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WEATHERPROOF AND DECAY-PROOF MATERIAL.

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My invention relates to the production of a sheathing of material on a felt or woven fabric base which is saturated with a bituminous composition and on which is a surface coating of a bituminous composition of relatively harder nature.

One of the objects of the invention is the production of a material which is waterproof and weather-proof in high degree when subjected to exposure as on a roof, and which at the same time is both waterproof and decay-proof when buried in the ground, or used as a protective covering on subsurface structures, such as on the exterior face of basement walls, or as a covering for steel pipes such as those used in oil pipe lines. A particular object of the invention is the production of a material for covering the pipes of oil pipe lines to prevent deterioration of the steel pipe by alkaline or other corrosive elements in the soil. This involves the use of a material which is in itself highly resistant to deterioration resulting from the presence of molds, bacteria and enzymes, and a material capable of a relatively permanent retention of its pliability.

My invention includes other objects and features or advantages some of which with the foregoing will be set forth in the following description of my invention. It is to be understood that I do not limit myself to the showing made by said description, as I may adopt variations of the preferred embodiment of my invention within the scope of the appended claims.

For many years it has been the practice to use fabrics or sheets of materials saturated with compounds of bituminous character for various protective purposes including use on steel pipes which were to be buried in the ground. and to which the material was applied by wrapping, the wrapped sheets being bound in place with wire. Such material has also been used extensively in building, as a roofing material and also against the outer walls of the substructure of the building to prevent the ingress of ground water. It has also been used as a flume lining in irrigation work.

Material of this character, as applied to the uses mentioned, has not been sucessful except in the field of roofing where it has attained a wide usefulness. It should be noted however that in the field of roofing materials, such fabrics have been subjected to a wetting only at intervals and usually there is no time during any one period where the material is continuously moist long enough for decay to set in and progress to any great extent. The general success of such material when used for roof coverings is overshadowed by the rather unsuccessful use when applied underground, and this has given rise to the widespread belief that the use of such sheets for roof coverings is a wholly independent problem unrelated to their use underground. In considering the application of such material to underground or subaqueous work, the proper viewpoint is to consider it as a heretofore unsuccessful phase of one general problem.

The important purpose of my invention therefore is the production at a reasonable cost of a fabric or material of the nature above described, which is a distinct improvement over existing materials, and one capable of universal application. In this respect it differs essentially from all other fabrics of the same broad class, in so far as their best and longest service is confined to a relatively narrow field of usefulness. My invention produces by a single formula or group of formulæ used together, a single material the equivalent of which has heretofore been only produced by several formulæ productive of two or more distinct materials. This results in a simpler manufacturing problem, in reduction of the number of commodities to be handled by the salesman, and in fewer articles to be stocked by the dealer.

My composition herein described does not appear to have been used by any of the various experimenters who have worked in this field. It is probable that admixtures of saponifiable ingredients have been used, rather than those herein described for the reason given by Abraham on page 393 of his work on "Asphalts and Allied Substances" in which he says "The larger the percentage of fatty substances (saponifiable) present in the mixture, the better will be its weather-resisting properties, other things being equal." It is also recalled that the tendency of inventors has been to go in the opposite direction from the admixture of paraffine wax and petroleum greases herein described because the asphalts which are produced in

the eastern portions of the United States are already overly rich in grease and wax like constitutents.

In general it may be said that the prior art although disclosing some if not all of the constituents herein described, has not been productive of a material having the possibilities of universal application exhibited by the fabric or sheet material of this invention. Earlier materials fall short of the universality of my material, because where the saturant and the coating, if coating was employed, were exclusively of coal-tar pitch, coal tar or admixtures of these with other corresponding or related tar products, the general result has been that the fabric dries out rapidly when exposed to the weather, becomes brittle and lifeless and rapidily disintegrates. Where the saturant was wholly asphaltic in nature or comprised asphaltum blended with rosin or wax tailings or other petroleum products, and where a coating of like but harder composition was employed, the fabric usually exhibited good weather-resisting properties, but was deficient in its power of resistance to rot and decay.

