UNITED STATES PATENT OFFICE.

CYRUS M. WARREN, OF BROOKLINE, MASSACHUSETTS.

IMPROVEMENT IN ROOFING MATERIALS.

Specification forming part of Letters Patent No. 191,208, dated May 22, 1877; application filed March 22, 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 Roof, which invention is fully set forth in the following specification:

This invention relates to roofs for buildings; and consists in a roof composed, first, of a foundation-layer of two or more thicknesses of paper or felt, saturated in the usual manner either wholly or partially with vegetable or mineral tar, natural or artificial, or other suitable material; secondly, of a protecting water and air-tight layer of native bitumen, or mixture of bitumens, or a compound of native bitumen and the residuum or heavy oil of petroleum, or other equivalent non-volatile material, such as heavy oil of bitumen, "candle-tar," or animal oil; thirdly, of a fire-proof layer of gravel, sand, broken stone, or other mineral substance.

That the nature of my invention may be clearly understood, I will state that hitherto it has been the common practice in the manufacture of roofs composed of felt, pitch, and gravel to employ a pitch made from coal-tar, or a mixture of pine or coal-tar and rosin, which materials are composed largely of volatile or drying matter which gradually evaporates or oxidizes on exposure to the sun and air, leaving a brittle residue, unsuitable either to bind the gravel or protect the felt, and resulting, finally, in a leaky roof.

My invention is adapted to prevent or retard this deterioration, and greatly increase the durability of such roofs, by covering the paper or felt foundation with a non-volatile material or preparation, which will remain soft, flexible, and free from cracks, so that the saturated paper or felt will be protected from becoming hard and brittle by evaporation of its volatile ingredients through a defective surface-layer.

In carrying out my invention I employ a foundation-layer of two or more thicknesses of paper or felt saturated with coal-tar or pine-tar, or other equivalent cheap material, or it may be saturated with the more expensive preparations of native bitumen, or other equivalent non-volatile material; but I am enabled by my invention to use cheap material, with less regard to its more or less volatile character, since all evaporation through the upper surface of the roof is permanently prevented by the impervious nature of the intermediate or protecting air-tight layer of my improved roof. This protecting layer of native bitumen, or some compound thereof, or other equivalent non-volatile material, will remain permanently soft and flexible, and free from cracks, and prevent the underlying paper or felt containing volatile matter from becoming hard and brittle by evaporation through the overlying layer, and eventually cracked and leaky.

As the more abundant native bitumens are commonly too hard to admit of being properly and conveniently applied as a surface coating to felt or paper upon a roof, I add to bitumens of this class a quantity of some oily, tarry, or pitchy material, preferably of a non-volatile character, sufficient to bring it to the consistency of ordinary coal-tar roofing-pitch.

Bitumens of a softer character, if not already of the proper consistency, are made so by admixture of a suitable quantity of some harder variety of bitumen, rosin, or other suitable stiffening material.

As an equivalent of native bitumen or asphaltum, rosin or other resinous material may be employed by combining it (in suitable proportions to form the pitch) with the heavy oil or residuum of petroleum, or other equivalent non-volatile and non-drying softening material, such as the heavy oil of bitumen, candle-tar, or a mixture of two or more of these or other equivalent non-volatile materials.

Upon this second or non-protecting layer thus composed is applied in the usual manner a fire-proof layer of gravel, sand, broken stone, or other mineral substance, and following upon this, after removal of the loose gravel, may be applied a finishing and further protecting layer of hydraulic-cement mortar.

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

In the construction of roofs, a protecting

layer of native bitumen, or mixture of native bitumens, or a compound of which this is an ingredient, in combination with a bottom layer of paper or felt and a top layer of gravel, sand, broken stone, or other fire-proof substance, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand and seal this 16th day of March, A. D. 1876.

CYRUS M. WARREN. [L. S.]

Witnesses:
HERBERT M. WARREN,
BENJ. H. CURRIER.