106-18.11 SR
OR 3,508,934
(29) phosphate rock

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FIRE-RESISTANT BITUMINOUS COMPOSITIONS
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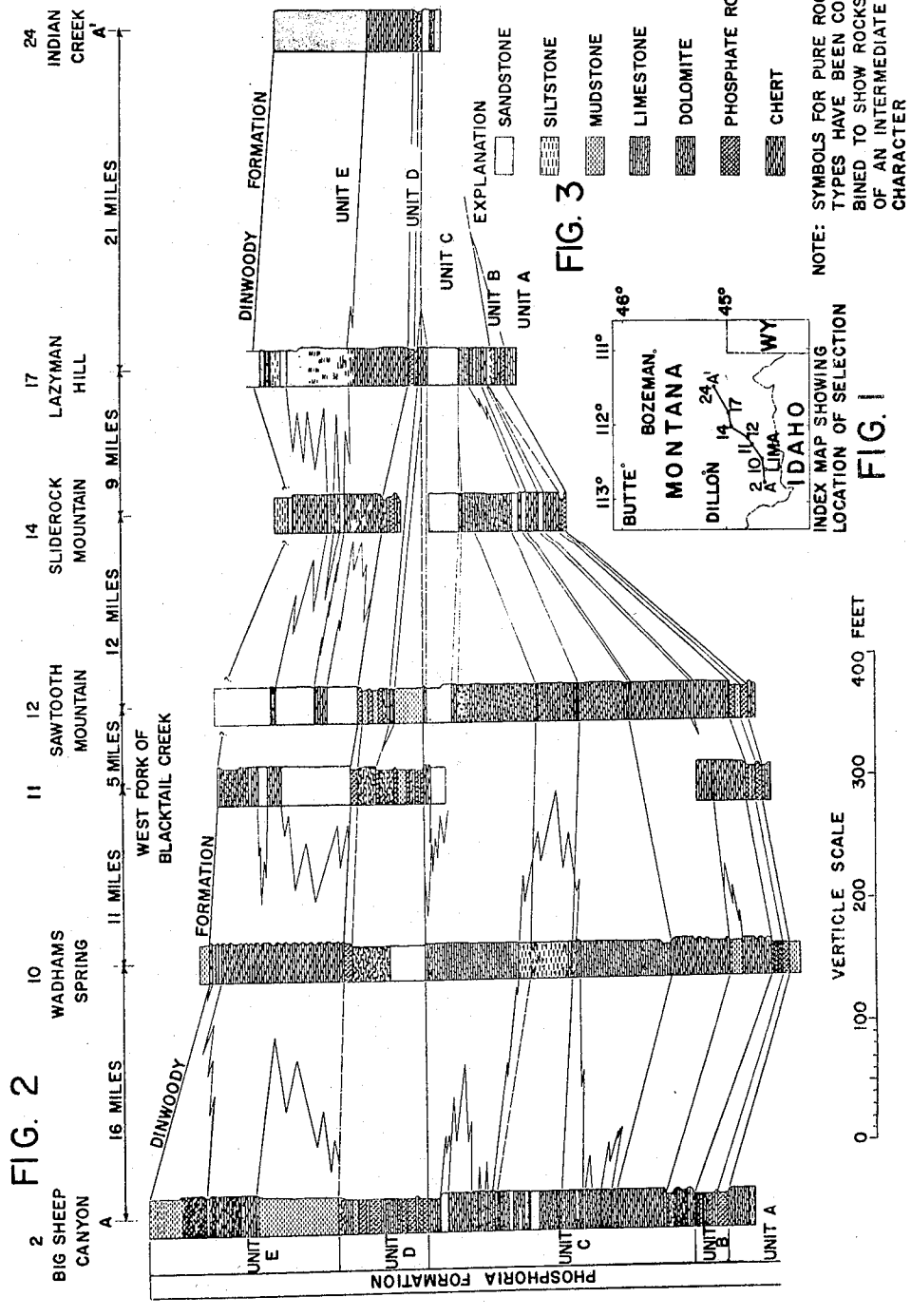


FIG. 2

FIG. 3

FIG. 1

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FIRE-RESISTANT BITUMINOUS COMPOSITIONS

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U.S. Cl. 106—15 10 Claims

ABSTRACT OF THE DISCLOSURE

This invention is directed to bituminous fire-resistant compositions comprising felts, asphalt and/or coal tar saturants, inorganic fillers, and a fireproofing composition comprising a natural-occurring phosphate rock and/or shale from phosphoria formations, deposits or beds having 0.25 to 40% by weight of phosphorous oxide.

