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PROCESS OF INCREASING THE SERVICE
LIFE OF ASPHALT

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Asphalt although having many advantages of ease of application and highly desirable properties in service, for paving, roofing, and like surfacing conditions, is by reason of such drastic exposure to air and sun given a tendency to soon harden up and become brittle and lose its initial desirable properties. A pavement surface thus may become practically ruined in three or four years exposure, and similarly the service life of asphalt coating generally is considerably shortened. I have found that this action is greatly accelerated by the presence of metal, particularly iron, in the asphalt, the effect thereof being of a catalytic order to greatly accelerate the deterioration of the asphalt during exposure. Oxidized asphalt is a residual stock and contains incidental iron from the manufacturing equipment. Any asphalt takes up metal where mixed in a metal pug mill, especially if the time is long or the temperature much above 350° F. In accordance with the present invention it now becomes possible to counteract such catalytic action in asphalt, and anti-catalytically inhibit the effect of metals, such as iron, which may be present.

To the accomplishment of the foregoing and related ends, the invention, then, comprises the features hereinafter fully described, and particularly pointed out in the claims, the following description setting forth in detail certain illustrative embodiments of the invention, these being indicative however, of but a few of the various ways in which the principle of the invention may be employed.

The asphalt, prepared by any of the known or desired methods, and to such specifications of penetration, etc. as desired, is, in accordance with the invention, treated with the action of an agent which for conciseness I hereinafter designate as a metal anticatalyst. Illustrative of such agent is amino-mercapto-benzothiazole, tetramethyl diamino diphenyl methane, phosphorus, P_2S_5 , and oil-soluble naphthenic acid, sulfides of phosphorus having less sulphur, as P_4S_3 , etc. In some instances, less desirably, sulphur may be employed, it being understood of course that the sulphur is incorporated after the asphalt has been brought to desired specification by the asphalt-making procedure, whether by blowing or other process. In other words, the sulphur is not introduced into the initial raw material or stock and the latter merely sulphurized.

The iron anticatalyst treatment is advantageous for asphalts prepared by aluminum chloride, as well as asphalts prepared by usual oxidizing or steam methods. The present treatment is like-

wise advantageous with natural asphalts, natural coal tar, etc. The amount of metal anticatalyst required is in general small, ordinarily less than 1 per cent and may be preferably 0.01–0.5 per cent. The anticatalyst is introduced with the asphalt in molten condition, being thoroughly disseminated in the mass. In some cases also it is advantageous to include a so-called oxidation inhibitor, the combination peculiarly giving results out of proportion to those with the individual ingredients. The oxidation inhibitor may be employed in amounts of 0.01–5 per cent, preferably less than 2 per cent. Illustrative of such inhibitor is tetra amino diphenyl methane derivatives, acetoacetanilid, phenyl naphthylamine, quinoline, tetramethylene pentamine, diphenylamine, etc.

As an example: An oxidized asphalt prepared ready for use, is treated by the incorporation while molten, of 0.25% of amino-mercapto-benzothiazole. This product tested by exposure in a flat bottom glass dish, with air blown upon the surface and with heating at 325° F. for a five hour period, showed a loss of penetration amounting to 16.3%. In contrast, the original asphalt, untreated with anticatalyst, similarly tested, showed a loss of 26.2%.

As another example: An oxidized asphalt prepared from Illinois petroleum bottom stock is treated by incorporation, while molten, of 0.25% of mercapto-benzothiazole and 0.1% of phosphorus. On test as above described, this product showed a penetration loss of only 13.5%.

As another example: An oxidized asphalt is treated by incorporating, while molten, 0.05% of phosphorus.

As another example: An asphalt prepared by means of 0.25% of aluminum chloride, to desired final specification, is treated, while molten, by incorporation of 0.05% of phosphorus.

Other modes of applying the principle of the invention may be employed, change being made as regards the details described, provided the features stated in any of the following claims, or the equivalent of such, be employed.

I therefore particularly point out and distinctly claim as my invention:

1. A process of increasing the service-life of asphalt, which comprises incorporating in processed asphalt containing metal causing accelerated deterioration on exposure, a metal-anticatalyst selected from the group consisting of sulphides of phosphorus, sulphur, and amino-mercapto-benzothiazole, in a small amount sufficient to increase the service-life of the asphalt against metal action.

2. A process of increasing the service-life of asphalt, which comprises incorporating in asphalt containing metal causing accelerated deterioration on exposure, a small amount each of an oxidation inhibitor and a metal-anticatalyst said anticatalyst being selected from the group consisting of sulphides of phosphorus, sulphur, and amino-mercapto-benzothiazole, sufficient to increase the service-life of the asphalt against metal action and brittling.

3. A process of increasing the service-life of asphalt, which comprises incorporating in processed asphalt containing metal causing accelerated deterioration on exposure, a small amount of P_4S_3 sufficient to increase the service-life of the asphalt against metal action.

4. A process of increasing the service-life of asphalt, which comprises incorporating in processed asphalt containing metal causing accelerated deterioration on exposure, a small amount of a phosphorus sulphide sufficient to increase the service-life of the asphalt against metal action.

5. A process of increasing the service-life of asphalt, which comprises incorporating in processed asphalt containing metal capable of causing accelerated deterioration on exposure, a small amount of amino-mercapto-benzothiazole sufficient to increase the service-life of the asphalt against metal action.

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