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UNITED STATES PATENT OFFICE.

SAMUEL S. SADTLER, OF SPRINGFIELD TOWNSHIP, MONTGOMERY COUNTY, PENNSYLVANIA, ASSIGNOR TO AMIESITE ASPHALT COMPANY OF AMERICA, OF CAMDEN, NEW JERSEY, A CORPORATION OF NEW JERSEY.

METHOD OF TREATING KENTUCKY, AND SIMILAR ROCK ASPHALTS, IN THE MAKING OF PAVING MATERIAL.

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There are certain natural deposits of rock asphalts in the United States, which, although extensive, have been generally regarded as unfit for paving purposes or for road construction. Among such rock asphalts are what are generally known as Kentucky rock asphalt and Missouri rock asphalt and hereafter, for brevity, I shall include all of these low grade rock asphalt deposits under the general term Kentucky rock asphalt. These rock asphalts consist substantially of sand or sandstone having an asphaltic or bituminous content which is rather soft and which in quantity is often small or low. It may here be pointed out that rock asphalt, in general, varies considerably in the asphaltic content. In certain rock asphalts the asphaltic material present or asphaltic content may be as high as 20% of the weight of the rock, while in poorer leaner rock asphalts, the asphaltic content may be as low as 7%. It has been ascertained that a rock asphalt in which the asphaltic content is more than 11% of asphalt cannot generally be used for paving purposes without the addition thereto of more mineral matter. The asphalt contained in a paving made therefrom softens and spreads too much during hot weather. For the production of good paving, the rock asphalt should have an asphaltic content of 9 or 10% of the weight of the rock or mineral matter. The asphaltic content of Kentucky rock asphalt is generally below 9%, and, therefore, it will be seen that the asphaltic content of the Kentucky rock asphalt which I propose to use in the construction of roadways is, generally speaking, too soft and weak to provide the tenacity required in roadway construction.

It is the object of this invention to so treat Kentucky rock asphalt as to make it eminently suitable for high grade road construction and paving.

A further object of my invention is to toughen or harden the asphaltic content of Kentucky rock asphalt and when necessary, to increase, as well as harden, the asphaltic content so as to render the same suitable for the construction of high grade paving.

Other objects of my invention will appear in the specification and claims below.

In carrying out my invention, I take the Kentucky or Missouri rock asphalt, or any other similar suitable bituminous sandstone or mixture of asphalt and sand or mineral material, and grind it until the rock particles are reduced to the size of grains of sand. When this grinding step has been completed all the particles of sand will be completely coated or covered or encased in the relatively soft asphalt which was contained therein.

I also reduce to a flour or fine powder by any suitable grinding or attrition process, a suitable hard natural asphalt such, for instance, as gilsonite. For the successful practice of my invention, however, it is not necessary that the grinding of the hard gilsonite or similar hard asphalt must be performed at the same place or at the same time that the Kentucky asphalt rock is reduced to sand. The gilsonite may be ground and powdered anywhere; or even purchased in powdered form, in the practice of my invention.

I now place in a revolving heater the ground Kentucky rock asphalt and to it I add a small amount of the powdered gilsonite or other suitable hard powdered asphalt and also a little hydrated lime or calcium carbonate or other calcium compound. I then heat the mixture in said revolving heater, keeping the contents agitated and turning continually. The temperature to which the mass or mixture in the heater is raised and maintained for about an hour, or possibly longer, should be about 260° F.

The amount of gilsonite or other hard asphalt which I so add to the ground Kentucky rock asphalt will vary somewhat, depending upon the amount of asphaltic content in the Kentucky rock asphalt. I find that, roughly speaking, I prefer to add, of the gilsonite, about 2% of the weight of the asphalt rock, or, in other words, a sufficient quantity to bring the asphaltic content of the resulting mixture up to 9% or 10%, such as has been above stated to be the amount of asphalt most suitable in paving compositions for road constructions. The amount of hydrated lime, whiting or similar material which I add to the mixture is approximately 10% of the asphaltic content of the rock or roughly 1% of the weight of the rock itself,

The purpose of adding the hydrated lime or similar material is not alone to harden the asphaltic content of the Kentucky rock asphalt. It is also for the purpose of neutralizing any acid reaction of the asphalt and to keep the asphalt somewhat on the alkaline side of neutrality. The temperature to which the mixture being treated in the revolving heater is subjected, is sufficient to cause the powdered gilsonite or hard powdered asphalt to dissolve or fuse into the soft asphalt of the Kentucky asphalt, but the temperature is not high enough to drive and distill off very much of the volatile bituminous substances contained in the soft asphalt of the Kentucky rock asphalt. To submit the mixture to so high a temperature as 400° F. would expel too much and too many of the more volatile bituminous ingredients of the Kentucky rock asphalt.

This heating and constant stirring of the mixture at or about the temperature above given effects or brings about a substantially perfect and intimate blending of the soft asphalt of the Kentucky rock asphalt with the hard asphalt of the gilsonite or similar material.