This application is a continuation-in-part of applicant's copending application Ser. No. 238,861, filed Nov. 20, 1962, now Patent 3,372,040.

This invention is directed to a fire-resistant bituminous composition and more specifically to a fire-resistant composition useful for the preparation of sidings and/or roofs and the like which comprises a bituminous saturant, felt, fillers, and an effective amount of a natural-occurring phosphate rock and/or shale.

More specifically, this invention is directed to a bituminous composition comprising a natural-occurring phosphate rock which may be used in the manufacturing of sidings, for home construction, shingles, wrapping and packaging paper, electrical transmission insulations, insulating board, and various other applications utilizing bituminous materials. The composition of this invention is intended to produce a self-extinguishing asphalt or asphalt mixture which will not support combustion and is capable of passing tests submitted by the Underwriters Laboratories.

It is well known that in determining the suitability of a particular roofing as a fire barrier, the Underwriters Laboratories have devised certain tests to show the merit of the roofing material. These tests are designated as Classes A, B or C, the order in which they are capable of resisting flame. Thus, for example, in accordance with tests of the Underwriters Laboratories, asphalt roofs or shingles which satisfactorily pass the Class C test may, however, fail to pass the more severe tests of Classes A and B. The latter two tests are reserved for the highly fire-resistant roofs which usually comprise asbestos or heavy mineral surface coatings. Under these tests, it is possible to determine whether or not a particular coating or roofing composition will soften and flow when exposed to flames so as to, in effect, act as fuel to the fire. As can be shown by the Flame Propagation test, the burning area spreads rapidly so as to envelope the entire area covered by the roofing. Another test, however, known as the "Burning Brand test," when used on most of the presently available roofing compositions, causes the protective granules to erode with the flow of the molten asphalt. Thus, the felt becomes exposed and offers little, if any, protection to the structure.

Accordingly, to avoid these and other problems, it has been found that conventional asphalt roofs or sidings, either in the form of shingles or sheets, may be fireproofed by incorporating in the asphalt saturants an effective amount of a natural-occurring phosphate rock and/or shale having a particular particle size and containing effective amounts of phosphorous oxide.

Thus, it is an object of this invention to provide a

roofing composition characterized as being non-flowing, flame-resistant, plastic and comprising a predominant amount of a bituminous composition and a roofing felt.

It is another object of this invention to provide a composition for preparing fire-resistant roofs or sidings which will enable the roof so formed to meet certain Underwriters Laboratories requirements with respect to fire resistance unattainable heretofore.

It is a further object of this invention to provide a composition comprising felt, asphalt and/or coal tar residues as a saturant for the felt in combination with fillers, and an effective amount of a natural-occurring phosphate rock having an effective amount of phosphorous oxide.

It is still a further object of this invention to provide a method of imparting flame-resistance to bituminous materials, such as asphalt normally used in preparing roofs and sidings.

These and other objects of the invention will become apparent from a further and more detailed discussion as follows.

It has been found, quite unexpectedly, that conventional roofing compositions comprising asphalt and/or coal tar saturants may be rendered fire-resistant by incorporating therein effective amounts of a natural-occurring phosphate rock and/or shale characterized as having 0.25 to 40% by weight of phosphorous oxide calculated on the basis of phosphorous pentaoxide (P_2O_5).

More specifically, it has been found that improved fire-resistant compositions may be obtained by utilizing a combination of 1 to 90 parts by weight, and more preferably 10 to 60 parts by weight, of a felt material, 15 to 70 parts by weight, and more preferably 30 to 60 parts by weight, of an asphalt and/or coal tar saturant, 0 to 30 parts by weight, and more preferably 5 to 15 parts by weight of an inorganic filler, e.g., silica, sand and the like, and 5 to 60 parts by weight, and more preferably 10 to 40 parts by weight of a natural-occurring phosphate rock and/or shale obtained from phosphoria formations having 0.25 to 40% by weight of P_2O_5.

