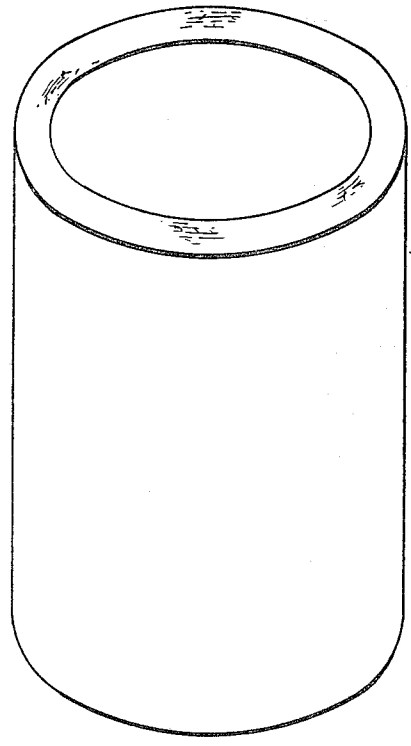
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INSULATING RISER SLEEVE COMPOSITION

Filed Oct. 23, 1965



RISER SLEEVE
COMPRISING:
ASBESTOS FIBER
BENTONITE CLAY
DIATOMACEOUS EARTH
AND BINDER OF LIME
AND/OR BASIC
MAGNESIUM CARBONATE.

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INSULATING RISER SLEEVE COMPOSITION

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ABSTRACT OF THE DISCLOSURE

A riser sleeve product for molten metal casting of an inorganic composition comprising asbestos fiber, bentonite clay, diatomaceous earth, and binder of lime and/or basic magnesium carbonate.

This invention relates to improved riser sleeves for metal casting, and in particular to riser sleeves of improved compositions and the novel and advantageous riser sleeve products thereof.

Riser sleeves, which provide reservoir chambers for molten metal to feed the same back into the mold cavity to compensate for shrinkage during solidification of the casting metal within the mold, have conventionally been constructed of gypsum plaster or of typical exothermic materials. Such materials however normally provide constructions which are inefficient, lack resilience and durability. Moreover, the gypsum sleeves are frequently unsatisfactory in service and the exothermic materials are costly.

It is the primary object of this invention to provide new, low-cost and effective riser sleeves products.

It is also a primary object of the invention to provide economical riser sleeves which have high thermal insulating properties and are reuseable under moderate applications and service conditions.

It is a further primary object of this invention to provide improved riser sleeves which are useful with a variety of molten metals and are not discernibly wetted or attacked by common molten metals and alloys such as brass, aluminum, etc.

These and other objects and advantages of this invention will become more apparent from the hereinafter detailed description thereof.

The drawing comprises a pictorial view illustrating a typical cylindrical riser sleeve construction and product produced from the composition of this invention.

This invention comprises novel and improved riser sleeve products consisting of the heat treated or reacted products of a specific combination of ingredients which upon exposure to apt thermal conditions so cooperate or coact whereby the resultant composition or concerted effects of the ingredients, or the thermal products thereof, provide enhanced and new beneficial properties and advantages appropriable to metal casting and in turn their use in riser sleeves of conventional configurations and applications. The riser sleeves of this invention essentially comprise and result from apt thermal treatments of the following ingredients set forth both in the broadest and preferred relative proportions therefor of the invention. The relative proportions are expressed in approximate percentages by weight.

Ingredients	Broad, percent	Preferred, percent
Asbestos fiber	5–20	8–15
Bentonite clay	5–20	8–15
Diatomaceous earth	50–90	60–80
Lime	0–15	0–10
Basic magnesium carbonate	0–15	0–10

Beyond the said given proportions of ingredients suitable for thermal conversion into the products of this invention, it is considered essential that the combination thereof contain at least one or the other enumerated lime or basic magnesium carbonate components as, or to effect a binder system. For example, with no or insignificant quantities of basic magnesium carbonate as the source of a binder the combination should include about 6 to 12% by weight of lime, and conversely with no or ineffective amounts of lime as the source of a binder the combination could include about 6 to 12% by weight of basic magnesium carbonate, or the products embody up to about 30% by weight of a combination thereof but preferably no more than about 20%.

Moreover, to produce an effective riser sleeve product of new and improved characteristics and of the precepts of this invention, the aforedefined combination of components, upon admixture, consolidation and shaping into a body of designed configuration and dimensions pursuant to common manufacturing procedures, must be fired or heat treated to a temperature greater than 1300° F. and under most all circumstances preferably to about 1400° F. for maximum derivation of benefits, for periods of an hour or more depending, of course, upon the mass of the given product, and normally for 3 to 6 hours, or longer. Higher temperatures can be applied, but the advantages or degree of improvements thereof attributable to any appreciable greater temperatures are not particularly significant or commensurate with the effort and therefore not recommended.

The riser sleeve products of this invention are effectively produced through the use of a water slurry or suspension as a medium for the admixing and interaction of the components thereof. Preferably a dilute slurry of the solids in the aqueous medium is prepared, and to effect a low density material of subsequent high thermal insulating efficiency and facilitate molding, the slurry of the essential combination of ingredients is heated to temperatures of at least 100° F. up to 212° F. for ½ hour or more to render the slurry of solids more amenable to shaping and dewatering into a self-sustained body of a low, dry density and with both good green and fired strength. The basic magnesium carbonate, if employed, can be prepared pursuant to common means comprising, for example, reacting a solution of magnesium hydroxide with carbon dioxide.

