

UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN FIRE AND WATER PROOF CEMENTS.

Specification forming part of Letters Patent No. 4,420, dated March 14, 1846.

To all whom it may concern:

Be it known that we, WILLIAM YATES, of Manchester, in the county of Lancaster, upholsterer, and DENIS DOLAN, of the same place, scagliola manufacturer, have invented a new and Improved Plastic Manufacture or Composition; and we do hereby declare that the following is a full and exact description.

The nature of our invention consists of the novel and peculiar combination of certain materials employed in the manufacture of cements and other plastic compositions, and also in the process and method whereby such novel and intimate combinations of materials are effected.

The differences in the proportions and of the materials employed will depend upon whether the composition required be for decorative, hydraulic, or fire-proof purposes. Hitherto most plastic compositions or cements concrete or set on the outer surface or side next to the atmosphere first, and from this cause they are always found liable to be detached or separated from the wall or whatever surface they may be placed upon, and hence ultimately become easily broken and flake off, which is the principal reason that all cements have hitherto been so defective in case of fire or any extraordinary application of heat or damp, as it will be found in all cases where known cements have as yet been used that in case of extreme heat from fire they immediately expand and fly or fall from the surface of the structure they may be placed upon from the weakness or insufficiency of bond or union between the cement or plaster and the ground upon which it may have been placed.

The chief objects we have in view in making our improvements are to produce a plastic composition that will set or concrete first upon the surface upon which it is applied, and so on gradually until it arrives at the outer face of the work, and at the same time have such adhesive or growing qualities to the material that it will scarcely be possible by any outward force or violence to destroy or overcome that adhesion, and also to produce such a composition as will resist the action of fire or water. These improved plastic compositions or manufactures may be applied to any purpose for which ordinary mortar, plaster, or cement is used, either in setting bricks or stones,

plastering walls or ceilings, and ornamental and other works.

The preparation is formed, as in the following formula, by two separate processes, the result of which by admixture is made to act upon each other: Take one pound of bark or a quarter of a pound of gall-nuts, which crush or grind fine, and boil them in two quarts of water, continuing the heat until one-half of the water has evaporated, so that only one quart shall remain, which mix with seven pounds of dry fire-clay, employing as much of this decoction as the last-mentioned quantity of dry fire-clay will absorb. Dry the clay thus prepared, then grind, and repeat the operation with such a quantity of the like decoction as will insure the saturation of the fire-clay by the tannin principle, or, in other words, put into the clay as much tannin as it is capable of containing. Dry the clay in this state again, and finally grind or otherwise reduce it to the state of fine powder. Where bark of gall-nuts is not at hand, any other tannin may be used in equivalent proportions. This is the first preparation. The second is made as follows, namely: Dissolve half a pound of glue in a pint of water. To the solution add a quarter of a pound of slaked or hydraulic lime, and let the mass be brought by the addition of water to the consistency of a beaten egg or thick cream. This mixture must be boiled and carefully mixed by stirring until it is thoroughly blended and of uniform constitution. Now add seven pounds of dry fire-clay and work the materials together into a paste or putty, and then dry the mass produced. The mode of drying resorted to is either to expose it to the action of the sun or to an artificial heat not exceeding that of boiling water—or, in other words, not above two hundred and twelve degrees of temperature. When it has thus been rendered perfectly dry, break it into lumps, and then by a mill or otherwise grind or pulverize the whole of the mass to the state of fine powder. This may be considered as the second preparatory process, being distinct from the preceding. These two separate compounds are now to be carefully and ultimately blended together until they are rendered uniform. To this fine dust or powder add eight parts—that is to say, eight times its own weight—in a dry state, of

sulphate of lime, (plaster-of-paris,) and mix all well together by running it through sieves or riddles, or in any other way. To these materials in this state add of silica sixteen parts, or twice the weight of sulphate of lime, in the state of well-washed and fine dry sand, or in a corresponding proportion, when, instead of the sand and any other silicious substance—as granite-stone or flint, for example—is employed. When the whole has been duly mixed the process is finished and the article obtained. It is for some purposes found advantageous to add afterward a small quantity of solution of alum, and, though this addition is not necessary, it is claimed as part of the process, fitting the article better for peculiar applications, and thus to be used or omitted as occasion may require, and therefore claimed as under the protection of the patent. The substance thus obtained, either with or without the alum, is used by adding water to it until it is of the usual consistency of common mortar or plaster, and applying it in the ordinary way to walls, ceilings, interior coatings, and other surfaces.