The felt material used in combination with the other roofing ingredients are conventional materials and may include, for example, various sized fibers obtained from rags, paper, wood, glass fibers, rock wool, asbestos, and mixtures thereof in any relative proportions. These fibers and combinations thereof are blended in such proportions that the resulting characteristics, i.e., strength, absorption capacity and flexibility, are sufficient to make acceptable roofing products. These felts are readily available and may be characterized, e.g., by weight, tensile strength, flexibility, etc., which enables them to withstand the strain encountered on the roofs and during the manufacturing processes. Moreover, the felts are characterized as having absorption capacities ranging from 1½ to 2 times their weights. The felts may be made on machinery similar to paper making machines in that the fibers are prepared by various pulping methods, depending upon the source of the material. Thus, for example, rag fibers may be prepared in beaters after the rags are cut and shreaded, which is similar to the preparation of fibers of paper and wood where cooking devices and attrition mills are utilized. The felts may be further characterized in terms of pounds per 480 square feet which is referred to as the felt number which may range from about a No. 21 to 75.

The asphalt and/or coal tar fluxes used as the saturants with the above-mentioned felts are well-known in the industry and may be obtained from petroleum, etc. Thus, the term "asphalt" used herein may include natural asphalt or asphalts derived from petroleum or coal tar. A typical asphalt known as a penetrating asphalt may have a softening point in the region of about 125° F., while the flexible coating asphalts may have softening points in the region of 225° F. The asphalts for purposes

of this invention, however, may have softening points ranging from about 80° F. to 300° F. and more preferably softening points ranging from about 125° F. to 160° F.

In the manufacture of a roof, it is desirable to construct the body with a sheet of highly absorbent felt impregnated or saturated with an oil-rich asphalt referred to herein as the saturant. The saturant may be then sealed in with a further application of a more hard, viscous coating asphalt which may, in itself, be protected, if desired, by a covering of outer mineral granules.

In addition to the asphalts or saturants in combination with the felts, various inorganic materials may be incorporated in the asphalt as a filler in amounts ranging from 0 to 30 parts by weight of the total composition and more preferably, in about 5 to 15 parts by weight of the composition. The amount of the inorganic filler used, if any, may depend upon the amount of the natural-occurring phosphate rock employed. Thus, for example, it is possible to use a mixture of the inorganic filler with the natural-occurring phosphate rock in any relative proportion so long as at least 50% of the mixture comprises the phosphate rock having an effective amount of phosphorous oxide.

The inorganic fillers may include various materials having a particle size ranging from 25 to 325 mesh and more preferably a mesh of 35 to 200, and include, for example, silica, talc, dolomite, lime stone dust, sand, and various mixtures thereof in any relative proportion. It is obvious that by the term "inorganic filler," it is intended to include all those materials ordinarily used in asphalt roofing. It has been found that roofing asphalts will resist weathering substantially better and are more resistant to shockproof or changes in weather if they comprise a certain amount of a finely-divided inorganic mineral known as fillers or stabilizers.

A typical example of preparing a roofing composition in accordance with this invention comprises the use of a felt which is subjected to a saturating process wherein moisture is eliminated and the fibers are filled or saturated as completely as possible with the asphalt saturant. After completion of the saturating process, the saturant is usually present in an excess amount on the surface of the felt sheet. If desired, at this point the phosphate rock or shale may be incorporated onto the felt with the saturant. This sheet is preferably held for a time so that the natural shrinkage of the asphalt upon cooling will cause the excess to be drawn into the felt, resulting in a very high degree of saturation. After saturation of the felt is completed, if the asphalt was applied to both the top and bottom surfaces, a surfacing material, e.g., talc or mica, may be applied to both sides by spreading and passing through a press roll. These mineral surface materials may be colored or color mixtures of granules in combination with the phosphate rock which are spread thickly on the coating asphalt. The coated sheets are then passed through a series of press and cooling drums in order to insure proper impregnation of the outer granules into the sheet which is then subjected to a controlled pressure to force the granules in the coating to the desired depth.

When it is desirable to prepare shingles from the above-mentioned prepared asphalt composition, the material is fed from the finishing machinery into a shingle cutting machine. Here, the sheet is cut to the desired shape and size and then separated into units which are accumulated in stacks of the proper number for packaging.

