

# UNITED STATES PATENT OFFICE.

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## IMPROVEMENT IN PROCESSES OF MAKING ARTIFICIAL MARBLE.

Specification forming part of Letters Patent No. 214,142, dated April 8, 1879; application filed November 29, 1878.

*To all whom it may concern:*

Be it known that I, HARRIET GOODHUE HOSMER, residing at Rome, in the Kingdom of Italy, have invented a new and useful Process for Making Artificial Marbles, which process is fully set forth in the following specification.

This invention relates to that class of processes employed for preparing and treating limestone or alabaster-stone, or other stone of like nature, so that the appearance, hardness, and beauty of natural marble in its various colors are obtained; and it consists in steaming the stone in a boiler or other vessel at a pressure varying according to the size of the stone, and afterward placing the stone in an alum-bath, if it is desired that the stone shall preserve its natural color, or, if it is desired to color the stone, in one of the various colored baths below described, according to the color desired.

In carrying out my invention, take the stone which has been carefully reduced to whatever finished shape is desired, whether as statues, architectural ornaments, or any of the forms in which marble is or can be used. Place the stone objects in a boiler furnished with a manometer, and lined, so that no rust can discolor the water, and also containing a grated platform at the bottom, so that earthy particles may sink and not adhere to the stone. I next fill the boiler with pure water, free from any mineral deposit, (rain water is best,) and of natural temperature, taking care that the objects be entirely immersed. The boiler is then closed hermetically and heat applied, and the water allowed to boil until the manometer indicates 5° atmospheric pressure, if the objects are small, and 6° or 7° if they are large. Then the water is allowed to cool until the manometer returns to zero.

Instead of the boiling process above described, steam alone may be introduced into the boiler, care being taken that the same degree of heat and pressure is maintained, and the result attained will be the same.

If it is intended that the objects shall preserve the natural color of the stone, I next place them in a bath consisting of pure water containing five per cent. of alum, as indicated by the areometer, and let them remain for

at least twenty-four hours. They may remain longer, if greater hardness is desired.

If water is used in the boiler, as before described, this alum-bath may be effected in the boiler itself, and in that case the alum is put in the water before the boiling begins, and the objects remain in the boiler twenty-four hours after the manometer returns to zero.

The alum-bath is only to be used when the natural color of the stone is to be preserved. If it is intended to color the stone, I take the objects from the boiler after the boiling or steaming process, and place them, according to the color desired, in any one of the various colored baths, the composition of which is given below, where they must remain entirely immersed at least twenty-four hours. The colored bath must be boiling, or very nearly so, at the time of the immersion, and it is better, though not essential, that the objects should be immersed while still warm from the boiler. An object may be immersed a second time to give deeper color, first letting it remain ten minutes in an oven at a temperature of 80° or 90°.

The following is the composition of the various colored baths, viz:

*Black or dark gray.*—Pure water, two liters; redwood, three hundred grams; fustic-wood, one hundred and twenty grams; sulphite of iron, ten grams; sulphite of copper, two and one-half grams. Boil the redwood and fustic-wood an hour and a half. Then add the sulphites, and continue the boiling until all the salts are dissolved, (three or four minutes will generally be sufficient.) Then pass the solution through a sieve, and add a gill of acetic tincture of iron. The color augments with time.

*Stone color.*—This is made in the same manner and with the same quantity of water, but with half the quantity of all the other substances as in the composition of black above given. Care must be taken to refill the vase in which the liquid is prepared as the water diminishes by boiling.

*Red.*—Pure water, three liters; vezzino, (or Brazilian wood,) three hundred and thirty grams; scotano, five grams; cream of tartar, one gram; alum, one gram. Boil until all the color of the wood is extracted, and then pass through the sieve.

*Yellow.*—Pure water, three liters; extract of yellow wood of Cuba, twenty grams; sulphite of magnesia, (or alum,) ten grams. Boil until the solution of the extract is complete.

*Green.*—Pure water, three liters; extract of yellow wood of Cuba, twenty grams; alum, ten grams. Boil until complete solution of extract; then add carefully, by means of a wooden spoon, as many drops of solfo-indigotic acid (Saxon blue) as may be necessary to give the shade of color desired. A piece of dry plaster-of-paris may be used to test the color by dipping it in the solution.

*Blue.*—Pure water, three liters; alum, ten grams; solfo-indigotic acid, (Saxon blue,) as much as in the previous composition of green, until the color desired is obtained.

Whatever color which penetrates the stone perfectly and is a permanent color may be used at pleasure. Dissolve the color selected in a little alcohol, which is afterward diluted with warm water in which alum is dissolved, in the proportion of twenty-four grains to every liter of water. The preceding is for colors insoluble in water.

For such colors as are soluble in water, no alcohol is necessary. They may be dissolved in boiling water in which a little alum or sulphate of magnesia is introduced.

The same colors which are permanent in cloth are permanent in stone.

Finally, after the objects are removed from their respective baths, they are allowed to dry thoroughly, which may require a fortnight, or even more, according to the size. They are then polished—first with pumice-stone, then with slate or lead. They are then rubbed with oil, and, lastly, after the oil is dry, with phosphate of lime. This process of polishing gives a brilliant and perfect luster. The ordinary methods of polishing marble will, however, apply perfectly to this artificial marble.

I am aware that heat has been before applied to stone and gypsum for the purpose of making it resemble natural marble; but in all previous processes, so far as I am aware, dry heat only has been so applied.

What is particularly new and useful in the process above described is the use of moist heat, or heat in the form of steam, which thoroughly penetrates the stone and makes it of uniform hardness and density throughout.

I claim as my invention—

1. The process of preparing and treating limestone or other like stone, including alabaster-stone, so that it acquires the appearance and uniform hardness throughout of natural marble in its various colors, by the use of and application thereto of moist heat, or heat

in the form of steam, in combination with a bath of alum and water, or with various baths composed of different chemicals and coloring materials, substantially as described.

2. The process of preparing and treating limestone or any other like stone, including alabaster-stone, so that it acquires the appearance and uniform hardness and density throughout of natural marble, by the use of and application thereto of moist heat, or heat in the form of steam, in combination with a bath of alum and water, substantially as described.

3. The process of preparing and treating limestone or any other like stone, including alabaster-stone, so that it acquires the appearance and uniform hardness and density throughout of natural marble in various colors, by the use of and application thereto of moist heat, or heat in the form of steam, in combination with a bath or baths composed of chemicals and coloring materials, substantially as described.

4. The process of causing limestone or other like stone, or alabaster-stone, to resemble or to acquire the appearance and uniform hardness and density throughout, or any of the qualities of natural marble, by the use of and application thereto of moist heat, or heat in the form of steam.

5. The process of preparing or treating limestone, alabaster-stone, or other like stone, so that it may acquire the appearance or any of the qualities of natural marble, by the use of and application thereto of a bath of alum and water.

6. The process of preparing and treating stone so that it acquires the appearance and uniform hardness throughout of natural marble in its various colors, by the use of and application thereto of moist heat, or heat in the form of steam at a pressure varying according to the size of the stone, in combination with a bath of alum and water, or with various baths composed of different chemicals and coloring materials, substantially as described.

7. The process of causing stone to resemble or to acquire the appearance and uniform hardness and density throughout, or any of the qualities of natural marble, by the use of and application thereto of moist heat, or heat in the form of steam at a pressure varying according to the size of the stone.

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