Consolidating and shaping of the slurried materials of the given compositions to any suitable body configuration and dimensions such as two half sections providing the conventional cylindrical sleeve can be carried out most effectively with a filter press. Other workable forming techniques comprise plate and frame type filter presses, pan casting with a relatively thicker or concentrated slurry, and like means. The shaped articles are then dried in an oven to accelerate the process.

The thus prepared composition and shaped body thereof is finally heat treated by exposure to temperatures greater than 1300° F. and most desirably about 1400° F. over a period of at least one hour and more effectively about 4 or 5 hours, but depending upon the mass to effectively heat soak the body throughout. The fired product, which possesses good thermal insulating properties, is neither wetted nor attacked by common molten metals such as aluminum employed in typical casting operations. Moreover, it exhibits a minimum of splattering of the molten metal upon initial contact.

The following examples comprise illustrations of the preferred and typical compositions of the riser sleeve products of this invention and means of manufacturing the same. It is to be understood that the specific proportions or ratios and components of the compositions given in the examples as well as the means, conditions, techniques, etc., set forth therein, are primarily exemplary and are not to be construed as limiting this invention to

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any specific ingredients or proportions thereof and compositions or conditions other than those hereinbefore specified as essential.

Example 1

Riser sleeves in complementary half-cylindrical sections, measuring 36 inches long and ½ inch thick with internal diameters of 2.5, 3, 4 and 7 inches respectively, were produced from the following combination of ingredients:

	Percent
Basic magnesium carbonate	7.9
Bentonite clay	8.2
Asbestos fiber	9.9
Diatomaceous earth (calcined)	73.7
Lime	0.3
	100.0

The basic magnesium carbonate was prepared by gassing a magnesium hydroxide solution with CO_2 gas. All given components were thoroughly mixed in an aqueos medium and press filter molded to the given configurations and sizes. The molded articles, following air drying, were fired at 1400° F. at 5 hours to throughly heat soak the same throughout their mass.

Example 2

Riser sleeve samples in like semi- or half-cylindrical sections and dimensions as given in Example 1 where also produced from the following formulation:

	Percent
Diatomaceous earth (calcined)	65
Bentonite clay	15
Asbestos fiber	12
Hydrated lime	8
	100

An aqueous slurry of an admixture of the said ingredients was heated and held for 1½ hours at 200° F. to form a gel, then press filter molded to the stated sizes. The manufacturing process was completed by firing the pressed and shaped products at 1400° F. for 5 hours as in Example 1.

The correspondingly dimensioned half-cylindrical sections from each of the foregoing examples were mated to produce complete cylindrical sections with the given internal diameters, and bonded together with either plastic or cloth tape, or steel straps. Samples of each were mounted in a vertical or upright position with the lower opening suitably anchored in and closed with foundry sand and filled with molten aluminum. They were unaffected by the molten metal, did not produce splattering of the aluminum, and upon solidification and removal of the formed metal ingot, appeared wholly intact and were reused. Similar riser sleeve samples were linkewise employed with molten iron, stainless steel and brass and were found to be highly effective and satisfactory in all reused. Similar riser sleeve samples were likewise em- Additional half-section samples were then cemented together with a high melting point asphalt and when filled with a molten metal iron there was bubbling and splattering of the metal adjacent the seams where the asphalt was present and which did not occur with the banded samples.

The thermal reaction compositions of this invention can conveniently and effectively be produced and employed in half cylindrical sections. They provide the novel riser sleeve products by uniting two complementary sections of like dimensions adjacent to each other to form a complete cylinder with the internal channel forming the molten metal reservoir. The abutting segments may be secured to each other with plastic or cloth tape, or metal straps which contain the same with adequate strength for the intended service.

It will be understood that the foregoing details are given for purposes of illustration and not restriction, and that variations within the spirit of this invention are to be included within the scope of the appended claims.

What I claim is:

1. An improved riser sleeve for molten metal casting having a thermally durable hollow body forming the reservoir chamber comprising the composition product of heating to a temperature greater than 1300° F. an admixture comprising, in approximate percentages by weight:

	Percent
Asbestos fiber	5–20
Bentonite clay	5–20
Diatomaceous earth	50–90

and at least one source of a binder selected from the group consisting of lime and basic magnesium carbonate in an approximate percentage by weight of 6 to 30%.

2. An improved riser sleeve for molten metal casting having a thermally durable hollow body forming the reservoir chamber comprising the composition product of heating to a temperature of at least about 1400° F. an admixture comprising, in approximate percentages by weight:

	Percent
Asbestos fiber	8–15
Bentonite clay	8–15
Diatomaceous earth	60–80

and at least one source of a binder selected from the group consisting of lime and basic magnesium carbonate in an approximate percentage by weight of 6 to 20%.

3. The improved riser sleeve product of claim **2** wherein the lime content is approximately 6 to 12% by weight.

4. The improved riser sleeve product of claim **2** wherein the basic magnesium carbonate content is approximately 6 to 12% by weight.

5. An improved riser sleeve for molten metal casting having a thermally durable hollow body forming the reservoir chamber comprising the composition product of heat treating at a temperature of at least about 1400° F. over a period of in excess of about 3 hours an admixture consisting essentially, in approximate percentages by weight, of:

	Percent
Asbestos fiber	8–15
Bentonite clay	8–15
Diatomaceous earth	60–80
Lime	6–12

6. An improved riser sleeve for molten metal casting having a thermally durable hollow body forming the reservoir chamber comprising the composition product of heat soaking at a temperature of at least about 1400° F. for a period in excess of about 3 hours an admixture consisting essentially, in approximate percentages by weight, of:

	Percent
Asbestos fiber	8–15
Bentonite clay	8–15
Diatomaceous earth	60–80
Basic magnesium carbonate	6–12

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