The natural-occurring phosphate rock of this invention is incorporated in the roofing material either alone or in combination with the inorganic fillers or stabilizer in the prescribed amount sufficient to impart to the felt and asphalt combination, fire resistance capable of passing the Underwriters Laboratory tests. The natural-occurring phosphate and/or shale may be pulverized to particle sizes such, for example, that 100% passes through a 27 mesh screen and approximately 4% passes through a 325 mesh screen. Thus, it is preferred for purposes of this invention to use particle sizes of the natural-occuring phosphate rock ranging from 25 to 325 mesh. The particle sizes and amount of the natural-occurring phosphate rock used in combination with the asphalt and felt will depend upon the amount of P_2O_5 content in said rock. Thus, for example, when the P_2O_5 content is approximately 35% by weight, it is only necessary to use 10% by weight or less of the rock in combination with the asphalt and felt. If, however, the P_2O_5 in the rock is present in smaller amounts, then it is obvious that larger percentages, e.g., up to 60%, of the rock may be used in combination with the asphalt and felt. It was unexpected to find that the phosphorous oxide, herein calculated as P_2O_5, was the effective ingredient of the natural-occurring phosphate rock which imparted fire-resistance to the asphalt compositions. The natural-occurring phosphate rock ranging from 25 to 325 this invention, may be found in phosphoria formations and deposits in the western part of the country or in the phosphate beds of the southern states, such as Florida and Tennessee, but more particularly in the western states, such as Montana. The phosphate ore or rock from Montana may contain approximately 10% by weight of distillable oil which may be utilized as the saturant in the manufacturing of the fire-resistant siding and roofing compositions of this invention, with the rock per se being used as the fire retardant.

A more specific description of the naturally-occurring rock and shale may be identified by the chart referred to herein as FIGURE 1 which has an index map that gives the location of a specific phosphoria formation. The chart is an illustration of a stratographic section showing the location of the entire phosphoria formation from Big Sheep Canyon to Indian Creek, for a total of about 74 miles. The phosphoria is divided into units, namely, E, D, C, B, and A. These formations have rock and shale sections containing from about 0.25 to 40% by weight of P_2O_5. A particular cut "A" in Unit D at Sawtooth Mountain, point 12 to the index map, shows the exact location as it presently exists in the southern part of the State of Montana. The vertical depth of Unit D is approximately 60 feet and comprises the phosphate rock, mudstone, and minor amounts of dolomite and chert. The exact composition of cut "A" of Unit D was found to have the following analyses:

TABLE I.—CUT A

Assay No.	Percent U	Th	P_2O_5	Width	Description
12	0.001	0.2	0.25	Slump	Chert.
11	0.001	0.1	0.50	3′	Argillaceous siltstone.
14	0.001	0.2	30.91	3″	Phosphate rock.
10	0.001	0.2	18.79	12′6″	Phosphate shale.
13	0.003	0.2	27.05	2′5″	Phosphate rock.
9	0.002	0.2	11.16	18′4″	Black shale seams with a 6″ seam of pure phosphate rock, the shale section being highly petroliferous.
8	0.001	0.1	1.47	2′4″	Siltstone.
7	0.001	0.2	8.68	8′1″	Petroliferous shale.
6	0.003	0.1	2.06	2′2″	Petroliferous siltstone.
5	0.003	0.2	9.73	4′9″	Phosphatic shale petroliferous with 3″ seam of phosphate rock.
4	0.001	0.2	3.16	2′3″	Siltstone.
3	0.002	0.2	10.73	8′6″	Black oolitic phosphate rock which is petroliferous.
2	0.005	0.1	30.59	1′3″	Phosphate rock, slightly petroliferous.
1	0.002	0.2	28.14	1′5″	Petroliferous phosphate rock.

In addition to the U, Th, and P_2O_5 content of the above-described Cut A, as shown in the graph of the Phosphoria formation of Unit D at Sawtooth Mountain (12), the following chemical analyses also were obtained.