The preparation as above described is applicable to the purposes of rendering fire-proof buildings, boxes, or safes for the preservation of deeds or other articles, and for the protection of property under any circumstances in which the preparation is used as a fire-resisting medium. Secondly, when the cement or plaster is required for hydraulic purposes, or setting under water, or in foundations, outside walls, or other such like work exposed to water or rain, it is requisite the formula should run as above, except, instead of or in connection with the fire-clay, substitute an equivalent quantity of oxide of lead, iron, or even iron filings, copper, or any other convenient oxide, and apply such substitute in the same manner as the said fire-clay in every respect, and the composition will be found perfectly waterproof, extremely adhesive, and of the greatest strength, and useful for building water-walls, docks, or arches, or any other structure where strength and water resistive power are required. Thirdly, for colored or fancy plaster composition or cement—such as imitation marble, scagliola, or other such like fancy work—the following alteration is required in the formula: One pound of glue to two ounces of good slaked lime, which must be boiled and diluted, as above described in preparing the fire-proof cement, and then to one part of this mixture add the coloring-matter and wet-grind it, as in preparing common paint or coloring, after which carefully dry and grind it to fine powder. To the other part add about fourteen pounds of carbonate or sulphate of barytes, or any other appropriate mineral instead of fire-clay, which make into paste or putty, and then dry and pulverize and grind to fine dust or flour, as in preparing the first-described or fire cement, and when so ground mix these two separate powders together. Then add of sulphate of lime eight times the weight of the barytes

or other mineral. In this colored plaster or cement the artist or operator must use his own judgment in mixing or combining the colors that are suitable to produce any particular or required tint or effect in color. This cement is intended for forming any decorative work that may be required—that is, by first forming a ground-work of the first-described or fire-proof cement, upon which put a skimming or coating of the colored cement, and they will both concrete together, forming a solid substance, and when dry can be highly polished.

If any imitation or artificial marble be required, mix the colors and apply them as in producing ordinary scagliola; and if the foundation be the fire-proof cement the most beautiful columns, pilasters, pannels, and slabs or moldings may be formed, and with this advantage that, owing to the adhesiveness and union of these two mixtures or cement, blistering and shelling off, as in scagliola work, will not occur. The cement may also be laid in solid colors and finished to a most beautiful surface. Its effect is exceedingly beautiful, and walls may be wrought or decorated in pannels, figures, flowers, &c., as desired.

In mixing the improved cement the flooring or pavement we put coarsely ground or pulverized granite instead of sand in the last coat or skimming, mixed with oxide of lead instead of fire-clay, and it forms upon the fire-proof cement a perfectly secure fire-proof floor with a surface harder than that of an ordinary stone, and may be employed as a plain or ornamental pavement or flooring if laid in the form of Mosaic tiles or tracery, as different colored granite may be procured with ease or otherwise.

To form a composition to represent wood-carving, cornices, or any ornamental decoration, where the weight of the plaster is objectionable, take to one hundred-weight of sulphate of lime the quantity of fire-clay and glue as in our second preparation, add three times the quantity of these ingredients, by measure or bulk, of ground spent bark, (such as the tanners throw away,) which must first have been well washed and dried in an oven or kiln and ground as fine as possible; and where strength in the composition is requisite, as in making benches, seats, or tables, take the hydraulic mixture of clay and glue—that is, put, instead of clay, an equivalent of the oxide of lead, iron, or copper, and blend all well together. Where bark is not obtainable take the same quantity of common sawdust or an equivalent quantity or amount of paper or woollen, silk, linen, or cotton fabrics, which must be previously well boiled and cleansed from all extraneous matter, and then well ground or pulverized to a fine powder. To three parts of this powder add the first and second preparations with the sulphate of lime, as in the fire-proof cement. Blend all well together. To this mixture add a solution of water and glue sufficient to make it of the consistency of paste or putty, which press into molds well oiled to prevent the same

from adhering to the molds. A hand-press will greatly add to the perfecting of the impressions of the carvings. It is found that the composition is capable of being mixed advantageously with other known cements, and this application is claimed as part of the discovery to be included in the patent.

We wish it to be distinctly understood that we do not intend to confine ourselves to any of the exact proportions of these ingredients to be used in the manner and for the purposes

above set forth, yet recommend them as those we found to be practically useful.

We do not claim as of our invention any of before-named well-known constituents; but

What we claim is—

The mixing and application of such constituents in the novel and peculiar mode before described.

WILLIAM YATES.
DENIS DOLAN.