

UNITED STATES PATENT OFFICE.

JAMES O'FRIEL, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN TREATING BITUMINOUS SUBSTANCES FOR PAVEMENTS, &c.

Specification forming part of Letters Patent No. **106,717**, dated August 23, 1870.

I, JAMES O'FRIEL, of Brooklyn, Kings county, and State of New York, have invented a new and Improved Preparation of Vulcanized Bitumen, to be used in connection with other substances in the construction of roadways, sidewalks, and roofing for houses, of which the following is a specification:

My invention relates to that class of devices employed for giving to road and foot ways an even, elastic, and hard surface, for the purpose of making travel easy and pleasant, known as "asphaltum," and containing coal and pine-tar and resin, none of which, however, I employ in my combination of matter, the nature of which consists in preparing a composition of a bituminous substance, sand or gravel, black oxide of manganese or sulphur, and sulphate of lime, and subjecting it to the action of superheated steam, substantially as hereinafter specified, which, on being properly treated, compounded, and laid over the surface of a prepared road, forms a monolithic stone that will not soften under the hottest tropical sun, nor will ice form on it in winter, while it produces an elastic, easy, and permanent roadway; and it also consists in preparing the road or foot way with a solid foundation and with layers of material which act as an elastic cushion between the solid foundation and the vulcanized bituminous surface, as I will further explain by an exposition of the ingredients and their treatment and the construction of the roadway, viz:

Of the ingredients I use about the following proportions: first, nine hundred and twenty-eight cubic inches of the residue of a distillation made from coal or gas tar, or directly from bituminous coal, which residue is a resinous mass or bituminous cement; second, two thousand nine hundred and sixty cubic inches of silex or gravel; third, one hundred and eight cubic inches of sulphur or black oxide of manganese; fourth, three hundred and twenty-four cubic inches of sulphate of lime. These ingredients I pulverize into a fine powder, and mix together in a dry unheated state until thoroughly amalgamated. I next place the ingredients in a close iron vessel, through which steam-pipes pass, provided with a mixer and inclosed in a steam-jacket, and I admit

superheated steam of 300° Fahrenheit through the steam-pipes, which pass through the vessel containing the combination and into the steam-jacket, and I set the mixer in action by steam or other power, agitating the mass within the vessel.

While this vulcanite of bitumen is being prepared I lay the foundation of the road, which may be composed of loose cobble-stone, rammed down, or a cobble-stone pavement already laid, with the joints raked out. On this foundation I lay a stratum composed in about the proportion of three hundred and forty-eight cubic inches of a material known as "elastic cement" (a distillation) to two thousand five hundred and ninety-two cubic inches of fine gravel, sand, or earth, said elastic cement and sand or earth being mixed together and heated, so as to form a mass. This compound I spread evenly on the foundation, grading with heated rakes and rolling with heated rollers until a smooth surface is attained. This stratum forms what I term a "cushion," and is intended to make the roadway semi-elastic.

Next I place on the elastic cushion a calcareous stratum, composed of about eighteen pounds of sulphate of lime to one and one-half cubic foot of gravel or sand, with water enough to mix the particles together, and I grade the same evenly with rakes and rollers until the water is taken up by the atmosphere, when a hard even surface will remain.

Finally, I take from the steam-mixing vessel the mixed mass or vulcanite of bitumen in a hot state, and spread the same over the now prepared road, grade the same with heated iron rakes to about the thickness of three inches, and I roll the same with heated rollers until the surface becomes vulcanized, and which, with the two other strata, will make a solid mass about seven inches in thickness, and ready for travel over it within one hour after the last or vulcanized bituminous stratum has been laid.

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

1. The composition of a bituminous substance with sand or gravel, black oxide of manganese or sulphur, and sulphate of lime,

when subjected to superheated steam, so as to produce the vulcanized bitumen, substantially as and for the purpose herein specified.

2. In combination with the vulcanized bitumen, as above specified, the elastic stratum or layer composed of elastic cement, as described, and gravel, sand, or earth, for the purpose set forth.

3. In combination with the vulcanized bitumen and elastic stratum, as above specified,

the stratum or layer composed of sulphate of lime and gravel or sand, substantially as and for the purpose herein described.

In testimony whereof I have hereunto set my signature this 27th day of June, 1870.

JAMES O'FRIEL.

Witnesses:

ARTHUR NEILL,
EMILE MOLTZ.