

UNITED STATES PATENT OFFICE.

HENRY F. WILLIAMS, OF SAN FRANCISCO, CALIFORNIA.

PROCESS OF TREATING BITUMINOUS SAND-ROCK.

983,851.

No Drawing.

Specification of Letters Patent.

Patented Feb. 7, 1911.

Application filed August 4, 1910. Serial No. 575,394.

To all whom it may concern:

Be it known that I, HENRY F. WILLIAMS, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented new and useful Improvements in Processes of Treating Bituminous Sand-Rock, of which the following is a specification.

My present invention relates to a process of treating bituminous sand rock to form paving material or the like.

In my U. S. Letters Patent No. 770,137, dated September 13, 1904, I disclosed a process of treating bituminous sand rock which consisted in softening said rock and then mixing with it lime-sludge produced in the manufacture of beet-sugar, whereby the said rock was hardened and toughened. This treatment adapted the bituminous sand rock for paving, roofing and other purposes. I have discovered a method of treating said bituminous sand rock to form the above products, whereby its use is greatly extended, and said products are greatly cheapened. A difficulty experienced in practicing the process described in said patent was found to be that, after digging the material from the earth and placing it in cars, wagons, or ships for transportation to the place where it is to be used, said material would be found, on arrival at its point of destination, to have conglomerated or cohered into a single mass. Consequently, practically the same amount of work which had been expended in originally digging out the rock would have to be done all over again in extracting it from the ship or car, and, at an even greater expense on account of the cost of demurrage. Consequently the use of this process was limited to localities and conditions where this extra expense could be avoided, and in the great majority of cases the extra cost thus entailed was either altogether prohibitive or greatly reduced the profit which should have been derived from the process.

In my improved process, the sand rock when it is first removed from the earth is in pieces of all sizes but in this condition has very little adhesive property, and therefore is easily reduced to pieces of the size of gravel. In this condition, it is now coated with lime-sludge, that is, with the same material with which it is afterward compounded. This coating is preferably effected by throwing the material into an agitator con-

taining said lime-sludge, in which being agitated it takes up a sufficient coating of said lime-sludge to prevent the pieces adhering to one another. In this condition it is placed in the cars or vessels for transportation and arrives at its point of destination in the same condition, conglomeration of the pieces having been prevented by the lime-sludge coating. A coating of other material than lime-sludge could be used to prevent this conglomeration, although less effective in producing final results, on account of the strong affinity between the carbonic acid in the lime-sludge and the hydro-carbon in the bituminous sand rock, so that when lime-sludge is used the result is a great increase in cohesion and hardness. These pieces so coated can now be taken to the street which is to be paved, and there laid down in a layer of suitable thickness, raked smooth, and tamped down by suitable tamping means, and finally rolled with the heated roller.

By the above operations the coating of lime-sludge will become incorporated in the bituminous sand rock, causing the same to become tough and hard, and the upper surface especially, which is thus rolled and heated, becomes homogeneous in character. It will be observed, however, that in the above process the pieces of sand rock are heated very slightly, if at all, and herein is the distinctive feature of the present invention.

In my former process, and in all prior processes, so far as I am aware in which bituminous rock is used for paving purposes and the like, a considerable amount of heat has been applied to the rock. It has heretofore been thought necessary to melt the bitumen to cause the pieces to adhere together, and even to add water thereto to soften it, all of which is just the opposite of what should be done. I find that any heat more than that which will expel the moisture contained in the rock is injurious, and in this respect my invention is an improvement upon prior processes. In my process I apply no more heat than is necessary to dry the rock.

When the sand rock is in pieces of the size of gravel, the moisture contained therein is very easily expelled, the heat of the tools by which it is handled being sufficient for this purpose. I may, instead of directly tamping the pieces of rock down in the place where the paving is to be laid, ap-

ply heat thereto in a suitable agitator, but I take care that the degree of heat thus applied is no more than is necessary to vaporize the moisture contained in the rock. 5 If the heat be thus kept below the above temperature, the natural adhesive properties of the bitumen are unimpaired, whereas, if the heat be raised to a greater temperature, then the bitumen loses to a greater or less extent its adhesiveness, probably because of 10 the carbonization which then takes place of the hydro-carbon present in the rock. By my process this carbonization is avoided.

A fair imitation of bituminous sand rock 15 itself can be produced by combining clean dry sand with asphaltic oils in sand rock, and this product will absorb a like amount of lime-sludge under like conditions of heat and mechanical manipulation. I therefore 20 regard it as within the scope of my invention to treat in the manner above described such a product of clean dry sand and heavy asphaltic oils, and I desire the term "bituminous sand rock" in the claims to be un- 25 derstood as a generic term including the artificial product above referred to.

I claim:—

1. The method of treating bituminous sand rock which consists in mixing it with 30 lime-sludge and subjecting it to a heat only sufficient to dry it without volatilizing any of the hydro-carbon constituents thereof, and then pressing it into the desired form, substantially as described.
- 35 2. The process of treating bituminous sand rock which consists in reducing it to

comparatively small pieces, coating said pieces with lime-sludge to an extent to prevent the adhesion of the pieces, subjecting said pieces to a low heat and pressing the 40 pieces, so heated, to the required form, substantially as described.

3. The process of treating bituminous sand rock which consists in coating pieces thereof with lime-sludge to an extent to 45 prevent the adhesion of the pieces, subjecting said pieces to a low heat, and pressing the pieces so heated to the required form, substantially as described.

4. The process of treating the bitumi- 50 nous sand rock which consists in reducing it to comparatively small pieces, coating said pieces with pulverulent material and mixing them with lime-sludge, subjecting said mixture to a low heat and pressing the 55 pieces so heated to the required form, substantially as described.

5. The process of treating bituminous sand rock which consists in reducing it to comparatively small pieces, coating said 60 pieces with lime-sludge to an extent to prevent the adhesion of the pieces, arranging said pieces in the desired form, and then subjecting the pieces to considerable pres- 65 sure, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

HENRY F. WILLIAMS.

Witnesses:

FRANCIS M. WRIGHT,
D. B. RICHARDS.