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ASPHALT ROOFING COMPOSITION

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This invention relates to an asphalt roofing composition, and is particularly concerned with the use of an asphalt blown in the presence of a phosphorus catalyst, such as phosphorus pentoxide, and thinned with a suitable solvent to form a weatherproof coating when spread on roofing felt.

This application is a continuation-in-part of my copending application Serial No. 469,315, filed November 16, 1954, now abandoned.

It is common practice to apply an asphalt coating to roofing felt at the time a roof is built or when its weatherproofing quality becomes impaired. Heretofore such coatings have comprised air-blown asphalts thinned with apppropriate solvents to provide the desired viscosity. Air-blown asphalts contain traces of minerals such as vanadium, magnesium, calcium and nickel, which apparently act in the same fashion as paint driers, and cause the asphalt solution to rapidly form a skin on the exposed surface of the coating when it is spread, as on a roof. This skin represents an advanced stage in the formation of a gel and contains less solvent and a larger amount of oxygen than the rest of the coating.

The tackiness, or adhesive quality, of the roofing composition is of particular importance in the weatherproofing of a new roof, or of an old roof, when an additional layer of roofing felt is to be applied on top of a layer of the roofing composition. The relative dryness of the skin formed on the exposed surface of compositions containing air-blown asphalt, when such compositions are spread on a roof and exposed to air, does not provide the adhesive qualities desirable for the application of an additional layer of roofing felt. Accordingly, when an additional layer of roofing felt is to be applied on top of a coating of such composition, it is necessary to limit the application of the asphalt coating to a comparatively small area of the roof, so that the coating will not become too dry for the additional layer of roofing felt to be cemented thereto. Such piece-meal application of the roofing composition substantially increases the time, and consequently the expense, of weatherproofing a roof.

The skin formed on the exposed surface of roofing compositions of air-blown asphalt also prevents the composition from curing uniformly, and thus causes the formation of alligatored surfaces containing high and low spots, even though the composition is spread evenly when it is applied. The curing of coatings of such composition induces a strain in the coating which tends to break the coating at the margin of the high spots, thereby causing premature failure of the weatherproofing qualities of the composition, as evidenced by leaks through the roof to which the composition is applied.

Another disadvantage incidental to the use of air blown asphalt as the base of roofing compositions is the fact that efficient protection of the roof is impossible if the roof is wet when the composition is applied. The skin which forms on the exposed surface entraps any moisture present in the form of bubbles or blisters.

In roofing compositions of the type with which the

present invention is concerned the asphalt provides the protective covering, and the solvent is merely the carrier that facilitates the application of the asphalt to the roof. In order for the asphalt to be spread properly the composition must have a certain viscosity, namely within the range of between 200 and 250 seconds on the Saybolt Furol orifice at 122° F. In order to attain the required viscosity roofing compositions having air blown asphalt as a base must have at least 35% solvent by weight. Accordingly, the maximum asphalt content of the composition is 65% by weight.

It is obvious that any increase in the percentage of asphalt in roofing compositions would increase the efficiency of the composition and lower the cost of weatherproofing the roof because it would reduce the amount of solvent required. Heretofore attempts to increase the asphalt content in roofing compositions having an air blown asphalt base have resulted in gelled materials that cannot be used as roofing compositions. Since catalytically blown asphalt has a lower viscosity than air blown asphalt it would appear that the substitution of catalytically blown asphalt for air blown asphalt would enable the use of a greater percentage of asphalt in a composition having the required viscosity. It has been found however that the solvents used for air blown asphalt are not suitable for use as solvents for catalytically blown asphalt because such compositions form a gel after a short period of time.

In accordance with my invention I use an asphalt blown in the presence of a catalyst, such as phosphorus pentoxide, as described in Patent No. 2,450,756, granted to A. J. Hoiberg October 5, 1948. The addition of the phosphorus pentoxide to the asphalt apparently forms chemical unions with the traces of metals found in air-blown asphalts, to produce stable mineral compositions that do not react with the solvent to form a non-adhesive skin such as that formed with air-blown asphalt solutions.

The particular type of solvent to be used depends upon the ultimate use of the composition. For example, it has been found that if a petroleum distillate such as varnish maker's and painter's naphtha is used alone as the solvent, the composition forms a gel after a short period of time and is therefore not suitable for a roofing composition. The addition of alkyl benzenes or similar aromatic hydro-carbons to the solvent in excess of 15% makes it possible to keep the catalytically blown asphalt in solution for prolonged periods of time.

In the preferred embodiment of my invention the roofing composition contains approximately 70% of catalytically blown asphalt and 30% solvent by weight. Ordinarily the tolerance is within 1%, and the asphalt content is always at least 65% by weight. The solvent consists of a blend of two thirds petroleum solvent and one third aromatic solvent.

