

# UNITED STATES PATENT OFFICE.

JAMES B. SPEED, OF LOUISVILLE, KENTUCKY.

## PROCESS OF MANUFACTURING HYDRAULIC CEMENT.

SPECIFICATION forming part of Letters Patent No. 450,750, dated April 21, 1891.

Application filed February 11, 1891. Serial No. 381,075. (No specimens.)

*To all whom it may concern:*

Be it known that I, JAMES B. SPEED, of Louisville, county of Jefferson, State of Kentucky, a citizen of the United States, have  
5 invented an Improved Process of Manufacturing Hydraulic Cement, of which the following is a full, clear, and exact specification.

My invention relates to improvements in the process of manufacturing hydraulic cement; and the object of my invention is to secure an economy both in the fuel required for calcining the cement-rock and in the time occupied in the operation of burning, as well as a uniformity in the cement product.

15 My invention consists in first reducing the blocks of rock as they come from the quarry to lumps or pieces of varying sizes, then separating such lumps or pieces into groups in which, respectively, the lumps are of approximately uniform size, then charging the several said groups of rock-lumps individually into the kiln with fuel, and finally firing the kiln, substantially as and for the purpose hereinafter set forth.

25 In carrying out my improved process the rock as it comes from the quarry in the form of large blocks is first reduced to lumps or pieces of comparatively small dimensions and of varying sizes. This may be accomplished  
30 by passing the quarried rock-blocks through a stone-breaker. The pieces of broken rock as they come from the stone-breaker are then separated into groups in which, respectively, the rock-lumps composing said groups are of approximately uniform size. This may be  
35 done by passing the broken rock over successive screens which have respectively meshes of various sizes, so that the smaller pieces of rock of approximately uniform size will pass  
40 through and fall beneath one screen. The pieces of somewhat larger and approximately uniform dimensions will pass through and fall beneath another screen, and so on until the largest pieces, approximately of uniform  
45 size, will be discharged as tailings from the final screen of the series. The respective groups of lumps, said lumps being, as stated, of substantially uniform size in the said respective groups, are then charged severally  
50 and individually into the kiln with the fuel. The respective groups of lumps may be

charged severally into separate kilns, so that each kiln may contain as its entire charge lumps of approximately uniform size throughout mingled with the requisite fuel, or the  
55 said groups may be charged successively individually into one and the same kiln, each group having supplied to it its requisite fuel, so that such kiln will have as a charge groups of lumps of uniform size in successive layers. 60  
It is obvious that in supplying fuel to the kiln or kilns with the said respective groups of lumps the larger lumps will require a larger proportion of fuel than the smaller lumps in charging. The kilns are then fired, 65  
and the operation of calcining the rock may be carried on in the well-known vertical kilns and which may be those that work on the "single-charge" or "continuous-burning" plans. 70

Any other known means than a stone-breaking machine may be employed to effect the reduction of the quarry-blocks of rock to small lumps or pieces, and any other known means than screens may be used to separate 75  
the broken rock into groups in which, respectively, the lumps are of approximately uniform size. The means described are named solely because they are believed to be preferable.

Heretofore in calcining cement-rock in kilns 80  
the rock in irregular-sized lumps or blocks has been indiscriminately charged into the kilns, so that each kiln contained a charge composed of rock-pieces of varying sizes mingled with the fuel either in alternate layers or heterogeneously. The calcining under these conditions has of necessity been ununiform and the product obtained varying in quality.

By means of my described method, the 90  
broken cement-rock being separated into groups of approximately uniform-sized pieces, respectively, the charge of each kiln of a series thereof or the successive charges of a single kiln will be composed of rock-lumps 95  
of substantially uniform size, and hence will be uniformly calcined, and also the quantity of fuel required and the period of time demanded to effect the calcining of each group of uniform-sized rock-lumps may be closely 100  
predetermined, thus effecting an economy in both the fuel and the time of operation.



I am aware that in the preparation of cement-rock for calcining the rock has been reduced by crushing into pieces of such a fineness that the rock has been approximately  
5 pulverized and so that the largest of such pieces did not exceed in dimensions a certain predetermined size, and that the thus-crushed rock has been then charged directly from the crusher into a furnace, in which it was in its  
10 pulverulent condition calcined. I make no claim herein to such treatment of cement-rock in its preparation for calcining, and such treatment of the rock is not analogous either in operation or result to my herein-described  
15 process. This is plainly obvious in that even in crushing the rock to a fineness which renders it substantially pulverulent the result will be that while pieces will be produced the largest of which will not exceed in dimensions a certain predetermined size, it will necessarily follow that some—in fact, the larger  
20 portion—of the rock-pieces in the crushed mass will be of a less dimension than the predetermined size fixed upon for the pieces of greatest dimensions, and hence the resultant  
25 mass of crushed rock will be composed of pieces which, though all of comparatively small dimensions, will be of varying sizes, and these pieces of varying sizes being  
30 charged directly and heterogeneously into a

furnace the disadvantages sought to be obviated by my described improved process will accrue in the resultant cement. In my improved process, as herein described and to which I limit my claim herein, the rock is reduced, as by breaking, to lumps or pieces of  
35 varying sizes, and these lumps are separated, as by a series of screens, into groups in which, respectively, the lumps are of approximately uniform size, and these groups of uniform-sized lumps are charged individually and severally into the kiln.  
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What I claim as my invention, and desire to secure by Letters Patent, is—

The process of manufacturing hydraulic  
45 cement, which consists in first reducing the blocks of rock as they come from the quarry to lumps or pieces of varying sizes, then separating such lumps or pieces of rock into  
50 groups wherein, respectively, the lumps are of approximately uniform size, then charging the several said groups of rock-lumps separately into the kiln with the fuel, and finally firing the kiln, substantially as and for the purpose set forth.

JAMES B. SPEED.

Witnesses:

A. S. FITCH,  
A. T. FALES.