CORE AND PROCESS OF FORMING THE SAME

The method of forming cores now in general use has many disadvantages among which is that the cores after being formed must be baked at excessive temperatures to harden the same and as the binder used therein often contains organic matter, the baking thereof produces fumes and smoke which is highly undesirable.

Another disadvantage to the present method of forming cores is that baking the cores at the necessary high temperature and the consequent burning of the organic matter contained therein by the hot metal of the castings causes carbonaceous deposits about the grains of sand and, therefore, renders the sand worthless for future use.

Another objection to the cores of the present type is that it is extremely difficult to remove the same from the castings, the usual method of chipping and rapping requiring considerable time and frequently cracking the castings when the walls are thin.

With the above and other objections in mind, this invention has as one of its objects a process of forming cores which does not require baking at excessive temperatures and which when completed forms a strong, durable core.

Another object of this invention resides in an improved process of forming cores and the like which contain a binder of a non-orangic nature so that the hot molten metal striking the cores has no injurious effect upon the sand and prevents the formation of carbon deposits.

A further object of this invention resides in an improved process of making cores which produces cores of a hard and durable nature, but capable of being readily disintegrated by wetting so that their removal from castings is a comparatively simple matter.

And a still further object of this invention resides in the provision of a binder for cores and the like which consists of sodium phosphates which act on the natural clay contained in the sand to accomplish a temporary set or hardening thereof.

The above objects are obtained by the use of a binder consisting of one or all of the following sodium phosphates:

1. Tertiary or tri-sodium phosphate, which has the chemical formula of \( \text{Na}_3\text{PO}_4.12\text{H}_2\text{O} \).
2. Secondary or normal sodium phosphate, which has the chemical formula of \( \text{Na}_2\text{HPO}_4.12\text{H}_2\text{O} \).
3. Primary or mono-sodium phosphate, which has the chemical formula of \( \text{NaH}_2\text{PO}_4.\text{H}_2\text{O} \).

Sodium phosphate has a characteristic of forming the natural clay content of either core or molding sand to temporarily set or harden when allowed to dry, therefore, the forming of cores with this element as a binder is extremely simple and comparatively inexpensive. In practice the sand is thoroughly mixed with the sodium phosphate and is then allowed to dry or if quicker hardening is desired, baked at a temperature as low as that of boiling water (212°F).

This relatively low baking temperature produces a considerable saving in fuel consumption, and as no organic matter is used in the binder, it is impossible to burn the cores, as is very often the case in present foundry practice. Furthermore as the binder is formed of inorganic matter there is nothing to decompose or char, and smoke or fumes heretofore common in core rooms is entirely eliminated, cores made with phosphate binders baking with a total absence of smoke of any kind.

The use of sodium phosphates as a binder further allows all of the sand forming the core to be reclaimed, by merely adding the required amount of new phosphate and water to bring it back to its original state.

The phosphate binder may be supplied in the solid state for use with wet sands or it may be supplied in aqueous solution to be used with dry sands. Should the sand be deficient in clay content such substances known as Goose Lake clay, or Wyoming fire clay may be added at the time the binder is being mixed with the sand.

Cores formed with sodium phosphate as a binder are hard and durable, and, as the phosphate is soluble in water, it is only necessary
to wet the core to remove it from a casting.

What I claim as my invention is:

1. The hereindescribed process of forming a core, which consists in mixing a sand having a clay content with sodium phosphate in forming the core, and in drying the core.

2. The hereindescribed process of forming a core, which consists in mixing a sand having a clay content with sodium phosphate suspended in water, in forming the core, and in drying the core.

3. A binder for use in making cores of sand having a natural clay content, which consists of sodium phosphate having the characteristic of acting on the natural clay content of the sand to produce a temporary set.

4. A core formed of sand having a clay content, and sodium phosphate as the sole binding agent.

In testimony whereof I hereunto affix my signature.

EMIL L. LEASMAN.