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FOUNDRY MOLD COATING

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5 Claims. (Cl. 22—189)

This invention relates to a composition for foundry molds. More particularly it relates to such a composition containing zircon as its principal ingredient.

In the art of casting metals, both ferrous and non-ferrous, into sand molds, foundrymen are consistently having trouble with the "burning in" of the sand to castings. The reason for this distressing problem is that ordinary foundry silica sand is not refractory enough to withstand the hot molten metal without some degree of fusion of the foundry silica sand. This fused sand becomes entangled in the molten iron along the walls of the molds and cores, which makes a very rough surface on the castings when they become cold enough to be shaken out of the sand. This rough surface on the cuttings must be cleaned by sand blasting, and very often by chipping, thereby increasing the cost of the casting. The embedded fused sand, if not removed entirely, destroys the cutting edge of machine tools when the castings are being machined to precision size. In order to overcome this difficulty, it has been suggested to employ zircon instead of silica as the foundry mold material or mold lining, as described in Bensing Patent No. 1,886,249. With this material, however, an additional difficulty becomes apparent. The zircon sand does not "burn in" the casting, but the iron in the casting has a tendency to penetrate the mold sand, forming deposits of iron oxide therein. In other words, the casting material penetrates the mold, instead of the mold material penetrating the casting.

These difficulties are overcome, according to the present invention, by providing a lining or coating containing zircon and carbon, preferably with the inclusion of a suspending agent, for foundry molds or cores either of zircon or silica sand.

In using zircon as a foundry mold material, it has been customary to employ the granular material as found in nature. The use of finely-divided or milled zircon in the mold proper is not feasible because the material then becomes so dense, tight and non-porous that cracks are very likely to occur and gases evolved during casting and cooling have no opportunity to escape. It has been found, however, that a coating containing finely-divided zircon may be applied to the metal contacting surfaces of the mold. This is accomplished by brushing or otherwise coating the composition, and the composition is then known as a "mold wash." A zircon mold wash can be applied either to a silica sand mold or a zircon sand mold, the former usually being employed for economy's sake unless the casting temperatures are excessively high. In any case, the advantage of a mold wash is that a fine, smooth surface can be formed to contact the metal, which is not possible with the coarser granular material. Smooth surfaced castings are thus obtained, and a minimum amount of finishing operation is necessary.

To secure the proper fluidity in a mold wash to enable it to be brushed or coated, a certain amount of water must be added. Since zircon is a relatively dense material, and does not exhibit colloidal behavior by itself, a suspending agent must be added to keep it from settling out. One of the best of these agents is bentonite, but this and other suspending agents have the disadvantage of decreasing the refractoriness of the zircon. In addition, because of the great affinity of bentonite for water, it increases the tendency of the material to form cracks upon heating to the high temperatures encountered in casting molten metal. The amount of bentonite necessary with zircon compositions containing no carbon, but with sufficient water (e. g. 45% based on the weight of the zircon) to secure the fluidity necessary in a mold wash, is around 8%. With this quantity, both decrease in refractoriness and cracking are likely to occur.

By incorporating, in a mold wash composition containing finely-divided zircon, a suitable quantity of finely-divided carbon, the difficulty of penetration of iron oxide into the mold is substantially completely avoided. In addition, a satisfactory fluid suspension of the mold wash in water can be obtained with considerably lesser quantities of suspending agents, particularly bentonite, than necessary without the presence of carbon, and under certain conditions without any bentonite or other auxiliary suspending agents. We have found that a satisfactory composition is produced with 1 to 50 parts of carbon and 1 to 4 parts of bentonite per 100 parts of zircon.

Various forms of carbon may be used, such as graphite, lampblack, carbon black, coke, etc., but it is preferred to use low ash, low volatile bituminous coke, sometimes called by-product, bee hive, metallurgical, or foundry coke, etc. The suspending agent, which also preferably acts as a bonding agent or binder, is preferably bentonite, as stated previously, but may be clay, aluminum, hydrate, etc. All the ingredients should be finely-divided, which may be accom-

plished by grinding the materials together in a ball mill in well known fashion. This grinding should preferably be continued until all the materials are capable of passing a 180 mesh screen.

The mixed finely-divided ingredients are usually sold in commerce in dry form. When it is desired to apply the mixture as a coating to foundry molds, it is added to a suitable quantity of water to attain a fluid consistency, and agitated until thoroughly mixed. Due to the high specific gravity of zircon, 1.7 times the specific gravity of silica, further agitation may be necessary at intervals to maintain proper uniformity in the suspension. The fluid suspension thus formed is coated or applied to molds or cores in any suitable manner, such as brushing, swabbing or spraying. Brushing is preferred. For small molds and cores, one coat is generally sufficient, but for large molds and cores two or more coats may be necessary.

In addition to the above ingredients, other materials customarily used in foundry mold practice, such as molasses water, may be added.

The invention having been described, the following specific mode of practicing the invention is now described: 100 parts of —200 mesh zircon, 8 parts of a low ash, low volatile bituminous coke (—200 mesh), and 1½ parts of bentonite are thoroughly mixed together. This mixture is added to 45 parts of water, and after mixing is ready for application to foundry molds or cores.

When parts are mentioned, parts by weight are understood.

As many variations are possible within the scope of this invention, it is not intended to be limited except as defined by the appended claims.

We claim:

1. A coating for foundry molds and cores comprising 100 parts of finely-divided zircon and 1 to 50 parts of finely-divided carbon.

2. A coating for foundry molds and cores comprising 100 parts of finely-divided zircon, 1 to 50 parts of finely-divided carbon, and 1 to 4 parts of a finely-divided suspending agent.

3. A coating for foundry molds and cores comprising 100 parts of finely-divided zircon, 1 to 50 parts of finely-divided bituminous coke, and 1 to 5 parts of bentonite.

4. A foundry mold comprising a granular material taken from the class consisting of silica and zircon provided with a coating containing 100 parts of finely-divided zircon and 1 to 50 parts of finely-divided carbon.

5. A foundry mold comprising a granular material taken from the class consisting of silica and zircon provided with a coating containing 100 parts of finely-divided zircon, 1 to 50 parts of finely-divided bituminous coke, and 1 to 4 parts of bentonite.

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CERTIFICATE OF CORRECTION.

Patent No. 2,282,349. May 12, 1942.

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It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 1, first column, line 17, for "cuttings" read --castings--; page 2, second column, line 17, claim 3, for "5 parts" read --4 parts--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 23rd day of June, A. D. 1942.

Henry Van Arsdale,
Acting Commissioner of Patents.

(Seal)