yet remarkably efficient facing composition that renders it possible to obtain castings having smooth, fine-grained surfaces, free from superficial pits, pin holes and blow holes, as well as being devoid of burnt-in sand or fused silica skins and from which castings the loosely adhering sand can be readily peeled, thus requiring but a minimum of brushing, tumbling or milling operations. Furthermore the castings so obtainable are especially suitable for the reception of enamel coatings and for galvanizing or nickeling without necessitating the preliminary pickling thereof.

In my prior Patent No. 1,787,964, I have disclosed a facing composition in which bentonite or a colloidal clay of the order of bentonite is employed as an essential ingredient thereof. My further investigations have led to the discovery that such bentonite or like colloidal clay of the order of bentonite in its general characteristics, can be wholly or partially dispensed with, if desired, in the manufacture of such facing composition for the casting of metals, without deleteriously affecting the properties of such facing composition insofar as the production therewith of satisfactory metal castings are concerned, and furthermore, that my improved facing composition, either free from bentonite or substantially free therefrom, is peculiarly satisfactory for the production of heavy, thick castings which, because of the unusually high thermal capacity thereof, due to their size, have heretofore rendered them extremely difficult to cast, except where resort was had to a slicking operation and expensive finishing operations were also employed and even then the number of rejects was often rather high due to scabbing and washing.

In carrying out my invention, I preferably proceed as follows:—

100 parts of coke, either metallurgical or beehive coke, foundry coke, retort carbon or the like, is intimately mixed with 30 parts of crude molasses or blackstrap, commonly known as foundry molasses, the molasses being atomized as a spray on a hot mass of coke while the latter is being revolved in a mixer and the ingredients being thoroughly rubbed together during such mixing operation in order to thoroughly coat and impregnate the particles of coke with the molasses binder. Following the mixing operation the mixture is heated to a sufficient temperature, preferably about 110° to 120° C. to evaporate the moisture and to produce a product which, when cold, has a dry appearance and can be readily ground to a dry dust. It is essential that the amount of molasses or its equivalent, such as dextrine, acacia gum, tragacanth gum, sugar or other similar readily water-soluble gums which are employed, should be present in the finished product in a substantially undecomposed state and in sufficient quantity, not less than 7% by weight of the finished product, to overcome the semi-water repellent properties of the coke base.

While in my aforesaid Patent No. 1,787,964, I have disclosed the employment of dextrine or like deflocculent in varying proportions in conjunction with bentonite, I am unaware that any one has heretofore proposed the simple admixture of a sugar or water soluble gum binder, in amount not less than 7% of the weight of the mixture, in a facing composition in which either no bentonite was employed or the content of bentonite or like highly colloidal clay material was less than 10% by weight of the mixture for, as set forth in my said patent, it was proposed to employ the gum essentially as a deflocculent or binder and the bentonite ingredient was relied upon essentially as the moisture absorbent or moisture compensating medium because of its high affinity for moisture. However, in my new composition in which the water soluble gum or sugar ingredient is employed in considerably larger quantities, it functions as the moisture absorbent or moisture compensating medium, even without the presence of any bentonite, or other like colloidal clay of the order of bentonite in its general characteristics, and this improved facing composition has characteristic advantages, which for many purposes and particularly for heavy, thick castings, render it even more suitable than compositions containing more than 10% of bentonite as the water absorbent or moisture compensating medium, since it is possible to apply relatively thick coats of such facing composition to the surface of the molds, even the vertical surfaces thereof, and the entire coating will tenaciously adhere to the mold surface without there being any tendency for the same to be displaced under the action of the flowing metal. Such a thick facing layer serves as a refractory insulating medium which effectively withstands the action of the hot molten metal and thereby serves to protect the molds against the erosive, burning or other deleterious actions thereof, and as the facing does not tend to run before the molten metal or become otherwise washed off or displaced during the casting operation, the cutting, rat-

tailing, cold-shutting (i. e. the enclosures of small heaps of facing in the metal) or other objectionable results frequently encountered heretofore are eliminated. Furthermore, this new facing when dusted on said molds produces a surface upon which the metal will lie quietly without the generation of bubbles or froth, since the steam generated by the action of heat upon the moist sand beneath such layer tends to escape through the interstices of the sand mold without penetration through the insulating facing layer.

While I preferably employ about 30 parts of crude molasses per 100 parts of coke, I may, if desired, employ larger quantities, say 35 to 40 parts per hundred parts of coke depending upon the absorbent properties of the coke, but in no case where reliance is had upon the molasses or sugar or gum alone, do I employ less than 7% thereof by weight of the dry finished mixture.

The molasses in the dry finished product not only acts as a deflocculent and prevents the piling up or lumping of the particles when the facing is dusted on the surface of a sand mold, but it possesses the highly desirable property, owing to its strong affinity for moisture, of rapidly dispersing the moisture absorbed from the underlying sand surface throughout the facing layer and thereby the facing is intimately united to the sand surface with the consequence that the washing of the sand ahead of the molten metal and the accumulation of the facing in the low spots of the mold is prevented. This quick dispersion of the water normally present in the surface of the sand mold is of the utmost importance especially where heavy, thick castings are being poured, as but about 7 to 10 minutes elapse between the facing of the mold and the pouring of the metal thereinto and unless there is a good absorption and dispersal of the water originally present in the sand surface, not only will the facing fail to properly adhere to the mold, but the steam generated locally at different spots in the mold surface will blow the casting.

