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ASPHALTIC FILAMENT COMPRISING ASPHALT, ETHYLENE-VINYL ACETATE COPOLYMER AND PARAFFIN WAX

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This invention relates to a filament containing a major proportion of asphalt together with minor proportions of paraffin wax and a copolymer of ethylene and vinyl acetate. The filament can also contain a minor proportion of a plasticizer.

Asphalt filaments have been prepared in the past as shown by U.S. Patents 1,289,892 and 1,352,623. These filaments, however, are quite short, i.e., less than a few inches in length, and they are very fragile.

We have developed a filament containing a major proportion asphalt and wax—both low cost materials—strengthened with a copolymer resin, which can be provided in almost any desired length. The filament of the invention is non-tacky, and strands do not stick together at temperatures in the range of 100° to 150° F. These properties are critical when the material is used to prepare such products as packing materials, batts and mulches.

Suitable asphalts are those derived from petroleum refining operations such as vacuum distillation, solvent extraction, i.e., propane deasphalting and oxidation processes or combinations of these. The asphalt must have a softening point—ring and ball in the range of about 200°–300° F. to be suitable for the continuous, flexible filaments of the invention. The composition contains at least 50 wt. percent asphalt, and the preferred range is 50–75 wt. percent.

Suitable waxes are the paraffin waves obtained in petroleum refining operations. Waxes having melt points of 125–160° F. (ASTM D87–57) and viscosities of 30–50 Saybolt Universal seconds at 210° F. (ASTM D446–53) are preferred. From 10 to 20 wt. percent wax is used in the filaments.

Our filaments also contain ethylene-vinyl acetate copolymers. One method of preparing the copolymers is disclosed in U.S. Patent No. 2,200,429 to Perrin et al. Generally, the preparation involves copolymerizing a mixture of ethylene and vinyl acetate by means of a free-radical producing catalyst, such as oxygen or an organic peroxide, at a pressure of 100 to 200 atmospheres and a temperature in the range of 150 to 250° C. and recovering the product. The proportion of ethylene to vinyl acetate in the resin can be varied considerably. For purposes of the present invention the resin contains from 5 to 15 moles of ethylene per mole of vinyl acetate. Particularly suitable ethylene-vinyl acetate copolymers are those having softening points (ring and ball) of 230–290° F.

If desired plasticizers and extenders can be added in small amounts, i.e., 10–30 wt. percent, to achieve desired effects. Examples include atactic polypropylene, polyoctene, polybutene, polyisobutylene, styrene-butadiene copolymers, heavy aromatic oils, petroleum resins, formolite-type resins and the like.

The ingredients are blended in any suitable equipment by heating and stirring at temperatures ranging from 275–450° F. The preferred procedure is to heat the asphalt to the desired temperature and add the other ingredients. The filaments can be prepared in conventional filament forming equipment.

The invention will be more readily understood by referring to the following illustrative examples:

Six hundred grams of air blown asphalt having a melt point of 250° F. was heated in a container to a temperature of 320° F. Then 200 grams of ethylene-vinyl acetate copolymer having a softening point of 276° F. and 200 grams of wax having a melt point of 127° F. were stirred into the asphalt. The blend was cooled and cut into rods. The rods were fed into a ¾ inch diameter standard plastics extruder having a length to diameter ratio of 12. The extruder contained no breaker plate or screen pack. The gears were set to give slow screw feeds. The die head was maintained at 350° F. employing electrical heating. An air stream was maintained about two feet below the die head to blow the filament out in a horizontal direction. With this set up, filaments ranging from 3–15 feet in length having a diameter of .001 to 0.2 inch were provided without difficulty. With more sophisticated equipment it is possible to make filaments of any desired length, and these can be wound up on rolls without sticking.

The following table shows the results obtained with various formulations. Ingredients are in wt. percent.

Table I

High Blown Asphalt	Ethylenevinyl acetate Copolymer	Carbon Black Oil	Atactic P.P.	Wax 3425	P.V.C.	Clay	Filament Properties	
							Flexible	Tacky
80	----------	----------	--------	--------	20	--------	No--------	No.
60	10	10	20	--------	--------	--------	Yes-------	Yes.
60	25	15	--------	--------	--------	--------	Yes-------	Yes.
60	20	10	--------	--------	--------	10	Yes-------	Yes.
60	20	----------	--------	--------	--------	[1] 20	No--------	Yes.
60	20	----------	--------	20	--------	--------	Yes-------	No.
50	30	----------	--------	20	--------	--------	Yes-------	No.
50	20	----------	10	20	--------	--------	Yes-------	No.
50	20	10	--------	20	--------	--------	Yes-------	No.

[1] Asphaltene.

The above data show that flexible non-tacky continuous filaments are obtained only when asphalt, paraffin wax and ethylene-vinyl acetate copolymer are employed in certain relative quantities.

I claim:

1. A substantially continuous flexible, non-tacky filament comprising from 50 to 75 wt. percent asphalt having a softening point of at least 200° F., from 10 to 20 wt. percent paraffin wax having a melt point of at least 125° F. and from 1 to 20 wt. percent of an ethylene-vinyl acetate copolymer resin having a softening point of 200–300° F.

2. A substantially continuous flexible, non-tacky filament having a diameter of .001 to .02 inch comprising from 50 to 75 wt. percent asphalt having a softening point of 200–300° F., from 10–20 wt. percent paraffin wax having a melt point of 125–160° F. and from 10–20 wt. percent of an ethylene-vinyl acetate copolymer resin having a softening point of 200–300° F. and containing 5 to 15 moles of ethylene per mole of vinyl acetate said filament

being characterized by the ability to be wound on a one inch diameter spool and unwound therefrom without breaking or sticking at a temperature of 100–150° F.

References Cited by the Examiner

UNITED STATES PATENTS

3,177,164	4/1965	Mills et al.	260—2.5
3,197,426	7/1965	Zaayenga	260—28.5

FOREIGN PATENTS

703,594	2/1965	Canada.

OTHER REFERENCES

Abraham: "Asphalts and Allied Substances," Van Nostrand, N.Y., 1960, vol. 3, pages 75, 80, 245.

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