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FOUNDRY MOLD WASH

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3 Claims. (Cl. 22—189)

This invention relates to metal founding, and more particularly to a wash for coating or facing foundry cores and molds; or the like.

An object of the invention is to provide a core or mold wash which can be economically and easily prepared.

Another object is to provide a core or mold wash which does not require expensive emulsifying agents, drying oils, or adhesives.

Another object is to provide a core or mold wash having a dispersion of refractory material therein, which can stand for long periods without settling out of the refractory material.

Another object is to provide a core or mold wash which can be readily applied by spraying, swabbing or dipping and can be subsequently dried in a convenient and expeditious manner.

Another object is to provide a core or mold wash which, when applied, forms a smooth facing of sufficient strength to resist the erosive action of molten metal during the casting process.

Another object is to provide a core or mold facing which prevents the metal from fusing with the sand or founding forms and thus saves time and labor in the cleaning operations.

Another object is to provide a core or mold facing which will produce castings having a smooth surface, whereby expensive grinding or chipping operations are eliminated.

A further object is to provide foundry structures such as cores or molds having an improved facing.

Other and further objects will be obvious upon an understanding of the illustrative embodiment about to be described, or will be indicated in the appended claims, and various advantages not referred to herein will occur to one skilled in the art upon employment of the invention in practice.

These objects are generally accomplished by preparing a wash or dispersion comprising refractory material, a fluid suspending medium, a suspending agent, if desired, and an adhesive or binder adapted to cause the refractory particles to adhere to each other and form a smooth film or coating when applied on the surface of sand founding cores or molds.

Suitable refractory materials which may be used are finely divided graphite, plumbago (native carbon in flake form), silica flour, soapstone, talc, zirconium dioxide, or the like. Preferably, plumbago or silica flour are employed and in amounts between about 25 and about 50 parts by weight.

The fluid suspending medium may be water which may be used in amounts between about 25 to about 60 parts by weight, depending upon the desired consistency of the wash. Also, a volatile inflammable fluid may be used as a suspending medium. Such a fluid may be an alcohol composition comprising approximately 90 parts by weight ethyl alcohol, 5 parts by weight methyl alcohol, 5 parts by weight ethyl acetate and 1 part by weight aviation grade gasoline. This composition may be used in amounts between about 50 and about 80 parts by weight.

If a suspending agent is necessary or desirable to stabilize the dispersion, bentonite, that is, colloidal clay, preferably is used in amounts between about .5 and about 5 parts by weight.

It has been found that a pulverized pine wood resin which is substantially insoluble in petroleum hydrocarbons such as gasoline, has the desired characteristics of cooperating with the other materials of the wash to provide a homogeneous, stable dispersion which is free from agglomerates. When the wash is dried, this resin serves as an adhesive or binder to cause the refractory particles to adhere to each other and form a smooth glaze-like coating on sand molds or cores. The binder enables the wash to be applied in small quantities and form a film or protective skin which is resistant to the erosive action of molten metal and prevents the metal from fusing with the sand of the core or molds. Preferably, between about 1 and about 10 parts by weight of the "resin" produce excellent results.

The material which is characterized by the term pine wood resin substantially insoluble in gasoline herein and in the appended claims, is the resinous material which may be prepared from pine wood, preferably from stump pine wood, in the following manner. The pine wood, which may or may not have been steamed to remove volatile constituents such as turpentine and pine oil, may be extracted with a coal tar hydrocarbon such as benzol or toluol, and the extract then freed of volatile constituents, leaving a residue consisting of a mixture of wood rosin and the resin used in the present compositions. Extraction of this mixture with a petroleum hydrocarbon such as, for example, gasoline, dissolves and removes the rosin. After separation of the rosin, high in abietic acid, a resinous residue remains which is low in abietic acid. Alternatively, the initial coal tar hydrocarbon extract may be treated with furfural, and the two layers which form separated, in which case the resinous residue is found dissolved in

the furfural from which it may be obtained by evaporation of the furfural. This resinous residue, used in the composition of the present invention, is characterized by a dark red brown color, cherry red in solution, and by substantial insolubility in petroleum hydrocarbons, but it will vary somewhat in its specific characteristics such as acid number, melting point, exact petroleum ether solubility, and content of naphtha and toluol insoluble material, depending upon the details of the extraction processes utilized. This resin will meet or nearly meet the following specifications, namely, substantial insolubility in petroleum hydrocarbons, substantially complete solubility in alcohol, a methoxy content from about 3% to about 7.5 (usually from about 4% to about 6%) an acid number in the range from about 90 to about 110, and a drop melting point in the range from about 95° C. to about 125° C.

While the proportions of the ingredients may vary, the following formulations are given as examples of core or mold washes which have been found to produce excellent results:

	Examples		
	I	II	III
	Parts by weight	*Parts by weight*	*Parts by weight*
Plumbago	45		
Silica flour		40	35
Bentonite	3	3	3
Resin *	2	7	2
Water	50	50	60

*Pine wood resin substantially insoluble in gasoline.