From the above it would seem logical that a combination in a single fabric of an asphaltic and coal tar saturant would prove desirable in securing a preservative which would be universally applicable. The tendency has been away from the combination of asphalt and coal tar in the same product, largely for two reasons. First, the manufacturer has made a distinction between fabrics intended for weather exposure and those intended for water-proofing and damp-proofing below-ground and, as indicated above, these two uses have appealed to him as falling under the requirements of two separate problems. He has solved these problems by making a different fabric for each use. Second, while it has been recognized that asphaltic fabrics or sheet materials are best adapted to weather exposure and tar saturated fabrics are best for under ground work there has been no tendency for the manufacturer to combine tar and asphalt or derivatives of tar with asphalt in a single fabric, for the reason that he has been trained to the belief that asphalt and tar will not mix. Quoting from Abraham on page 339 of the book referred to "Bituminous materials which give the diazo reaction (containing phenols) should not be mixed with bituminous substances not giving this reaction. In other words native asphalts, asphaltites and pyrogenous asphalts should not be blended with tars or pitches (excepting fatty acid pitch), since it has been found by experience that such mixtures, although they may melt together perfectly, are not durable or weather-proof."

It should also be noted that the tendency of manufacturers is to avoid the inclusion of a liquid constituent in the saturant. If we regard the teaching of the prior art, semi-solid tars, pitches, waxes and greases are used for saturants or for constituents for saturants. It is true that some materials used contain a proportion of liquid material such as soft asphalt or tar pitch which contains a proportion of oil, which is liquid at normal temperatures, and a remainder of stiff pitch, but the manufacturer will not entertain the notion of using any liquid constitutent even if he compensates for it by the addition of a correspondingly harder pitch, the belief being that the two will not amalgamate properly and permanently.

In my invention I have made a decided departure from the general practice, relative to the saturant, by the addition of tar distillates to mixtures of asphalt and such pitches as may be easily blended with asphalt. As to the coating, the departure from the normal practice is made by the addition of petroleum grease and paraffine wax to the asphalt. While it is not new to vary the proportions of stearin pitch or even pine-tar pitch with asphalt as a saturant, yet the whole trend of the art has been to diminish the proportion of such ingredients to the lowest possible amount and in fact to eliminate them altogether.

One of the chief improvements contemplated in my present invention as regards the saturant, is the production of a material which will act as a preservative to the fibers of the fabric so that these fibers will not rot or decay in moist locations, or when subjected to the presence of molds, bacteria and enzymes. To this end a perservative or antiseptic material is added to the saturant, and obviously it must be soluble in the bulk of the saturant, so that it may be carried into the fabric in the process of saturation. Another improvement lies in the inclusion of a resinous material which not only exerts a decided preservative action, but imparts to the whole product a characteristic wholesome odor long associated in the mind of the dealer in and user of such materials with rugged wear and freedom from decay.

One of the chief improvements in the coating is the incorporation therein of inert unsaponifiable materials normally repellant to water and moisture, and which tend to diminish the brittleness of the asphaltic material constituting the major proportion of the coating.

My preferred method of carrying out my invention is as follows: A good quality of roofing felt is selected, of a weight preferably from 35 to 75 pounds per 480 square feet, according to the desired weight of the finished material and preferably of a rag stock comprising in the main cotton rags with about ten per cent of woolen rags. An admixture of burlap up to fifteen per cent

is permissible, although it has been found that burlap is readily destroyed by rot particularly when used under ground. The felt should be made into an acceptable sheet according to the usual standards for such materials, and is then saturated in the manner usual to such class of goods with a saturant composed of 50 pounds soft asphalt, 35 pounds pine-tar pitch, 5 pounds pine tar, 5 pounds creosote, 5 pounds soft stearin pitch.

By soft asphalt is meant an asphalt derived either from natural sources, or the residue from the distillation of petroleum by steam distillation process or by blowing with air. This furnishes the bulk or main body of the material, and should have a softening point of approximately 100° F. and a penetration of 200, both by the methods of the American Society for Testing Materials, Standards for 1921. The pine-tar pitch and pine tar are the well known articles of commerce. The function of these resinous distillates is a dual one; they exercise a preservative action and impart a wholesome and attractive odor which is of the utmost importance in its effect on the sale of the product. In addition, the pine tar acts as a tempering agent, imparting to the mixture certain characteristics favoring ready working and handling. The creosote is preferably one which complies with the specifications of the American Railway Engineering Association, or the American Wood Preservers Association, which specifications may be found either in the standards of these associations, or in Bulletin 1036 of the United States Department of Agriculture. As regards the choice between the grades of creosote numbers 1, 2, or 3 of the American Railway Eengineering Association, there is normally not much preference. The number 1 grade is preferable where the fabric is to be exposed to conditions favoring volatilization. Its function is that of a preservative to prevent development or growth of destructive forms. The stearin pitch may be any commercial stearin pitch having a consistency approximating that of the soft asphalt. It confers pliability on the mixture.

The fabric which has been saturated with the above described saturant is coated with a coating consisting of 87 pounds high melting point air-blown California asphalt, 1.5 pounds paraffine wax, 11.5 pounds petroleum grease.