With my improved product, it is possible to build up layers of at least ⅛" in thickness, if desired, on the surfaces of molds utilized in the pouring of heavy castings, whereas with facing compositions heretofore employed, with the exception of that described in my co-pending application herein referred to, merely a skin-coat of facing material could be applied to a molded surface as it was necessary to blow off all the loosely adhering material and consequently slicking operations were required in all those cases where more than a skin coat of material was desired.

By the term "adhesively united", as employed in the claims, is intended that kind of a union as results from the deposit of the gummy material on the surface of the carbon particles from the gummy material in a liquefied condition, due either to the prior solution of the gummy material before admixture with the coke or the spraying of the mixture of dry gummy material and dry carbon particles with water in order to convert the gummy material into a liquefied condition and effect such adhesive union, or due to the presence in the admixture of carbon particles and gummy material of a hygroscopic substance or material capable of extracting water from humid atmosphere which causes liquefaction of the gummy material and such adhesive union with the coke particles.

Having thus described my invention, what I claim and desire to obtain by United States Letters Patent is:—

1. The method of making a dry facing composition for metal-casting sand molds, which comprises intimately mixing together finely divided carbonaceous material and liquid molasses and then reducing the mixture to a dry condition at an elevated temperature sufficient to effect the evaporation of the moisture, but insufficient to effect the substantial decomposition of the solid content of the molasses; and the amount of molasses employed being such that the solid content thereof is at least 7% by weight of the dry finished product and sufficient to impart to said product the property of absorbing and rapidly dispersing moisture contained in the surface of the sand mold and to cause the product to firmly adhere to a mold surface upon which it is dusted without there being any substantial tendency for the same to be displaced under the action of the flowing metal during the casting operation.

2. The method of making a dry facing composition for the surface of metal-casting sand molds, which comprises impregnating and coating finely divided particles of a carbonaceous facing material with a minor percentage of liquid molasses and then reducing the mixture to a dry condition at a temperature sufficient to effect the evaporation of the moisture content of the molasses, but insufficient to effect the substantial decomposition thereof and destroy the high affinity of the dry mixture for moisture and then reducing the mixture to a dust-like condition, the amount of molasses being not in excess of 40 parts of liquid molasses per 100 parts of the carbonaceous material and being in excess of an amount sufficient to correspond to at least 7% of molasses figured on the dry basis in the finished dry mixture.

3. A dry facing composition for metal-casting sand molds, comprising principally finely divided carbon particles the majority of which are adhesively united with a water-soluble organic gummy material in an undecomposed condition, such composition being characterized by its affinity for moisture contained in the surface of sand molds used in casting operations and its capability of permitting the application of a thick layer of facing, of ⅛ of an inch in thickness, by a mere dusting operation, to a sand mold surface without there being any tendency for the same to run before the molten metal or otherwise become washed off or displaced in the casting operation.

4. A dry facing composition for metal-casting sand molds, comprising principally finely divided carbon particles intimately admixed with the solid content of molasses and the amount of such solid content of molasses present in the mixture being in excess of 15% by weight and not exceeding 50% by weight of such dry mixture.

5. A dry facing composition for metal-casting sand molds, comprising principally finely divided carbon particles directly and homogeneously coated with an organic gummy material having a rapid moisture dispersion rate and said mixture not containing more than between 9% to 10% of colloidal inorganic ingredients.

6. A dry facing composition for metal-casting sand molds, comprising principally finely divided carbon particles directly and homogeneously coated with dextrine and the amount of such dextrine exceeding 7% and not more than 50%, calculated on the dry basis, by weight of the mixture and the amount of colloidal inorganic in-

gredients in said mixture not being more than between 9% to 10%, by weight of said mixture.

7. A dry facing composition for metal-casting sand molds, comprising principally finely divided carbon particles directly and homogeneously coated with molasses solids and the amount of such molasses solids being at least equivalent of 15% and not exceeding 50%, by weight of the mixture of liquid molasses, and the amount of colloidal inorganic ingredients in said mixture not being more than between 9% to 10% by weight of said mixture.

8. A dry facing composition for metal-casting sand molds, comprising principally finely divided carbon particles directly and homogeneously coated with molasses solids and the amount of such molasses solids exceeding the equivalent of 25% and not more than 50%, by weight of the mixture of liquid molasses, and the amount of colloidal inorganic ingredients in said mixture not being more than between 9% to 10% by weight of said mixture.

9. A dry facing composition for metal casting sand molds, comprising principally finely divided carbon particles and containing at least seven percent by weight of a water-soluble gummy material having a rapid moisture dispersion rate, the majority of said carbon particles being adhesively united to said gummy material and the total amount of said carbon particles and said gummy material, calculated on a dry basis, exceeding 90% by weight of the mixture, said composition being characterized by its capability of permitting the application of a thick facing layer thereof up to ⅛ of an inch in thickness to a sand mold surface by a mere dusting operation without there being any tendency for the same to run before the molten metal when the mold is poured or otherwise become washed off or substantially displaced during the metal casting operation.

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