

UNITED STATES PATENT OFFICE.

CYRUS M. WARREN, OF BROOKLINE, MASSACHUSETTS.

IMPROVEMENT IN CONCRETE PAVEMENTS.

Specification forming part of Letters Patent No. **179,831**, dated July 11, 1876; application filed January 11, 1876.

To all whom it may concern:

Be it known that I, CYRUS M. WARREN, of Brookline, in the county of Norfolk and State of Massachusetts, have invented a new and Improved Concrete Pavement, which invention is fully set forth in the following specification.

This invention consists in a pavement composed of a layer of concrete, of which coal-tar or coal-tar pitch is an ingredient, and an upper or protecting layer of bitumen, or a compound made of native bitumen, or asphaltum, or rosin and the tarry residuum or heavy oil of petroleum or "candle-tar."

Concrete composed principally of coal-tar or coal-tar pitch and sand, broken stone, or equivalent, has been used for a long time as a pavement, and the utilization of such concrete is very desirable, on account of its low cost. Pavements made from such concrete, however, very soon deteriorate. The volatile matters, largely mixed with coal-tar or coal-tar pitch, evaporate by the influence of the atmosphere, and the concrete becomes brittle, and in a short time the pavement is full of cracks and holes.

This difficulty I have obviated by applying to a pavement composed of a concrete containing coal-tar or coal-tar pitch a protecting layer of native bitumen or asphaltum, or a compound made of native bitumen, or asphaltum, or rosin, and of the heavy oil or residuum of petroleum or candle-tar, to which may also be added sand, ashes, broken stones, or equivalent material.

In the preparation of this compound I have selected ingredients which are free, or nearly so, of volatile matter, and which at the same time can be obtained at a low cost.

My compound is prepared by fusing bitumen or rosin together with a suitable quantity of the heavy oil or residuum of petroleum or candle-tar. When cold my compound hardens, and it can be easily put up in barrels for convenient transportation. When it is to be

used the barrels are broken up, the compound is heated, and it can be readily spread on the concrete.

By applying this protecting layer to a concrete pavement containing coal-tar or coal-tar pitch the following desirable objects are attained: first, increased durability without much additional cost; second, increased solidity when new, admitting of immediate use without injury and without the liability to crack and crumble to dust when old or during the prevalence of cold weather; third, the continued utilization of coal-tar and coal-tar pitch as a paving material of a low cost, but under improved conditions, which effectually overcome the well-known objections to its use as now employed. The protecting layer, being composed of materials almost entirely free from volatile constituents, is not liable to deteriorate by the influence of the atmosphere, and it serves to protect the foundation of inferior concrete against the deteriorating influence of the atmosphere.

A pavement can thus be produced which is equal in durability to a pavement composed entirely of native bitumen, and which is considerably cheaper.

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

A pavement composed of a foundation of concrete containing coal-tar or coal-tar pitch and a protecting layer of native bitumen, or of a cement made of native bitumen or rosin, and of the heavy oil or residuum of petroleum or candle-tar, or of a concrete containing one or more of these ingredients, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand and seal this 7th day of January, 1876.

CYRUS M. WARREN. [L. S.]

Witnesses:

W. HAUFF,

E. F. KASTENHUBER.