UNITED STATES PATENT OFFICE.

JOHN A. FRANCIS, OF NEW YORK, N. Y.

IMPROVEMENT IN THE MANUFACTURE OF HYDRAULIC CEMENT.

Specification forming part of Letters Patent No. **212,094**, dated February 11, 1879; application filed September 4, 1878.

To all whom it may concern:

Be it known that I, JOHN ALFRED FRANCIS, of the city, county, and State of New York, have invented a new and useful Improvement in the Manufacture of Hydraulic Cement, of which cement the following specifications contain a full and accurate description.

My invention consists in the use of blue clay, containing silica, alumina, magnesia, and peroxide of iron, such as can be found at all times upon the banks and bottoms of rivers, bays, and lakes, combined with the refuse coal-ashes to be had in cities and towns and sewer-mud.

For the purpose of burning the foregoing materials, I add coal-dust, being the refuse of coal yards and mines. In order to impart strength to the whole, I add sand known as "parting-sand," which has already been brought to a white heat. To the whole of these ingredients I now add carbonate of lime, (chalk,) to which is added the refuse lime of tanneries after it has been used in taking off the hair from the skins.

In order to compound my artificial hydraulic cement, which I designate "Union" hydraulic cement, I take the clay containing the ingredients already mentioned, the coal-ashes, the mud from city-sewers, and the coal-dust in suitable proportions, (in a wet state,) in combination with carbonate of lime, the proportion being one of the foregoing ingredients to two of carbonate of lime. I proceed, then, to grind the whole in a wet state into a homogeneous paste between suitable millstones. I then take parting-sand, which is of a sharp fine grit, and the refuse lime from tanneries, and other limes not contaminated with sulphuric acids or soda, and grind them into a homogeneous paste, the proportion being equal. Each of these compositions is ground in separate mills in a semi-fluid state, and when they pass through the millstones they run into any form of a brick-making machine, when they are turned out into bricks or cubes, after which they are set out to dry under suitable sheds like any other kind of bricks, and, when dried, are then placed in the kiln and burned.

The paste which I call "No. 1" must be burned in a kiln developing a large amount of heat, so that a white heat may be secured to the bricks.

The paste which I call "No. 2" can be burned at a much lower temperature, as the materials have already been burned once and only require sufficient heat to combine them, so that there is no longer a free lime.

When the pastes Nos. 1 and 2 are in a calcined state, they are then ground together in the proportion of three-fourths pound of No. 1 paste to one-fourth pound of No. 2 paste, thus imparting to the cement additional quantity of silica, which prevents the cement from cracking in the process of setting.

Having described my invention, I claim—

1. Clay containing silica, alumina, peroxide of iron, and magnesia, or clays having these substances added in proper proportions, with coal-dust, coal-ashes and sewer-mud, in combination with carbonate of lime, for the purpose of manufacturing artificial hydraulic cement.

2. The refuse lime from tanneries, combined with parting-sand from foundries, for the purposes herein described.

3. Treating the materials set forth in the manner herein described in the manufacture of artificial hydraulic cement.

Dated at the city of New York the 3d day of September, A. D. 1878.

JOHN A. FRANCIS.

In presence of—

THOMAS W. PEYTON,

JOSHUA M. FIERO.