TABLE II.—ANALYSES OF ORE

Sample	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Major, Greater than 10%	P_2O_5	CaO	SiO_2	----	SiO_2	SIO_2	----	CaO	----	----	CaO	SiO_2	CaO	CaO
													P_2O_5	P_2O_5
Major/Minor, 5–25%	SiO_2	----	Al_2O_3	SiO_2	Al_2O_3	Al_2O_3	SiO_2	----	SiO_2	SiO_2	----	----	SiO_2	SiO_2
	CaO	----	CaO	CaO	CaO	CaO	CaO	----	CaO	CaO	----	----	----	----
	----	----	P_2O_5	----	P_2O_5	----	----	----	P_2O_5	----	----	----	----	----
Minor, 1–10%	----	SiO_2	----	MgO	----	MgO	Al_2O_3	SiO_2	----	Al_2O_3	SiO_2	----	----	----
	----	----	----	P_2O_5	----	----	P_2O_5	MgO	----	K_2O	----	----	----	----
	----	----	----	----	----	----	----	----	----	P_2O_5	----	----	----	----
Minor/Low, .5–5%	Al_2O_3	Al_2O_3	Fe_2O_3	Al_2O_3	Fe_2O_3	Fe_2O_3	Fe_2O_3	P_2O_5	Al_2O_3	Fe_2O_3	MgO	CaO	Al_2O_3	Al_2O_3
	Fe_2O_3	Fe_2O_3	----	Fe_2O_3	K_2O	P_2O_5	K_2O	----	Fe_2O_3	----	----	----	Fe_2O_3	Fe_2O_3
	----	----	----	K_2O	----	----	----	----	K_2O	----	----	----	----	----
Low, .1–1%	MgO	MgO	TiO_2	Na_2O	TiO_2	Na_2O	MgO	Al_2O_3	MgO	TiO_2	Al_2O_3	P_2O_5	MgO	MgO
	Na_2O	Na_2O	MgO	----	MgO	K_2O	ZnO	Fe_2O_3	ZnO	MgO	Fe_2O_3	----	ZnO	ZnO
	----	----	ZuO	----	Na_2O	----	Na_2O	----	Na_2O	ZnO	P_2O_5	----	B_2O_3	B_2O_3
	----	----	Na_2O	----	----	----	----	----	----	Na_2O	----	----	----	----
	----	----	K_2O	----	----	----	----	----	----	----	----	----	----	----
Low/Very Low, .05–.5%	TiO_2	Cr_2O_3	Cr_2O_3	TiO_2	Cr_2O_3	TiO_2	TiO_2	----	TiO_2	Cr_2O_3	----	Fe_2O_3	Cr_2O_3	Cr_2O_3
	Cr_2O_5	V_2O_5	----	MnO	ZnO	Cr_2O_3	Cr_2O_3	----	Cr_2O_3	V_2O_5	----	----	V_2O_5	K_2O
	V_2O_5	ZnO	----	----	----	MnO	V_2O_5	----	V_2O_5	----	----	----	K_2O	----
	ZnO	K_2O	----	----	----	----	----	----	----	----	----	----	----	----
Very Low, .01–.1%	MnO	TiO_2	V_2O_5	Cr_2O_3	V_2O_5	V_2O_5	Li_2O	TiO_2	Li_2O	ZrO_2	Cr_2O_3	Al_2O_3	TiO_2	TiO_2
	Li_2O	MnO	MnO	V_2O_5	MnO	Li_2O	----	Cr_2O_3	----	Li_2O	V_2O_5	B_2O_3	MnO	V_2O_5
	----	----	----	ZnO	Li_2O	----	----	V_2O_5	----	----	B_2O_3	----	----	MnO
	----	----	----	Li_2O	----	----	----	Na_2O	----	----	----	----	----	----
	----	----	----	----	----	----	----	K_2O	----	----	----	----	----	----
Very Low/Trace, .005–.5%	ZrO_2	ZrO_2	NiO	SrO	NiO	ZrO_2	NiO	SrO	NiO	CuO	TiO_2	MgO	NiO	NiO
	SrO	SrO	ZrO_2	----	ZrO_2	B_2O_3	MnO	----	ZrO_2	NiO	MnO	B_2O_3	ZrO_2	ZrO_2
	----	Li_2O	SrO	----	B_2O_3	SrO	ZrO_2	----	MoO_3	MnO	SrO	----	SrO	Sro
	----	----	Li_2O	----	SrO	----	B_2O_3	----	B_2O_3	MoO_3	----	----	Li_2O	Li_2O
	----	----	----	----	----	----	SrO	----	SrO	B_2O_3	----	----	----	----
	----	----	----	----	----	----	----	----	----	SrO	----	----	----	----
Trace, Less than .01%	CuO	CuO	CuO	CuO	CuO	CuO	CuO	CuO	CuO	Bi_2O_3	CuO	TiO_2	CuO	CuO
	NiO	NiO	Bi_2O_3	NiO	Bi_2O_3	NiO	Bi_2O_3	NiO	MnO	SnO_2	NiO	CuO	Bi_2O_3	Bi_2O_3
	Bi_2O_3	Bi_2O_3	MoO_3	Bi_2O_3	MoO_3	Bi_2O_3	MoO_3	MnO	Bi_2O_3	Ag_2O	Bi_2O_3	NiO	MoO_3	MoO_3
	MoO_3	MoO_3	SnO_2	ZrO_2	SnO_3	MoO_3	SnO_2	Bi_2O_3	SnO_2	BaO	ZrO_2	Cr_2O_3	SnO_2	SnO_2
	SnO_2	SnO_2	Ag_2O	MoO_3	Ag_2O	SnO_2	Ag_2O	ZrO_2	Ag_2O	Cb_2O_3	MoO_3	V_2O_5	Ag_2O	Ag_2O
	Ag_2O	Ag_2O	B_2O_3	SnO_2	BaO	Ag_2O	BaO	MoO_3	BaO	CdO	SnO_2	MnO	B_2O_3	B_2O_3
	B_2O_3	B_2O_3	BaO	Ag_2O	Cb_2O_3	ZnO	Cb_2O_3	SnO_2	Cb_2O_3	----	Ag_2O	Bi_2O_3	BaO	BaO
	BaO	BaO	Cb_2O_3	B_2O_3	----	BaO	----	Ag_2O	CdO	----	B_2O_3	ZrO_2	Cb_2O_3	CdO
	----	----	----	----	----	----	----	B_2O_3	----	----	ZnO	MoO_3	CdO	----
	Cb_2O_3	Cb_2O_3	----	BaO	----	----	----	ZnO	----	----	BaO	SnO_2	----	----
	----	----	----	----	----	----	----	BaO	----	----	K_2O	Ag_2O	----	----
	----	----	----	----	----	----	----	Li_2O	----	----	Li_2O	ZnO	----	----
	----	----	----	----	----	----	----	----	----	----	----	BaO	----	----
	----	----	----	----	----	----	----	----	----	----	----	SrO	----	----
	----	----	----	----	----	----	----	----	----	----	----	K_2O	----	----
	----	----	----	----	----	----	----	----	----	----	----	Li_2O	----	----

