Patented Aug. 13, 1946 2,405,650

UNITED STATES PATENT OFFICE

2,405,650

CORE FOR METALLIC CASTING AND COMPOSITION FOR SAME

Carl E. Hartwig, Teaneck, and Raymond E. Roehrenbeck, Lyndhurst, N. J., assignors to Swan-Finch Oil Corporation, New York, N. Y., a corporation of New York

No Drawing. Application June 17, 1944, Serial No. 540,882

6 Claims. (Cl. 22—188)

1

This invention relates to cores for metallic castings, particularly for metals such as magnesium, aluminum, and other metals having a melting point below about 1600° F.; and to compositions for same.

Core compositions for metal casting consisting of the well-known linseed oil-kerosene-rosin type are in general use, but are unsuitable for casting of magnesium and similar metals because cores prepared of such material having sufficient baked strength for handling have too high hot strength causing cracks in magnesium and like castings and the burnt core is difficult to remove. Urea-formaldehyde has been heretofore proposed as a core binder for light metal casting. Particularly when cores of considerable size are made, it is necessary to use about 50% of such resin with approximately 50% of cereal binder in order to increase the green strength. Such cores are moisture absorbent when baked and thereby lose strength and, prior to baking, render the composition made therewith somewhat sticky. The green composition tends to stick to the core boxes, resulting in poor surface on the cores which is reflected in poor surfaces on the finished casting.

The principal object of the present invention is accordingly to provide an improved core for magnesium and similar metal casting which shall produce on baking a polymerized core which has substantially no tendency to absorb moisture from the air.

Another object is to provide a core composition which shall eliminate in large part the stickiness of the compositions using only urea-formaldehyde and shall produce a core having a higher green strength than such composition.

The invention comprises the novel products, the specific embodiments of which are described hereinafter by way of example in accordance with which we now prefer to practice the invention.

We have found in accordance with our invention that a core comprising sand, urea-formaldehyde and a suitable proportion of a calcium magnesium ligno-sulfonate gives the desired results. The calcium magnesium ligno-sulfonate is one of the products obtained from waste sulfite liquor and is sold under the trade name "Goulac" by Robeson Process Company. A typical proximate analysis of this Goulac as furnished by Robeson Process Company is as follows:

	Per cent
Calcium and magnesium ligno-sulfonates	72.93
Total sugar	18.06
Remainder (probably mixture iron salts, wood tars, etc.)	9.01
Total	100.00

2

We have found that if a sufficient quantity of this latter material is employed with urea-formaldehyde resin unpolymerized, say in the A to B stage, cores made therewith may be removed from the core boxes substantially without sticking, resulting in smooth surfaced cores and smooth surfaced castings. The use of such composition thus permits an increase in core production by decreasing the time and labor consumed in cleaning core boxes.

We have found also that baked cores made with our composition have a much higher resistance to moisture than straight urea-formaldehyde cores. This, we believe, is due to the fact that the calcium magnesium ligno-sulfonate acts to form a co-polymer with the urea-formaldehyde. We can not state positively that such co-polymer is formed, but we do know at the end of the baking period, that a polymerized resin is obtained which is more resistant to water than the usual formaldehyde-urea polymer and attracts substantially no moisture accordingly. Furthermore, when straight urea-formaldehyde is used for cores, is is well known that cereal binders are required in many of the cores to provide sufficient green strength for handling prior to baking. By the use of our composition, a greater green strength is acquired, thus permitting elimination of cereal binder in many smaller cores where it was previously used with the urea-formaldehyde resins and decreasing the amount of such binder where required in larger cores. This is advantageous in the molding of light metals such as magnesium, etc., because cereal binder does not burn out readily in casting with magnesium or similar metal. Thus, the core on burning has too high a strength causing shrinkage cracks in the magnesium or like casting.

The proportions of materials for the core composition which we employ are as follows:

Urea-formaldehyde resin	About 70% to about 30%
Calcium magnesium ligno-sulfonate	About 30% to about 70%

These materials are mixed dry in the proportion of about .5% to about 1.5% with about 98.5% to 99.5% sand or similar core forming granular material. The combined materials are employed in the usual manner in making up the core by moistening the sand and binder with water and molding to the desired shape. The cores are then baked at about 325° F. to 350° F. for about 2 hours or more.

The following are specific examples of our invention as we now prefer to practice it. It is to be understood that the examples are illustrative and that the invention is not to be restricted thereto except as indicated in the appended claims.

Example 1

Fifteen parts by weight of urea-formaldehyde resin, designated as BRU 16570 of the Bakelite Company, being a partly polymerized resin in the A to B stage, ocurring as a white powder, are mixed with 10 parts of a calcium magnesium ligno-sulfonate which is a substantially dry sulfite-lignite evaporate sold as "Goulac." This dry powder mixture constitutes the core composition and is combined in the proportion of about 1% thereof to 99% of dry sand, which is then moistened with water and molded into the desired shape. Thereafter, the shape is baked at about 350° F. for about 2 hours to polymerize the binder.

Example 2

7.5 parts by weight of urea-formaldehyde resin of the kind mentioned in Example 1 are mixed with 17.5 parts of a calcium magnesium ligno-sulfonate as also described in Example 1. The dry powder mixture is combined in the proportion of about 1.5% thereof to 98.5% of dry sand which is then moistened with water and molded into the desired shape. Thereafter, the molded shape is baked at about 350° F. for about two hours, causing polymerization of the binder.

The ingredients in the above examples may have added thereto other well-known ingredients for the purposes stated below. For example, there may be added for green strength any one of the well-known cereal binders, which we believe are prepared from various types of starches, or clays such as bentonite. Small proportions of, say, up to 3 or 4% of fly-ash may be added to improve the working properties of the composition. Oxidation inhibitors such as sulfur, boric acid and fluoride salts may be added.

We claim:

1. A core composition consisting predominantly of sand and containing partially polymerized urea-formaldehyde resin mixed with but not chemically combined with a calcium magnesium ligno-sulfonate in sufficient quantity to reduce substantially the stickiness of the core and on baking to render it highly resistant to moisture.

2. A sand core composition having a predominant content of sand and a binder constituting about .5% to about 1.5% of the solid material of the core, said binder consisting of about 70% to about 30% of partially polymerized urea-formaldehyde mixed with but not chemically combined with about 30% to about 70% of calcium magnesium ligno-sulfonate.

3. A sand core composition having a predominant content of sand and a binder constituting about .5% to about 1.5% of the solid material of the core, said binder consisting of about 60% of partially polymerized urea-formaldehyde mixed with but not chemically combined with about 40% of calcium magnesium ligno-sulfonate.

4. A binder composition for forming sand cores in which the sand predominates, said binder comprising a substantially dry partially polymerized urea-formaldehyde mixed with but not chemically combined with a calcium magnesium ligno-sulfonate.

5. A binder composition for forming sand cores in which the sand predominates, said binder comprising about 60% to about 40% of a substantially dry partially polymerized urea-formaldehyde mixed with but not chemically combined with about 40% to about 60% of calcium magnesium ligno-sulfonate.

6. A binder composition for forming sand cores in which the sand predominates, said binder comprising about 60% of a substantially dry partially polymerized urea-formaldehyde mixed with but not chemically combined with about 40% of calcium magnesium ligno-sulfonate.

CARL E. HARTWIG.
RAYMOND E. ROEHRENBECK.