United States Patent Office 2,748,012 Patented May 29, 1956

2,748,012

SEALING COMPOSITION FOR JOINTS IN CONCRETE STRUCTURES

Francis T. Helm, Downingtown, and Thomas D. Just, Ambler, Pa., assignors to West Bank Oil Terminal Co., Inc., Philadelphia, Pa., a corporation of Pennsylvania

No Drawing. Application December 27, 1952, Serial No. 328,258

2 Claims. (Cl. 106—269

This invention relates generally to compositions intended primarily for use in filling and sealing joints in concrete pavements, bridges and the like, and more particularly to an improved bituminous composition containing wax and cork in such intimate admixture with the bituminous material as to provide highly resilient and adhesive compound capable of effectively sealing joints in concrete against the infiltration of moisture throughout repeated cycles of expansion and contraction of the jointed structure, and which will not flow from the joint or be picked up by vehicle tires at summer temperatures.

The material which constitutes the principal part of the joint-sealing filler of the present invention is a water-in-oil type of bituminous emulsion treated with an amine as described in United States Letters Patent to William W. Allen, No. 2,416,134, granted February 18, 1947. The bituminous emulsion constituent of the present composition preferably includes as its basic material a cut-back of hard asphalt having a melting point of from 115° F. to 130° F., and a penetration of from 85 to 100. As is well known, such cut-back is obtained by dissolving a bituminous base (asphaltum) in a sufficient amount of a volatile hydrocarbon solvent, such as naphtha, to provide it with the requisite liquidity.

As described in the above mentioned Allen patent, the water-in-oil type of bituminous emulsion above referred to includes as final constituents thereof liquified bitumen, a water insoluble fatty acid soap in colloidal state derived as the reaction product of an aqueous solution of a fatty acid soap mixed with a salt of a heavy metal, e. g., aluminum sulphate, iron chloride or lead nitrate, capable of reacting with the soap to render it water insoluble in the presence of the liquified bitumen, and an aliphatic amine containing not less than five carbon atoms, the amine being included in free state and in an amount less than 1 per cent of the total weight of the emulsion. The amines most satisfactorily employed in the preparation of this water-in-oil bituminous emulsions are the aliphatic amines of the class having chains of from 5 to 20 carbon atoms, this class including not only the saturated amines but also those having one or more unsaturated linkages. As examples of the saturated aliphatic amines, Allen refers to hexadecyl amine, octadecyl amine and dodecyl amine, while as examples of the unsaturated amines he refers to octadecadienyl amine and octadecenyl amine.

We have found that by incorporating in the bituminous emulsion of the water-in-oil type described in the aforesaid Allen patent, wax and comminuted cork or other suitable fillers, there is obtained a resulting composition which serves ideally as a filling and/or sealing material for joints in concrete structures, such as the joints provided in concrete pavements, roadways and bridges to allow for expansion and contraction of the structure.

The wax employed in the composition is preferably a petroleum wax having a melting point of from 175° F. to 185° F., a penetration at 77° F. of 10 to 18 mm., a specific gravity of approximately 35.5, a flash point of

approximately 580° F., a furol viscosity of 70 to 85 seconds at 210° F., and an oil content not exceeding two (2) percent. These specifications are not critical and may vary within reasonable limits.

The cork employed in the composition is comminuted to a mesh of 50 or finer, and preferably is of 150 to 200 mesh. In lieu of cork, other water-insoluble aggregate may be incorporated in the cut-back asphalt composition, such as granulated rubber, sawdust and other substances having the capability of imparting to the joint sealing composition the property of not only resiliently resisting compression forces, such as are applied thereto upon expansion of the jointed concrete structure in which the composition is employed, but also of preventing rupture or disintegration of the composition when the filled joint is enlarged upon contraction of the jointed structure. The cork or other such filler thus serves as an aggregate to resiliently bond and hold together the water-in-oil bituminous emulsion and wax content of the joint-sealing composition and to render the same elastic, expansible and compressible, in addition to its being highly adhesive.

The primary function of the wax in the composition is to quick-set the same after it has been poured into place, the setting being effected ordinarily at a temperature of about 100° F. In addition, the wax serves to stabilize the composition against flow under relatively high temperatures.

The constituents of the composition of the present invention are preferably present in the following proportions by weight:

	Percent
Bituminous emulsion	55 to 83
Wax	25 to 10
Cork (or equivalent aggregate)	20 to 7

The resulting composition may be rendered sufficiently fluent for pouring by heating it to a temperature of from 125° F. to 175° F., in which state the composition not only effectively covers and becomes bonded to all irregular concrete and like surfaces to which it may be applied, but also effectively coats and bonds together and to the concrete all loose particles which may be present in the crevice of the joint to completely fill the latter without inclusion of air holes or any other discontinuities. Once it has been poured into place, the composition, through the action of its wax constituent, sets rapidly and is quickly stabilized permanently against undesired flow even when subjected to relatively high temperatures. The composition has an exceedingly high degree of adhesiveness to concrete and is permanently bonded to the concrete which defines the joint and to all loose solid particles present in the joint, regardless whether the concrete and/or particles are dry, wet, cold or hot at the time of application of the composition thereto.

It will be understood, of course, that the proportions hereinbefore recited may be varied within reasonable limits without departing from the general principles or real spirit of the invention, and accordingly, it will be understood that it is not intended to limit the invention except as may be indicated by the appended claims.

What is claimed as new and useful is:

1. A joint-sealing filler composition for use in sealing joints in concrete structures and the like comprising a water-in-oil bituminous emulsion which essentially consists of a liquified bitumen, a water insoluble fatty acid soap in colloidal state derived as the reaction product of an aqueous solution of a fatty acid soap mixed with a salt of a heavy metal capable of reacting with the soap to render it water insoluble in the presence of said liquified bitumen and an amine of the group consisting of alkyl and alkylene amines containing from 5 to 10 carbon atoms and has intimately admixed therewith a petroleum

wax and an aggregate of finely comminuted cork, said bituminous emulsion, petroleum wax and cork being respectively present in the composition in the proportions of 55 to 83 per cent, 25 to 10 per cent and 20 to 7 per cent of the total weight of the final composition.

2. A joint-sealing filler composition for use in sealing joints in concrete structures and the like comprising a water-in-oil bituminous emulsion which essentially consists of a liquified bitumen, a water insoluble fatty acid soap in colloidal state derived as the reaction product of an aqueous solution of a fatty acid soap mixed with a salt of a heavy metal capable of reacting with the soap to render it water-insoluble in the presence of said liquified bitumen and an amine of the group consisting of alkyl and alkylene amines containing from 5 to 10 carbon atoms and has intimately admixed therewith a petroleum wax and a water-insoluble resilient, finely comminuted

and inherently compressible aggregate, said bituminous emulsion, petroleum wax and aggregate being respectively present in the composition in the proportions of 55 to 83 per cent, 25 to 10 per cent and 20 to 7 per cent of the total weight of the final composition.

References Cited in the file of this patent

UNITED STATES PATENTS

265,183	Tichenor	Sept. 26, 1882
482,890	Grunsweig	Sept. 20, 1892
2,393,022	Clark et al.	Jan. 15, 1946
2,416,134	Allen	Feb. 18, 1947
2,464,759	Camp	Mar. 15, 1949
2,526,537	Camp	Oct. 17, 1950
2,526,538	Camp	Oct. 17, 1950
2,563,499	Smith	Aug. 7, 1951