After having been so heated and agitated to effect this blending of the asphalts the material is allowed to cool while the agitation or turning of the heater is continued, and at this point I prefer to add a small amount of any suitable volatile solvent of asphalt, such as petroleum residuum, coal tar or some similar material. The purpose of this added material is to replace whatever, of the more volatile bituminous ingredients of the asphalt, may have been driven off or expelled therefrom during the step of heating the mixture as above described. After this solvent has been thoroughly intermixed with the paving material, the paving material so produced may be removed from the heater and may be spread over the foundation of the road in a cold condition and without further treatment. It is not necessary to reheat the material for laying it on the road foundation. The paving material so produced is laid substantially cold and having been rolled or tamped over the foundation forms the permanent surfacing of the roadway, excepting, of course, that a thin layer of sand may be applied to the top surface of it to prevent the sticking thereto of the roller or other means used for compressing and spreading the material to form the surface of the roadway.

By the practice of the above process the asphaltic content of inferior rock asphalt, such as Kentucky rock asphalt, is toughened, rendered slightly alkaline, and, when necessary, substantially increased in volume or amount so as to render such rock asphalts eminently suitable as paving material for roadways and for similar purposes the treatment being effected without substantially driving off the more volatile solvents contained in the Kentucky rock asphalt, which are utilized in the process to bring about a substantially perfect blending of the two kinds of asphalt which go into the making of the finished material. Only a relatively small amount of solvents for asphalt are required to be added after the heating operation for only a small amount of the volatile matters or ingredients have been expelled during the heating process.

Having thus described my invention, what I claim and desire to protect by Letters Patent of the United States is:

1. The method of making a surfacing material for roadways, which consists in grinding rock Kentucky asphalt to reduce the rock particles therein to substantially the size of grains of sand, adding thereto, of powdered hard asphalt, substantially 2% of the weight of the asphalt rock, heating the mixture to substantially 260° F., and constantly stirring said mixture while it is being so heated.

2. The method of making a surfacing material for roadways, which consists in grinding Kentucky rock asphalt to reduce the rock particles therein to substantially the size of grains of sand, adding thereto, of powdered hard asphalt, substantially 2% to the weight of the asphalt rock and adding thereto, of lime, substantially 1% to the weight of asphalt rock, heating the mixture to substantially 260° F., and constantly stirring said mixture while being so heated.

3. The method of making a surfacing material for roadways, which consists in grinding Kentucky rock asphalt to reduce the mineral particles therein to substantially the size of grains of sand, adding thereto, of powdered hard asphalt, substantially 2% of the weight of said rock, and, of lime, substantially 1% of the weight of said rock, heating the mixture at a temperature of substantially 260° F. to blend said hard asphalt with the asphalt of said Kentucky rock without driving off any great amount of the volatile bituminous content of the Kentucky rock asphalt, continuously stirring said mixture while being so heated, allowing the blended mixture to cool and, while it is cooling, adding thereto and simultaneously stirring into the same, a small quantity of a solvent of asphalt.

4. The method of treating Kentucky rock asphalt which consists in reducing said rock asphalt to the consistency of particles of sand, adding thereto gilsonite to increase the asphaltic content of the sand to about 9%, heating the mixture to substantially 260° F., and constantly stirring said mixture while it is being so treated.

5. The method of treating Kentucky rock asphalt which consists in reducing said rock asphalt to the consistency of particles of

sand, adding thereto gilsonite to increase the asphaltic content of the sand to about 9%, and of lime substantially 1% of the weight of the rock, heating the mixture to substantially 260° F., and constantly stirring said mixture while it is being so heated.

6. The method of treating Kentucky rock asphalt which consists in reducing said rock asphalt to the consistency of sand, adding thereto a small quantity of gilsonite to increase the asphaltic content of the mixture to about 9%, agitating and stirring said mixture and simultaneously subjecting the same to a temperature sufficient to intimately mix and blend the particles of gilsonite with the softer Kentucky asphalt and below a temperature which would drive off any great amount of the volatile bituminous content of the Kentucky rock asphalt.

7. The method of treating Kentucky rock asphalt which consists in reducing said rock asphalt to the consistency of sand, adding thereto a small quantity of gilsonite to increase the asphaltic content of the mixture to about 9%, and of lime substantially 1% of the weight of the rock, agitating and stirring said mixture and simultaneously subjecting the same to a temperature sufficient to intimately mix and blend the particles of gilsonite with the softer Kentucky asphalt and below a temperature which would drive off any great amount of the volatile bituminous content of the Kentucky rock asphalt.

8. The method of treating Kentucky rock asphalt which consists in reducing said rock asphalt to the consistency of sand, adding thereto a relatively small quantity of powdered gilsonite sufficient to increase the asphaltic content of the mixture to about 9% and heating said mixture to a temperature of substantially 260° F. and constantly stirring said mixture while being so heated, allowing the mixture to cool and in cooling continuously stirring and agitating said mixture and adding thereto, while cooling, a small quantity of a suitable solvent of asphalt to replace any volatile bituminous ingredient that may have been expelled from the Kentucky rock asphalt during the preceding heating step.

9. The method of treating Kentucky rock asphalt which consists in reducing said rock asphalt to the consistency of sand, adding thereto a relatively small quantity of powdered gilsonite sufficient to increase the asphaltic content of the mixture to about 9% and, of lime, substantially 1% of the weight of the rock, and heating said mixture to a temperature of substantially 260° F., and constantly stirring said mixture while being so heated, allowing the mixture to cool and in cooling continuously stirring and agitating said mixture and adding thereto, while cooling, a small quantity of a suitable solvent of asphalt to replace any volatile bituminous ingredient that may have been expelled from the Kentucky rock asphalt during the preceding heating step.

In witness whereof, I have hereunto set my hand this second day of March, 1926.

SAMUEL S. SADTLER.