

UNITED STATES PATENT OFFICE

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FOUNDRY CORE AND BINDER THEREFOR

No Drawing.

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The present invention is concerned with improved foundry cores and binders therefor.

In the manufacture of foundry cores which are employed for the casting of metals or alloys, a comminuted refractory material such as sand, is ordinarily employed and this refractory material is bonded by means of an adhesive material. Among the binders which have been proposed heretofore are vegetable oils. From a practical standpoint the chief disadvantage of a vegetable oil binder is that it is relatively expensive. Moreover, in cores where high sand ratios are desirable the use of such an oil binder results in cores the surfaces and edges of which lack proper strength. As a consequence the cores lose their contour and the result is either a useless or waste core or casting, or a casting of inferior quality.

Cereal products such as dextrine, flour, and the like have also been proposed for bonding comminuted refractory material in the preparation of foundry cores. However, dextrine and analogous substances have the practical disadvantage that they readily absorb moisture and hence the core in which they are employed must be immediately used else it will soften and be unfit for use. To overcome this it has been proposed to add to the dextrine or analogous substance a small proportion, say 5 to 10 percent, of a mineral oil to prevent the absorption of any great amount of moisture which will tend to render the core unfit for use in foundry work. Such cores, containing a preponderant amount of dextrine or similar material compared to the oil present, are, however, defective in that their crushing strength is relatively low. The core containing a minor proportion of oil and a major proportion of dextrine, is decidedly weak in the interior while presenting a relatively hard outer surface. A hard outer surface on the core is, of course, a decided advantage inasmuch as a core with such a surface can be handled without danger of the core losing its contour, but the lack of interior strength is a disadvantage which often offsets any advantage obtained by the use of

the dextrine in producing a hard outer surface on the core.

A practical core bond should be one which imparts to the comminuted refractory material employed sufficient adhesiveness so that the core will have sufficient strength against crushing and hold together during the casting operation for a sufficient length of time to permit the molten metal to acquire a set, and at the same time it should also have the property of imparting a hard outer surface to the core so that it may be easily handled without loss of shape. It should, of course, be of such a nature that the core may be easily disintegrated after the metal has been cast so that it will be readily removable from the cast metal objects. Moreover, it should be relatively inexpensive and easily prepared and kept.

In accordance with my invention foundry cores are bonded with a binder containing largely a drying oil, such as chinawood oil, linseed oil, perilla oil, soya bean oil, and the like, and a small portion of cereal product, such as dextrine and the like. Preferably there is formed an aqueous emulsion of the ingredients with which is incorporated an emulsifying agent or stabilizer, such as triethanolamine, bentonite, fish glue, ammonia, ammonia soaps, ammonium alginate and the like. A core with a binder containing a major proportion of drying oil has its refractory particles thoroughly and firmly bonded together and is waterproof in character. In addition, the incorporation of a minor proportion of dextrine or like material imparts a hard outer surface to the core but is not present in sufficient quantity compared to the oil present to detract from the strength of the core nor to absorb any deleterious amount of moisture. The hard outer surface acts to protect the core from damage in handling or storage. Moreover, the binder may be prepared in the form of a stable emulsion and is easy to keep and use. While several emulsifying agents or stabilizers may be employed, as noted above, I prefer to use triethanolamine which gives a very stable emulsion in water.

In order to carry my invention into prac-

tice and produce a suitable foundry core, I have determined the proportions of ingredients which may be employed in making the binder to be within the following approximate limits:

	Parts by weight
Dextrine or similar material-----	7 to 15
Drying oil-----	40 to 70
Emulsifying agent or stabilizer--	1 to 3
10 Water -----	25 to 35

As a specific illustration of the preparation of a core binder and core in accordance with my invention the following example is given.