The phosphoria in the southwestern part of Montana is shown to be divided into five groups in an ascending order of sandstone dolomite, a thin phosphatic shale, a sandstone dolomite chert, an upper phosphatic shale, and a chert quartz sandstone. The upper phosphatic shale member, or Unit D as indicated in the chart and more specifically in the table, is particularly rich in phosphate rock and shale which contain higher percentages of P_2O_5. Unit D contains phosphate rock comprising 10 to 20% of a carbonate fluoro-apatite. The mudstone of this unit may contain as much as 20 to 25% organic matter, about 10% of which is a distillable oil.

Commercially this phosphate rock is available as one or more phosphate minerals, primarily calcium phosphate, but may include phosphitized limestone, sandstone, shale, and other forms of phosphate rock. While these phosphate materials do not have a definite chemical structure, the major minerals are of the apatite group and are represented by the formula

$$Ca_{10}(PO_4CO_3)_6(FClOH)_2$$

wherein in some instances the phosphate radical is replaced with small quantities of metal oxides and the anions, i.e., fluorine, may be a combination of fluorine, chlorine, and hydroxyl ions, or any one alone. In addition, small quantities of calcium may be replaced by elements, such as magnesium, manganese, strontium, lead, sodium, uranium, cerium, and yttrium. Other impurities include iron as limonite, clay, aluminum phosphate, fluorine, and silica as quartz.

The phosphate rock of this invention may be used in combination with mopping asphalts or flexible asphalt coating compositions which ordinarily have softening points in the region of about 225° F. Here, the roofs are prepared by laying the base felt onto the surface which is subsequently covered with the mopping asphalt comprising the phosphate rock which is used in layers of felt and asphalt until a built-up roof is obtained which is capable of passing the Classes A and B Underwriters' tests. In these tests, the roofing or asphalt shingle with or without the surface granules is placed at an angle 30° and an oxyacetylene flame having a temperature of about 2000° F. is positioned at right angles to the shingle so that the tip of the flame touches or is in contact therewith. If the flame fails to burn through the shingle in about two minutes, the shingle will successfully pass the Class A Underwriters' test. The asphalt compositions utilizing the lower softening point materials require a greater amount of the fire-resistant phosphate rock, while the asphalts having the higher softening points require a lesser amount of the fire-resistant rock depending, of course, upon the amount of P_2O_5 present. By interdispersing the P_2O_5 containing rock throughout the asphalt saturant, the amount of combustible material in contact with the flame is minimized and the rock serves as a barrier between the flames and the combustible asphalt.