In preparing the wash compositions illustrated by Examples I, II, and III, pulverized resin, the refractory material (plumbago or silica flour) and bentonite are mixed together well before adding the water. After thorough dry mixing, the water is added and at this point, a small amount of a wetting agent may be added to produce easy wetting of the resin, refractory material, and bentonite by the water. A suitable wetting agent for this purpose is a composition comprising about 85 parts pine oil, nine parts oleic acid soda soap and six parts water, although other wetting compositions may be readily substituted. After thorough wetting of the materials, the wash is made up to desired consistency and is well agitated by a suitable stirring device.

Example IV

A suitable wash, wherein the resin is first emulsified, may comprise the following ingredients:

	Parts by weight
Plumbago or silica flour	40
Water	50
Resin emulsion	10

In preparing this composition, the resin is emulsified in water by means of casein, soya bean protein, animal glue, or other protective colloid, which has been cut with alkali, such as ammonia or sodium carbonate. Preferably, the proportions of materials used are:

	Parts by weight
Resin	100
Casein	5
NH_4OH (28° Bé.)	9
Water	130

The emulsion is prepared by melting the resin and heating it to about 110° C. An aqueous solution of 5 parts of casein made soluble by 3 parts ammonium hydroxide in 30 parts of water is prepared. An ammonia solution of 6 parts ammonium hydroxide in 100 parts of water is added to the molten resin while stirring slowly first and gradually increasing the speed of agitation as the emulsion is formed. The casein solution is then added to complete the emulsification. The resulting emulsion is light brown in color, stable, of fine particle size, and contains about 40% solids.

Example V

A suitable wash adapted for air or flash drying, wherein a volatile solvent is employed as the suspending fluid, may comprise:

	Parts by weight
Plumbago or silica flour	25
Resin *	2
Volatile solvent	73

* Pinewood resin substantially insoluble in gasoline.

The resin is the same as that used in the foregoing examples. The volatile solvent employed may be an alcohol composition comprising 90 parts ethyl alcohol, 5 parts methyl alcohol, 5 parts ethyl acetate, and 1 part aviation grade gasoline. The resin and refractory materials can be dispersed in the solvent without the use of a suspending agent, such as bentonite. However, it may be desirable to agitate such washes during application in order to keep the refractory materials suspended in the solvent.

The wash may be applied to the surface of cores or molds or other founding structures formed of sand or the like by swabbing, spraying or dipping. Where water is used as a suspending medium (Examples I, II, III, and IV), the wash may be applied to the cores prior to making, or green cores and subsequent baking of the cores will dry the film of wash. If desired, the wash may be applied immediately after the cores or molds have been baked so that the residual heat of the sand, while cooling will dry the wash to a smooth facing. Also, the wash may be applied after the cores or molds have cooled and may be baked thereon by heating the cores or molds in a suitable oven.

Where the volatile composition is used as a suspending agent (Example V), the wash is applied in any suitable manner and may be permitted to air dry. If desired, to expedite drying, a torch may be applied to ignite the volatile and inflammable alcohol composition, which, upon burning leaves a hard smooth film or protective facing of refractory materials on the surface. This may also be applied to green sand molds or cores and the heat created by the burning solvent may be utilized to sufficiently dry the sand.

From the foregoing description, it will be seen that the present invention provides a sample inexpensive core or mold wash which is easy to prepare and can be readily applied. Only small amount of wash need be applied to form a smooth hard film or facing adhering to the core or mold and adapted to resist the erosive action of hot metal and prevent fusing of the sand so that the sand will readily peel from the casting. The cores, molds, or other founding structures provided with this film produce better castings which require a minimum amount of grinding, chipping other machining operations, thereby greatly reducing the founding costs and speed-

ing up production. Another feature of the invention is that the "resin" may be used in relatively small amounts and that quantities of resin remaining in the sand will not prevent its further use in forms.

It will be understood that the details and examples hereinbefore set forth are illustrative only and that the invention as broadly described and claimed is in no way limited thereby.

What I claim and desire to protect by Letters Patent is:

1. A foundry mold and core wash composition essentially comprising a finely-divided refractory material, a finely-divided substantially gasoline-insoluble resin derived from pine wood, and a volatile liquid suspending medium, said refractory material and suspending medium being present in such relative proportions that the composition is in fluid form, and said resin being present in an amount representing between about 1 and about 10 per cent by weight of the entire composition.

2. A foundry mold and core wash composition essentially comprising a finely-divided refractory material, a finely-divided substantially gasoline-insoluble resin derived from pine wood, a suspending agent, and a volatile liquid suspending medium, said refractory material, suspending agent, and suspending medium being present in such relative proportions that the composition is in fluid form, and said resin being present in an amount representing between about 1 and about 10 per cent by weight of the entire composition.

3. A foundry mold and core wash composition comprising between about 25 and about 50 per cent by weight of a finely-divided refractory material, between about 1 and about 10 per cent by weight of a finely-divided substantially gasoline-insoluble resin derived from pine wood, and the remainder consisting of a volatile inflammable liquid suspending medium.

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CERTIFICATE OF CORRECTION.

Patent No. 2,270,770. January 20, 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 24, for "or" read --of--; page 2, second column, line 42, for "making" read --baking--; and line 63, for "sample" read --simple--; 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 10th day of March, A. D. 1942.

Henry Van Arsdale,
Acting Commissioner of Patents.

(Seal)