The petroleum solvent may be a varnish maker's and painter's type of naphtha. Preferably the naphtha is "raw" or unsweetened, because of its greater economy. The unsweetened solvent has a small sulfur content, since sulfur is a normal contaminant of all petroleum products, and the sulfur improves the solvency of the naphtha. However, the sulfur content is not specifically required, and a well sweetened naphtha of the type indicated may be used in connection with the aromatic solvent.

The aromatic solvent may be one of the alky benzenes, as, for example, xylene. A suitable aromatic solvent is available commercially under the name of heavy aromatic naphtha.

The preferred aromatic solvent has the following properties:

A. P. I. gravity	60° F.	20.3
Specific gravity	60° F.	0.932

Lbs./gal.	60° F.	7.76
Flash	° F. (Tag)	149
Kauri-butanol (1)		95
Aniline point, mixed	° F.	77
Percent aromatics		83.0
Color, Saybolt		19
Distillation, ° F.:		
IEP		346
10% off		405
50% off		458
90% off		506
FBP		537

The blend of aromatic solvent and petroleum naphtha possess the following distillation characteristics:

A. P. I. gravity	44.0
IEP, ° F	262
5%	275
10%	282
20%	296
30%	307
40%	320
50%	336
60%	353
70%	372
80%	396
90%	447
95%	481
End point	508
Recovery, percent	98.5
Reside, percent	1.0
Loss, percent	.05

Petroleum fractions having a high content of aromatic hydro-carbon also constitute desirable solvents. Although hydro-carbon solvents are preferred, it is possible to use chlorine-containing organic compounds, such as, for example, orthodichlorobenzene, monochlorobenzene, ethylenechloride, and carbon tetrachloride. It is also possible to use sulphur-containing organic compounds, such as phenyl mercaptan, thiophene, or some of the aromatic sulphides. Another solvent that might be used is a nitrogen-containing organic compound, such as aniline. The chlorine, sulphur- and nitrogen-containing organic compounds are not generally used as solvents for commercial preparation of roofing compositions because they are too expensive, compared to the more common hydro-carbons. Carbon disulfide is another very efficient solvent, but is not recommended because of its extreme volatility and fire hazard.

The viscosity of my roofing composition is within the range of 200 to 250 seconds on the Saybolt Furol orifice at 122° F. and may be brushed readily. In applying the solution to a roof it is customary to nail a layer of roofing felt in place. A coating of the roofing composition is then spread over the felt, and another layer of felt is applied over the first layer. It is important that the roofing composition quickly develop tackiness and adhesive qualities to cement the second layer of felt in place. My composition of catalytically blown asphalt in an appropriate solvent does not produce a skin, and therefore presents an open surface throughout the area over which it is spread, thereby permitting the solvent

to evaporate freely and to maintain the open surface until the roofing material is completely cured.

The open surface on my composition also makes it possible to apply the roofing composition on wet roofs because it will adhere to wet surfaces and will penetrate such surfaces as the moisture is driven out by the action of the composition as well as by natural drying. The composition does not form a skin on the exposed surface and the moisture cannot be entrapped. As the moisture is driven out of the roof the composition penetrates the voids left by the removal of such moisture and prevents subsequent access to the roof by water from rain or any other source.

The curing is uniform throughout the spread solution, and the uniform drying characteristic of my composition prolongs the effective time during which an additional layer of felt may be cemented to the asphalt coating. The longer period of time during which the asphalt coating presents an open, sticky surface, permits larger areas of roofing to be covered with a single application of the roofing composition before the additional layer of felt must be applied.

The uniform curing of my asphalt coating also provides a coating of uniform thickness when the asphalt composition is spread evenly, and prevents the formation of an alligatored surface. The absence of high and low spots in the surface of my coating eliminates the possibility of early failure of the weatherproofing quality of the coating due to breaks in the surface caused by strain induced by such high and low spots.

While I have described a few preferred embodiments of my invention in detail, it will be understood that the description thereof is illustrative rather than restrictive, as many details may be modified or changed without departing from the spirit or scope of my invention. Accordingly, I do not desire to be restricted to the exact composition described, except as limited by the appended claims.

I claim:

1. A roofing composition consisting of an asphalt blown in the presence of phosphorus pentoxide and a solvent comprising a mixture of xylene and petroleum naphtha.

2. A roofing composition consisting of an asphalt blown in the presence of a phosphorus catalyst and a solvent comprising a mixture of alkyl benzene and petroleum naphtha.

3. A roofing composition consisting essentially of from 65 to 75% by weight of an asphalt blown in the presence of a phosphorus catalyst and from 25 to 35% of a solvent, said solvent consisting of a lower alkyl benzene and petroleum naphtha in approximately a one to two ratio.

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