As indicated above, the fire-resistant agent is blended with the molten asphalt in the same manner as previously used for inorganic fillers with conventional equipment. The asphalt including Trinidad asphalt, coal tar, pitch, etc., and mixtures thereof, are blended with the fillers, e.g., limestone, clay, slate, etc., in the required proportions and applied to the surfaces to be protected including, for example, saturated roofing felts.

Particular examples which illustrate the bituminous compositions of this invention are given below.

EXAMPLE I

	Parts by weight
Felt, e.g., glass fibers, etc.	1 to 90
Asphalt or coal-tar saturant	15 to 70
Fillers, e.g., sand, mica, talc or the like	0 to 30
Natural-occurring phosphate rock 0.25 to 40% by weight of P_2O_5 (25–325 mesh)	5 to 60

EXAMPLE II

Dry felt	10
Saturant (asphalt)	25
Inorganic filler	5
Phosphate rock (29.8% P_2O_5) (200 mesh)	60

EXAMPLE III

Dry felt, e.g., glass fibers	25
Asphalt saturant	40
Phosphate rock	35

The relative proportions of the ingredients as illustrated above will depend obviously upon the type of roof being prepared whether asphalt shingles or a mopping asphalt, etc., and will vary depending upon the amount of fire retardant, i.e., P_2O_5, ingredient in the particular phosphate rock being used.

Roofs and sidings prepared by the above-described bituminous compositions may be further characterized as not liquefying under the application of heat to flow from its base when placed on slopes up to 50° and which retain the particular granule materials during exposure to the flame until substantially all of the organic binder is burned. Moreover, the composition forms hard, continuous cross-like surfaces upon being exposed to flame and after being burned out, retains a cohesive ash capable of withstanding high air velocities. This ash protection further inhibits the spread of the flame on roofs even when the flame is fanned up to 20 miles per hour. Moreover, asphalt roofs have been found to resist cracking under thermal stress and strains set-up during the burning of the roofing surfaces when covered with the bituminous compositions of this invention.

While this invention has been described with respect to a number of specific embodiments, it is obvious that there are other variations and modifications which can be employed without departing from the spirit of the invention, as particularly pointed out in the appended claims.

What is claimed is:

1. A bituminous composition for preparing fire-resistant sidings and roofs which comprises 1 to 90 parts by weight of a felt, 15 to 70 parts by weight of an asphalt or coal tar saturant, 0 to 30 parts by weight of an inorganic filler and 5 to 60 parts by weight of a natural-occurring phosphate rock having a particle size ranging between 25 to 325 mesh; said phosphate rock characterized as having 0.25 to 40% by weight of phosphorous oxide as a fire-retarding ingredient.

2. The composition of claim 1 further characterized in that the felt is selected from the class consisting of fibers of rags, paper, wood, glass, rock wool, asbestos, and mixtures thereof.

3. The composition of claim 1 further characterized in that a filler is present in the asphalt saturant in amounts ranging from 5 to 15 parts by weight.

4. The composition of claim 1 further characterized in that the natural-occuring phosphate rock is present in amounts of 10 to 40 parts by weight and is characterized as having 5 to 30% by weight of phosphorous pentaoxide.

5. The composition of claim 4 further characterized in that the saturant has a softening point ranging from about 125° F. to 260° F.

6. A process of imparting flame-resistance to asphalt-felt roofing compositions which comprises incorporating therein 5 to 60 parts by weight of a natural-occurring phosphate rock having a particle size between 25 and 325 mesh; said phosphate rock characterized as having 0.25 to 40% by weight of phosphorous pentaoxide as a fire-retarding ingredient.

7. The process of claim 6 further characterized in that the felt is selected from the class consisting of fibers or rags, paper, wood, glass, rock wool, asbestos, and mixtures thereof.

8. The process of claim 7 further characterized in that the asphalt is present in an amount of 15 to 70 parts by weight and the felt is present in an amount ranging from 1 to 90 parts by weight.

9. The process of claim 8 further characterized in that the asphalt has a softening point ranging from about 125° F. to 260° F.

10. The process of claim 9 further characterized in that the natural-occurring phosphate rock is present in an amount ranging from about 10 to 40 parts by weight of the asphalt and felt and has a phosphorous pentaoxide content ranging from 5 to 30%.

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