

UNITED STATES PATENT OFFICE.

ARCHIBALD A. DICKSON, OF TORONTO, CANADA.

METHOD OF TREATING HYDROUS ROCK.

SPECIFICATION forming part of Letters Patent No. 620,894, dated March 14, 1899.

Application filed December 3, 1897. Serial No. 660,677. (No specimens.)

To all whom it may concern:

Be it known that I, ARCHIBALD ANDERSON DICKSON, a subject of the Queen of Great Britain, and a resident of the city of Toronto, in the county of York and Province of Ontario, in the Dominion of Canada, have invented a certain new and useful Improved Method of Treating Hydrous Rock, of which the following is a specification.

10 This invention relates to the treatment of hydrous materials of a rocky character found in natural deposits or veins in the different forms of sulfate of lime—such as gypsum, (CaO, SO₃+2HO,) selenite, alabaster, and the
15 like—for the purpose of rendering them capable of being readily hardened and polished, and whereby various useful and ornamental articles and materials may be produced, either plain or colored, to resemble different kinds
20 of marble, chalcedony, onyx, or the like, the object being to perform such work and to produce such articles and materials in a manner more economically, conveniently, and efficiently than by the other methods known in
25 the art.

In practice it has been found that one of the chief difficulties has been that during the process of dehydration the native material has been found to curl and twist to such an
30 extent as to destroy the form or equality of shape of the article or block under treatment. Another fatal objection to all of the old methods with which I am acquainted is that in the majority of cases cracking or slaking of the
35 material occurs both during the dehydrating and cooling process.

I will now describe my new method or process in such detail as will enable those skilled in the art to put the same into practice and
40 more particularly point out the novelty in the claim.

In mining the native material (which for clearness of description I will confine to gypsum rock) I use channeling or sawing machines in preference to breaking out or blasting, as the rock is thus in no danger of becoming fractured, shattered, or separated in its pores. The blocks or pieces are now
45 sawed, turned, or otherwise worked into the desired shapes, and then preferably put into
50 clamps or other holding devices of such char-

acter that a support or slight pressure will be had at the necessary points. These clamps or holders may include in their grasp either single articles or pieces or a number of such
55 as may suit the circumstances, their use, however, being specially valuable when used in connection with pieces of large dimensions. The next step is that of dehydration—that is to say, I drive off the desired or necessary
60 proportion or amount of the inherent moisture by subjecting the articles or pieces to the action of heat, preferably by hot air of the required temperature in a closed chamber or compartment. When, according to the qual-
65 ity of the gypsum (in which the moisture varies) or the size of the piece, it has been subjected to a suitable degree of heat and for the necessary time, the heating agent is withdrawn from the chamber and a gradual cooling
70 of the material is thus effected, (or in using a large plant I may find it convenient to move the dehydrated material to one or more cooler chambers, thus keeping up a constant operation with a large quantity of gypsum.) The
75 desired degree of coolness having been thus effected, I prepare a bath containing a solution (preferably of the same temperature as is now possessed by the gypsum) of ammonium alum, Al₂3SO₄(NH₄)₂SO₄24H₂O, and
80 immerse the articles (with their clamps still in place when such are used) therein and let them remain until the pores are completely filled with this hardening solution, or frequent hasty dippings may be employed in
85 certain cases to some advantage, as known in the art. The use of ammonium alum in the bath is the essential feature of my process, as I find that this chemical from the peculiar penetrating action of the constituent ammo-
90 nia acts both as a mordant and a hardening element, and I am consequently able to dispense with extra liquids, acids, and salts, and thus economize both labor and first cost of materials. Upon their removal from the bath
95 I allow the slabs or other articles to drain and dry, preferably in the open air or in a suitably-conditioned apartment, the time now depending solely upon the size of the article and state of the atmosphere. I may add any
100 suitable coloring ingredients (such as anilin dyes or their equivalents) to the solution in

the bath, according to the appearance desired for the article, and I may sometimes employ those natural materials which are the closer affinities of the pure ammonium alum—such
5 as chrome-alum, iron-alum, and the like—in addition to the ammonium alum, when they produce the desired colors. The clamps or holders when used are now removed and the blocks, slabs, or ornamental pieces can be
10 polished by any known or suitable means or methods.

I have found by practical experiment that the above process produces a finished article of superior hardness and free from crack or
15 blemish, and the chemicals employed are such as will not be objectionable or dangerous to the workmen employed.

I do not claim nor is it necessary to describe any particular form or arrangement of
20 apparatus, as any intelligent person may eas-

ily construct and arrange a plant suitable for carrying out my present improved process.

What I claim, and desire to secure by Letters Patent, is—

The process of treating hydrous gypsum 25 rock to enable it to be hardened, which consists, essentially, in first dehydrating the rock by the action of heat; second, cooling it gradually; third, subjecting it to the action of a combined mordant and hardening material 30 by immersing it in a single solution of ammonium alum, $\text{Al}_2, 3\text{SO}_4(\text{NH}_4)_2, \text{SO}_4, 24\text{H}_2\text{O}$ until the mass has been thoroughly impregnated therewith and the pores filled, and finally drying it, substantially as set forth.

ARCHIBALD A. DICKSON.

Witnesses:

ROBT. A. KELLOND,
E. J. CHECKLEY.