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ASPHALT COMPOSITIONS

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This invention relates to improvements in asphalts and more particularly relates to asphalts resistant to alligating.

One of the major types of failure of asphalts, especially roofing asphalts, is the phenomenon known as "alligating" brought about by the asphalt flowing or creeping underneath the surface skin and away from surface cracks. When films of asphalts are exposed to the atmosphere and sunlight, the shiny black surface becomes dull and chalky after a few days exposure. This change which occurs at the surface only is due to weathering. Certain weathering conditions contribute to so-called "alligating"; an asphalt susceptible to flow, direct sunlight to furnish ultraviolet light, and a sufficiently high exposure temperature to soften the asphalt. The sun's ultraviolet rays causes surface oxidation which forms the thin dull skin which "floats" in the viscous liquid beneath it. When the sub-surface asphalt not so affected is subject to creep or cold flow under the conditions of exposure, the surface film or skin may contract, and crack. The sub-surface asphalt then slowly flows away from the cracks forming channels which eventually penetrate through the whole film and permit water leakage.

It is an object of the present invention to provide an asphalt composition which is resistant to "alligating." Another object of the invention is to provide a roofing asphalt which does not tend to "alligator." Still another object of the invention is to provide a method of inhibiting the tendency of asphalts to "alligator." Other objects and advantages of the invention will become apparent from the following description thereof.

In accordance with the present invention, the above objects are attained by the use of asphalt containing from about 0.001% to about 1.0% preferably 0.05% to about 0.5% of an oil-soluble polyvalent metal soap of a high molecular weight mono-carboxylic acid of at least about 10, preferably 12 to about 30, carbon atoms. Examples of such soap are copper oleate, cobalt naphthenate, manganese naphthenate, copper oleate, manganese stearate, copper laurate, etc. In using such fatty acid soap, it is important that they be used in amounts within the above limits, since the use of large amounts of the soap will promote too rapid hardening and result in failure from rupturing after embrittlement.

The effect of various materials on the "alligating" of asphalts is determined by an accelerated test in the Weather-Ometer, a commercial accelerated weathering device. The apparatus is equipped with a thermostatically controlled cabinet in which a cylindrical panel holder rotates around a carbon-arc lamp. The use of special carbon rods and Corex-D filters gives a light which simulates intense sunlight, including the ultraviolet frequencies. The test panels, three-by-six-inch aluminum sheets with upturned edges, are coated with an 0.025 inch film by weighing out the calculated amount of asphalt and heating so that leveling occurs. Each cycle consists of 18 hours in the Weather-Ometer under the light at a black bulb temperature of 175° F., followed by 2 hours

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in ice water. The test panels are inspected daily until sufficient weathering deterioration occurs to cause failure. The panels are also visually inspected for "alligating."

Failure is determined with a spark-gap instrument, developed by the ASTM, in which a high-voltage probe is passed over the weathered film. Wherever the film is broken a spark-through occurs. More than six such spark-through points, separated by at least $\frac{3}{16}$ inch, is the criterion of failure. The number of Weather-Ometer cycles required to reach this stage is recorded as the accelerated life of the asphalt being tested. The extent of "alligating" is also noted.

The effectiveness of the described metal soaps in preventing "alligating" is demonstrated by the data in Table I, obtained in the above described test with the Weather-Ometer. The asphalt (control) use in the mixtures so tested was an asphalt made largely from uncracked products and having the following specifications:

Flash (C.O.C.) ° F. _____ NLT⁽¹⁾ 475
Specific gravity at 60° F. _____ NLT 1.00
Softening point ° F. _____ 160–170
Penetration:
32° F. _____ NLT 8
77° F. _____ 20–30
115° F. _____ NMT⁽²⁾ 75

¹ "Not less than."
² "Not more than."

Table I

Sample No.	Metal	Cycles in Weather-Ometer To Failure	Alligating
1-----	None (control)-----	12-15	Deep.
2-----	No. 1 plus 6.05% copper oleate-----	34	None.
3-----	No. 1 plus 0.1% cobalt naphthenate.	46	Do.
4-----	No. 1 plus 0.05% manganese oleate.	36	Do.

The term "asphalt" as used herein and in the appended claims means normally solid asphaltic products and may be residual asphalts, steam-reduced asphalts, propane precipitated asphalts, oxidized asphalts, pressure still "tars" or mixtures thereof. While the specifications for such asphalts may vary depending upon locality, special specifications for particular uses, etc. in general the softening point, may vary from about 95° F. to about 300° F.

Percentages given herein and in the appended claims are weight percentages unless otherwise stated.

I claim:

1. A "non-alligating" composition consisting essentially of a normally solid asphalt normally susceptible to "alligating" and from about 0.001% to about 0.5% of an oil-soluble polyvalent metal soap of a high molecular weight monocarboxylic acid having at least ten carbon atoms, selected from the group consisting of a naphthenic acid and oleic acid, said polyvalent metal being selected from the group consisting of copper, cobalt, and manganese.

2. An asphalt composition as described in claim 1 in which the polyvalent metal soap is copper oleate.

3. An asphalt composition as described in claim 1 in which the polyvalent metal soap is manganese oleate.

4. A "non-alligating" asphalt composition consisting essentially of a major proportion of a normally solid asphalt, normally susceptible to "alligating," and from about 0.001% to 0.5% cobalt naphthenate.

5. The method of inhibiting the "alligating" of a normally solid asphalt normally susceptible to "alligating" when exposed to sunlight and weathering comprising incorporating in said asphalt from about 0.001% to about 0.5% of an oil-soluble polyvalent metal soap of a

high molecular weight monocarboxylic acid having at least 10 carbon atoms, selected from the group consisting of a naphthenic acid and oleic acid, said polyvalent metal being selected from the group consisting of copper, cobalt and manganese.

6. The method of claim 5 in which the polyvalent metal soap is copper oleate.

7. The method of claim 5 in which the polyvalent metal soap is manganese oleate.

8. The method of inhibiting the "alligating" of a normally solid asphalt, normally susceptible to "alligating" when exposed to sunlight and weathering, comprising incorporating in said asphalt from about 0.001% to 0.5% cobalt naphthenate.

References Cited in the file of this patent

UNITED STATES PATENTS

2,023,068	Flood	Dec. 3, 1935
2,189,379	Kon et al.	Feb. 6, 1940
2,382,337	Schiller	Aug. 14, 1945
2,430,546	Agnew	Nov. 11, 1947
2,580,025	Holmes	Dec. 25, 1951
2,581,640	Fasold et al.	Jan. 8, 1952

OTHER REFERENCES

Abraham: "Asphalts and Allied Substances," 1945, page 730.