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CORE COMPOSITIONS

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This invention relates to cores and compositions for fabricating cores adapted for foundry use.

Core compositions have generally been produced from fine grained silica sand, shore sand, sea sand, or equivalent fine grained material mixed with a binder material usually termed a core oil. The core oil binder usually consists of various combinations of such materials as gum or resin, drying oil such as linseed oil, or a mixture of drying oils including linseed, castor, soya bean, or fish oils, and a diluent such as kerosene. Cores are sometimes made from molasses and water, but this has been found unsatisfactory since the cores crack adjacent the surface thereof during baking and do not bake completely through, the odor and tendency of molasses to absorb moisture further rendering this material unsatisfactory as a core binder.

It has been found that a solution of sugar and water may be employed to temper sand and the sand thus treated may be employed in conjunction with the usual amounts of any of the known types of core oils to produce a stronger and more satisfactory core. It has also been found that reduced amounts of core oil in combination with tempered sand, sand treated with a sugar and water solution, will afford strength of cores comparable with that of cores of untempered sand and the usual amount of core oil. Thus cores having much greater strength than usually effected may be obtained at little or no additional cost and cores of the usual or greater than usual strength may be made at a much reduced cost.

The principal object of the invention is to improve the art of sand cores.

Another object is greatly to increase the strength of cores without materially increasing their cost of production.

A further object is to reduce the cost of cores having normal or greater than normal strength.

It is also an object of the invention to provide an improved method of fabricating cores by tempering the same with a sugar-water solution and employing the sand so treated in conjunction with reduced amounts of core oil, whereby to effect an improved core construction and to effect an economy in the cost of core production.

Other objects, features and advantages will become apparent from the following description and appended claims.

According to this invention, cores are made from a fine dusty sand, such as shore or sea sand, or other available silica sand and the like, tempered by a sugar and water solution comprising approximately ten to seventy per cent granulated sugar or other desired types of sugars, such as glucose, syrups, and the like, and approximately ninety to thirty per cent water. The sand thus tempered or treated is mixed with any conventional type of core oil or binder material, such as linseed oil, polymer oil, and the like. Polymer oil consists of a mixture of polymerized diolefines resulting from bringing cracked petroleum distillates into contact with solid absorbents, such as fuller's earth, colloidal clays, charcoal, and the like. The amounts of core oils employed in practice depends largely upon the size of the casting to be produced.

In making heavy castings, as low as twenty parts of tempered sand to one part of core oil may be employed in the core composition, while in making cores for light castings, the ratio may be increased to as much as two hundred parts of tempered sand to one part of core oil. Cores constructed according to the principles of this invention are baked at approximately the same temperatures and for approximately the same period as in conventional core production, that is, at temperatures of about 400° F. and for a period of about two hours or less, a lower baking temperature and period being possible in the case of polymer oil binders.

By way of example, it has been found that a core composition consisting of, by weight, sixty parts of sand, tempered or treated as above indicated by the addition of eight parts of the above specified sugar-water solution, and one-half a part of polymer oil, or a similar amount of linseed oil, or other commercial core oils, produced a core having about double the strength of a core made up of sixty parts of untempered or untreated sand and one part of linseed oil. The core including linseed oil and untempered sand had a bond strength of approximately twenty pounds per square inch, under tension, while the cores made up of the same amount of sand, tempered by the sugar-water solution and including one-half of the amount of either polymer or linseed oil, had a bond strength of approximately forty pounds per square inch, under tension.

The cost of the linseed oil was about sixty cents per unit weight, of polymer oil about forty-six cents per unit weight, and of granulated sugar about 3.9 cents per unit weight, on the same basis. A linseed and untreated sand core including a unit weight of linseed oil had a bond strength of about 20 pounds per square inch and cost about 60 cents for the core oil, or three

cents per pound of bond strength. The core which included tempered sand and one-half unit of linseed oil produced a bond strength of forty pounds per square inch, under tension, and was produced at a cost of 30 cents for the oil and three cents for the sugar-water solution, giving a total bonding material cost of thirty-three cents, or approximately $\frac{8}{10}$ of a cent per pound of bond strength. When one-half of a unit of polymer oil was employed with the tempered sand, a bond strength of about forty pounds was effected at an oil cost of about 23 cents and a sugar-water solution cost of three cents, or about $\frac{8}{10}$ of one cent per pound of bond strength. Thus, the tempered sand in combination with a reduced amount of core oil lessened the cost of cores in proportion to their strength in the ratio of more than three to one.

Core strengths may be varied by retaining a constant amount of any conventional core oil and changing the amount of sugar-water solution employed or by retaining a constant amount of the sugar-water solution for the purpose of tempering or treating the sand and changing the amount of core oil used, the ratio of sand to core oil not being greater than 240 to 1.

A sugar-water solution alone does not provide a satisfactory core binder since the core, during baking, cracks too rapidly adjacent the surface thereof and does not bake through due to too rapid drying. The tempering solution in combination with too small a proportion of core oil has a similar effect. A sufficient amount of core oil delays drying and allows thorough baking of the core.

The core composition, according to this invention, is preferably made by mixing sugar, water and sand and then mixing in the core oil. The ninety to thirty per cent water and ten to seventy per cent sugar solution is preferred and from one half to fifteen parts of the sugar-water solution are employed to a hundred parts of sand, the number of parts of the sugar-water solution employed, decreasing as the sugar content of the solution is increased. Because of the relatively higher costs of the core oil, the minimum amount of this material is employed consistent with the desired strength of the cores to be made. Acceptable results, however, may be obtained by thoroughly mixing sugar, water and oil together and immediately mixing with sand, or the sand, sugar, water and oil may all be mixed at the same time.

As many changes may be made in the above composition and method, and many apparently widely different embodiments and processes could be had according to this invention without departing from the spirit thereof, it is intended that all matter contained in the above description shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. A composition for forming cores which consists of approximately twenty to two hundred and forty parts sand, one to thirty-six parts of a ten to seventy percent solution of sugar in water for tempering said sand and one part of a binder material selected from a group of substances consisting of drying oils, gums, and resins.

2. A composition for forming a binder material for a sand core which consists of approximately one to thirty-six parts of a ten to seventy percent solution of sugar in water for tempering the sand of the core and one part linseed oil.

3. A composition for forming a binder material for a sand core which consists of approximately one to thirty-six parts of a ten to seventy percent solution of sugar in water for tempering the sand of the core and one part of a mixture of polymerized diolefines.

4. A composition for forming cores which consists of approximately twenty to two hundred and forty parts of sand, one to thirty-six parts of a ten to seventy per cent solution of sugar in water, and one part of linseed oil.

5. A composition for forming cores which consists of approximately twenty to two hundred and forty parts of sand, one to thirty-six parts of a ten to seventy per cent solution of sugar in water, and one part of a mixture of polymerized diolefines.

6. The method of making a core which comprises tempering a fine aggregate by mixing therewith a sugar in water solution, then mixing the tempered aggregate with a binder material selected from a group of substances consisting of drying oils, gums and resins, then forming such mixture to the desired shape, and then baking the shaped mixture at approximately 400° F.

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