	Per cent by weight
Dextrine -----	13.7
Water -----	27.6
Triethanolamine-----	1.2
20 Chinawood oil-----	54.5
Water white rosin in 55° naphtha----	3.0

The dextrine is dissolved in the cold water preferably by means of mechanical stirring. The solution is then cooked over a steam bath for approximately twenty minutes at a temperature of 85° to 90° C. The triethanolamine is added as soon as the dextrine solution has reached room temperature.

In a separate vessel the rosin is added to the chinawood oil and the two materials are vigorously stirred. While the rosin and chinawood oil are being stirred together the solution of ingredients prepared as outlined in the preceding paragraph is added and stirring continued until all signs of streakiness are gone. The binder so prepared is in the form of a very stable emulsion.

In preparing a core the refractory material, for example sand, is mixed with the binder in a suitable mixer until all the particles are thoroughly covered. The mixture may contain, by volume, 1 part of the binder to 30 parts of sand for exceedingly hard, strong cores. For the softest and weakest cores, a mixture of 1 part binder to 120 parts of sand may be used. The usual ratios for ordinary foundry cores are from 1 to 50, to 1 to 80, binder to sand.

In the specific example given rosin solution is employed with the other ingredients. While it is preferable to use the rosin because it permits a reduction in the amount of emulsifying agent or stabilizer and is usually cheaper than the latter, giving hence a cheaper binder, it is to be understood that its use is not indispensable. Where it is employed, 2 to 4 parts by weight of a 50 percent solution in 55° naphtha is the approximate range for use with the range of other ingredients given above. Other suitable natural resins may be employed in the place of rosin.

The binder prepared in accordance with the present invention is a very stable emul-

sion, the ingredients of which will not separate on standing at room temperature for months. It may be frozen at a temperature as low as 0° F. for as long as 72 hours and while this treatment may cause some separation, the ingredients easily go back into suspension after a little agitation.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A foundry core comprising a refractory material and a bond therefor, said bond comprising largely a drying oil and a relatively minor proportion of cereal product.

2. A foundry core comprising sand and a bond including an aqueous emulsion containing mainly chinawood oil, and relatively minor proportions of triethanolamine and dextrine.

3. A foundry core comprising sand and a bond including an aqueous emulsion containing mainly chinawood oil, and relatively minor proportions of triethanolamine, dextrine and rosin.

4. A core bond adapted to be admixed with a comminuted refractory core body comprising a major proportion of a drying oil and a relatively minor proportion of cereal product.

5. A core bond adapted to be admixed with a comminuted refractory core body comprising a stable aqueous emulsion containing a major proportion of drying oil and a relatively minor proportion of dextrine.

6. A core bond adapted to be admixed with sand for the manufacture of cores comprising an aqueous emulsion of chinawood oil, triethanolamine, and dextrine, the chinawood oil being the major constituent of said emulsion.

7. A core bond adapted to be admixed with sand for the manufacture of cores comprising an aqueous emulsion of chinawood oil, triethanolamine, dextrine, and rosin, the chinawood oil being the major constituent of the emulsion.

8. A composition for making foundry cores comprising a comminuted core body material suitable therefor and a binder comprising an aqueous emulsion of a major proportion of drying oil, and a relatively minor proportion of cereal product, and a stabilizer for said emulsion.

9. A core bond adapted to be admixed with a comminuted refractory core body for the manufacture of cores, comprising a stable aqueous emulsion of drying oil and cereal product said emulsion being composed of ingredients in approximately the following proportions:

	Parts by weight
Cereal product -----	7 to 15
Drying oil -----	40 to 70
Emulsifying agent or stabilizer --	1 to 3
Water -----	25 to 35

10. A core bond adapted to be admixed
with sand for the manufacture of cores, com-
prising a stabilized aqueous emulsion of
chinawood oil approximately 54.5% by
weight, dextrine approximately 13.7% by
weight, rosin approximately 3% by weight,
water approximately 27.6% by weight and
triethanolamine approximately 1.2% by
weight.

10 In witness whereof, I have hereunto set
my hand.

JAMES M. SAMPSON.

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