UNITED STATES PATENT OFFICE.

CLIFFORD RICHARDSON, OF NEW YORK, N. Y., ASSIGNOR TO THE BARBER ASPHALT PAVING COMPANY, OF SAME PLACE.

ASPHALTIC PAVEMENT.

SPECIFICATION forming part of Letters Patent No. 607,884, dated July 26, 1898.

Application filed February 4, 1897. Serial No. 622,028. (No specimens.) Patented in England April 12, 1897, No. 9,315.

To all whom it may concern:

Be it known that I, CLIFFORD RICHARDSON, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Asphaltic Pavements, (for which I have obtained Letters Patent in Great Britain, No. 9,315, dated April 12, 1897,) of which the following is a specification.

This invention relates to that well-known class of asphalt pavements in which a natural or artificial bitumen, or both combined, is mixed with a mineral aggregate of sand, either silicious or calcareous, and fine mineral dust or hydraulic cement for the purpose of making a bituminous concrete, which when properly combined, laid, and compressed shall form a pavement-surface.

Asphalt pavements have been laid for many years under different formulæ by many different parties; but heretofore it has never been found practicable to produce pavements uniform in character. It has been found by all of those who have engaged in this business that pavements laid upon the same formula will not be alike, that some will be excellent in quality, durable, and in every way effective, while others laid upon the same formula will fail to come up to the standard requirements in many respects. Many efforts have been made from time to time to discover the cause of this difference in pavements of the same composition of materials, but without success. In the course of many experiments and trials I have discovered that the grading of the sand in a paving composition is not, as heretofore supposed, a mere matter of convenience and dependent upon the particular kind of sand used, but that it is a matter which is absolutely essential to secure a pavement of uniform quality, and I have discovered that by properly grading the sand, as I shall hereinafter set forth, using other materials in proper and in most cases well-known proportions, I am enabled to lay pavements which shall be substantially alike in all respects and to adopt a formula with the positive knowledge as to the character of the pavement which will result therefrom. I have further discovered that by properly grading the sand I am enabled to combine effectively therewith a larger proportion of bitumen without making a pavement that will become too soft and liable to "creep," while securing a greater degree of toughness and pliability than has heretofore been practicable with pavements of requisite durability. For the purpose of regulating the sizes of the particles of the mineral aggregate, of which the mixtures consist to which this invention relates, a series of sieves is employed, which are made with a sifting portion of brass cloth of the numbers commonly known in the trade as Nos. 10, 20, 30, 40, 50, 80, 100, and 200 mesh and which pass particles having on the average a diameter of .085, .17, .24, .32, .50, .67, one, and two millimeters. This series is selected because the average diameters of the largest particles passed by the different sieves bear a numerical relation to each other, being about one, two, three, four, six, eight, twelve, twenty-four, the size of the largest particle passed by the smallest sieve being taken as unity; but any other series of sieves could be used in place of these with the same objects in view, if they pass particles within the same extreme limits of size. With these sieves the grading of the mineral matter in an asphalt pavement or of the sand and dust of which it is composed can be determined and represented in percentages, as hereinafter illustrated.

Experience with such pavements as have worn the best shows that they have accidentally been made with sand containing but a small proportion of coarser-sized particles. Further experimental tests have shown me that it is desirable to have the mineral aggregate rich in particles of the size passing the two-hundred, one-hundred, and eighty mesh sieves, and I have also found that mineral aggregates which contain much fine material will carry more bitumen, will prove more dense and compact, and will have better wearing properties than those made of coarser material and which will carry less bitumen.

The present improvement in the making of asphaltic pavements consists, therefore, in the grading of the mixture of sand and dust (by "dust" I mean any earthy matter that will pass through a sieve having at least one hundred meshes to the inch) by means of sifting and varying the proportions of the material employed, so that the resulting surface mix-

ture shall contain at least thirty-five per cent. and preferably a larger amount of material which will pass an eighty-mesh sieve. The grading of this thirty-five per cent. or more of sand in the mixture is preferably as follows: ten per cent. or more passing a two-hundred-mesh sieve or smaller than .085 millimeters in average diameter; ten per cent. or more passing a one-hundred-mesh sieve, but not a two-hundred; fifteen per cent. or more passing an eighty-mesh sieve, but not a one-hundred.

Not more than fifteen per cent. of the material used should be so large as to fail to pass a forty-mesh sieve, preferably less, and but a small amount, or none, should fail to pass the ten and twenty mesh sieves. In combination with such graded mineral aggregates I add the bituminous cement in such amount as to give over 10.5 per cent. (and preferably more) pure bitumen, soluble in carbon bisulfid, or as much as well-known tests will show that the mixture will carry without becoming "sloppy" when hauled upon the work.

As an illustration of one of the best graded mixtures made according to my invention the following will serve: bitumen, 11.10; passing two-hundred mesh, 15.30; one-hundred mesh, 12.70; eighty mesh, 20.50; fifty mesh, 33.70; forty mesh, 3.60; thirty mesh, 1.50; twenty mesh, 1.10; ten mesh, .50.

No asphalt-paving surfaces have ever been laid heretofore which contained these high percentages of bitumen and graded fine mineral matter; and this is the important feature of my discovery—that is, not only that the mineral matter shall be graded, but that by thus grading it I am enabled to employ so much larger a proportion of bitumen than has ever heretofore been effectively used.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. An artificial-pavement composition containing bitumen and mineral matter, in which the latter contains predetermined proportions of different grades, at least thirty-five per cent. of the mineral matter consisting of particles capable of passing—at least ten per cent. through a two-hundred-mesh sieve, at least ten per cent. through a one-hundred-mesh sieve, and at least ten per cent. through the eighty-mesh sieve, substantially as described.

2. An artificial-pavement composition containing bitumen and mineral matter, in which the latter contains predetermined proportions of different grades, as specified, and the proportions of bitumen exceeds 10.5 per cent., substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CLIFFORD RICHARDSON.

Witnesses:
W. CLARENCE DUVALL,
G. P. KRAMER.