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HIGHLY REFRACTORY MORTARS, TAMPING MATERIAL AND MATERIALS FOR REPAIRS AND COATING AND A PROCESS OF AND CEMENT POWDERS FOR PREPARING THEM

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The present invention relates to highly refractory mortars, tamping material and materials for repairs and coating and a process of and cement powders for preparing them.

For the manufacture of highly refractory mortars, tamping material and materials for repairs there are chiefly used substances which as regards their main properties resemble the basic material of the fire-bricks to be used in masonry. Moreover, for the protection of fire bricks there are often used refractory coating materials consisting of the same substances as the fire bricks, or refractory coating materials containing particularly highly refractory substances which cannot be used in making the whole building unit owing to their high cost. The highly refractory materials for the purpose in question are in most cases made up with clay as a binding agent, and in preparing a mortar they are mixed with water; they are hardened by allowing them to dry gradually, as for instance, in the case of ordinary refractory cement. If, for instance, water-glass is used as a binding agent, the application of self-hardening masses for the purpose in question is possible only to a certain extent, for by the addition of alkali silicate the fire-proof character of the material is considerably diminished.

Now we have found that self-hardening highly refractory mortars may be obtained by using alumina sols, namely concentrated colloidal solutions of water-soluble alumina, together with substances of a spinel-like character. On using these mortars for industrial purposes they have the great advantages of a self-hardening mortar suitable also for highly refractory structures. The alumina sols are made in known manner from aluminium chloride by elimination of the chlorine and they may be applied in any desired concentration, either in a thinly liquid or viscous solution.

Among the spinel-like compounds the residue obtained by the alkaline extraction of chromium from its ores has been proved to be particularly suitable.

The masses thus produced are suitable as self-hardening highly refractory mortars as well as self-hardening tamping material or materials for repairs, painting and coating. The property of self-hardening of the spinel-like masses, for instance the aforesaid residue obtained by the alkaline extraction of chromium ores, which residues are generally in the form of a fine powder is attained and influenced by burning the masses after having been dried, so as to form a clinker-like mass, and then grinding the clinker thus obtained. The fineness of grinding the finished mixture determines the rapidity with which the mass containing the alumina sol sets. By the burning operation the product is, on the one hand, sufficiently strongly pre-sintered, and, on the other hand, rendered sufficiently reactive to the water-soluble alumina.

The mortars, tamping material, coating materials and the like made from the residue of chromium ores, are distinguished by an especially good thermal conductivity and stability to variation of temperature. Since the masses are capable of self-hardening they may be used for the manufacture of various kinds of moulded bodies which have the special advantage that they are stable in storage without being previously calcined and may be used as refractory materials.

For a part of the residue of the alkaline extraction of chromium ores or the other spinel-like compounds in the pulverised mortar there may be substituted other substances provided that the latter do not disadvantageously influence the thermal properties of the finished material; there may, for instance, be admixed other fire-proof substances, such as grogs, as well as binding agents, fluxing materials of various kinds and the like.

The following example serves to illustrate the invention, but it is not intended to limit it thereto:

The residue of the alkaline extraction of chromium ores is heated to a temperature of 1400° C, then cooled and ground. The ground product is sieved. From the sieved grain fractions a cement powder of the following composition is made:

	Per cent
The ground product passed through a sieve of 500 meshes per square centimeter but retained by a sieve of 900 meshes per square centimeter	40
The ground product passed through a sieve of 2310 meshes per square centimeter, but retained by a sieve of 3600 meshes per square centimeter	50
The ground product passed through a sieve of 10,000 meshes per square centimeter	10

100 grams of the cement powder thus obtained are mixed with 35 cc. of alumina sol of specific gravity 1.45. The mass sets after a short time and after three days it shows an average strength of 50 kilos per square centimeter. Test pieces from this mass are attacked neither by water

nor by alkali lye, in the cold as well as at boiling point.

The hardened masses show a refractoriness of more than Seger cone 38 (corresponding with a temperature above 1850° C) and soften (ta-point) under a pressure of 2 kilos per square centimeter at 1320° C. The "ta-point" is that temperature at which a cylindrical test piece under load ceases to expand as its temperature rises but is shortened by a jolt due to the softening of the piece.

The coarse fractions of the pulverised mortar may be exchanged for fire-proof grogs of the same size of grain; the property of hydraulically hardening is preferably provided by the finest fractions of the spinel-like compounds. There may also be admixed fluxing materials and binding agents of any known kind.

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