UNITED STATES PATENT OFFICE.

EDWIN THEODORE DUMBLE, OF AUSTIN, TEXAS.

PROCESS OF HARDENING BITUMINOUS SUBSTANCES.

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To all whom it may concern:

Be it known that I, EDWIN THEODORE DUMBLE, of Austin, in the county of Travis and State of Texas, have invented a new and Improved Process of Hardening Bituminous Substances, of which the following is a full, clear, and exact description.

My invention relates to a process for hardening or partly solidifying to any required degree substances such as liquid or viscid bitumens, tars, or asphaltums, either natural or artificial.

The present ordinary method of rendering a liquid bitumen denser or harder consists in expelling therefrom by heat the lighter or more volatile portions, as in the manufacture of petroleum or in the distillation of coal-tar, where the various light oils of different series and different volatility are driven off, leaving finally a residuum of pitch whose degree of softness or hardness corresponds to the degree of heat used. Substantially the same method is applied to the asphaltum used in street paving. This compound after being mixed with the requisite amount of sand or other similar material, must be heated until the lighter petrolin oils are evaporated to give it the necessary consistency and firmness.

My improved method is based upon the discovery of the fact that at suitable temperatures these oils of liquid or viscid bitumens, tars, and asphaltums are capable of dissolving bituminous coals and analogous solid bituminous materials to such an extent as to render them harder and even solid on cooling, and without serious loss of weight by evaporation of the lighter oils. My process takes advantage of this fact for the purpose named. I find that as the characters of these liquid materials vary the temperature at which solution takes place varies also, as well as the amount of any given bituminous coal or analogous material that can be dissolved in them.

The principal points of the process are as follows: The liquid or viscid material is heated in any suitable vessel to a temperature near but below its boiling-point. The bituminous coal or analogous bituminous material, preferably in a pulverized condition, is also heated and the two materials are mixed while hot in suitable proportions and the heat gradually raised to the boiling-point and continued until solution is effected. This part of the process is greatly facilitated by constant stirring, and in practise a steam-jacketed pug-mill, such as is used in agglomerating coal-dust and pitch in the manufacture of artificial fuel, gives excellent results, although any other device which will serve the same purpose may be used as well; or the materials may be mixed cold and then brought to a proper temperature for solution. In practise I prefer the former method.

By regulating the amount of bituminous coal or analogous bituminous material added any degree of hardness can be given the product up to that of hard pitch at least. By this process the amount of hard pitch produced is greatly increased, some of the liquid or viscid asphaltums having the power of dissolving twice their weight of other bituminous material with but little loss of their own substance.

To illustrate the process by an example, I will state that an asphaltum from Indian Territory was hardened with a coal having the following proximate analysis: moisture, .40; volatile matter, 36.42; fixed carbon, 59.63; ash, 3.54.

The asphaltum is fluid at 100° centigrade. The coal after being pulverized is heated to the same temperature, and if medium pitch is wanted a quantity is added weighing from one to one and one-fourth times as much as the asphaltum; if hard pitch, from one and one-half to twice as much. The heat is then raised to about 200° centigrade and the materials thoroughly stirred until solution takes place, which is known by the smoothness and ropiness of the mixture. It is then run out into any suitable receptacle to cool.

I desire it to be understood that the same result is obtained whether the solid material (bituminous coal) and the liquid or viscid material be first heated separately and then mixed to effect their combination or the two materials mixed before heating. These two processes therefore are equivalents, and the appended claims cover both processes.

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

1. The herein-described method of harden-

ing liquid or viscid bituminous substances, which consists in mixing them with bituminous coal or analogous bituminous material, subjecting them to a temperature below the volatilizing-point of the lighter oils, thereby softening and dissolving the solid bituminous material and uniting it with the liquid or viscid bituminous substance, as set forth.

2. The herein-described method of hardening liquid or viscid bituminous substances, which consists in mixing them with bituminous coal or analogous bituminous material, subjecting the mixture to an initial temperature below the boiling-point of the liquid or viscid bituminous substance, thereby softening and dissolving the solid bituminous material and uniting it with the liquid or viscid bituminous substance and then gradually increasing the temperature to the boiling-point of the compound, as set forth.

EDWIN THEODORE DUMBLE.

Witnesses:
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