The asphalt used for the coating should have a softening point of approximately 210° F. and a penetration of 20, by the methods of the American Society for Testing Materials Standards for 1921. It has been found that an asphalt of these characteristics may be prepared from California oil residuum by the oxidizing or the air-blown process. The paraffine wax is the ordinary white paraffine wax of commerce, having a melting point of 128° F. It renders the mixture wax-like and relatively non-adhesive. The petroleum grease is the dark colored petroleum grease of commerce, and its function is to soften the mixture without unduly lowering the melting point. It also imparts to the compound of which it forms a part, its own characteristic of permanence or stability of form.

The coating may be applied to the saturated felt in the manner usual to such operations, and gives good results when applied in the amount of about 6 pounds on each side, per 100 square feet of fabric. To the coating thus applied, a dusting of finely ground soapstone, wood flour, mica, graphite, or similar material is applied to prevent adhesion of adjacent surfaces when wound into rolls.

The usual range of proportions of materials is intended to be covered by the typical example given. In the example of coatings disclosed, an especially high softening point was sought. The softening point of such a coating has been found in the laboratory to be 195° F. It is possible to use coatings having softening points as low as 150° F. in which event much larger proportions of paraffine wax and petroleum grease may be used. Proportions ranging as high as 3 per cent paraffine wax and 18 per cent petroleum grease would not be beyond the possible range. If the fabric were intended for use in cold storage plants as a dampproof material, it is probable that both the saturant and the coating would be softened to a point beyond any test figures characterizing the above indicated proportions.

The proportions of the ingredients of the saturant may be varied considerably. If the fabrics are intended for roofing, it is possible to reduce the amount of preservative, i. e. creosote or equivalents, and get good results. It is, however, preferred to maintain a good proportion of preservative in the felt for roofing work, as vegetable fiber saturated with ordinary saturants undergoes a distinct loss of strength when exposed to weather action. On the other hand it is frequently advisable to increase the percentage of preservative when dealing with severe exposure underground as on the covering of pipe lines laid in filled ground, or where there is much alkali in the soil.

It is also obvious that the stearin pitch may be increased at the expense of the pine-tar pitch or vice versa. The amount of asphalt in the saturant may also be varied particularly as it is well known that good results may be had in roof coverings which are wholly asphaltic.

The above named variations in proportions are prompted by considerations of particular use. Obviously in them, I depart

somewhat from the express purpose of my invention which is the making of a fabric having universal adaptability.

While a narrow choice of materials has been mentioned in the above examples it is possible to extend this list considerably. It is preferred to use asphalt as the ingredient in the largest proportion, in both the saturant and the coating, on account of its relative cheapness and because asphalts of excellent quality may be readily procured. If coal-tar pitch, which is the only alternative material procurable in large quantities and at reasonable prices should be contemplated as a major constituent of either saturant or coating, or both, the objection immediately arises that coal tar is a poor weather resisting material, compared to asphalt, and furthermore that coal tar is highly susceptible to differences in temperature, becoming brittle when cold and fluid when hot.

In place of pine-tar pitch it is possible to use an increased amount of asphalt of the proper hardness and a certain increased amount of stearin pitch. To compensate for the loss of preservative constituents thus displaced, an increased amount of creosote may be used, and if we embody this idea in concrete form we have a typical formula for the saturant as follows: 75 pounds soft asphalt as above, 12.5 pounds stearin pitch, 7.5 pounds creosote, 5 pounds pine tar.

In this example the additional amount of creosote supplies the preservative action which otherwise would have been obtained from the pine-tar pitch. Materials other than creosote exert a favorable preservative action in the saturant. Among these may be mentioned copper resinate and copper oleate. In place of creosote it is also possible to use a certain proportion of coal tar. Since coal tar is only about one-fourth as toxic as creosote in its germicidal and fungicidal properties, it is evident that the use of creosote is preferable. In place of stearin pitch, petroleum grease may be used. Wool grease may be substituted in part for stearin pitch. Rosin in small quantities may be incorporated in the saturant and also wax tailings, both of these having the effect of increasing the penetration of the saturant although they do not contribute permanence to the material.

In so far as the coating is concerned similar substitutions may be made therein. In place of paraffine wax, crude scale wax and ozokerite may be used. Substitution for petroleum grease should only be made by the use of unsaponifiable materials of similar nature, or by limited amounts of substances having low percentages of saponifiable ingredients. Petroleum oils of high viscosity, wool grease in limited quantity and wax tailings in limited amount may be substituted in part for the petroleum grease.

It may be well to observe that if desired various fillers such as graphite, silica and mica may be added to the coating.

It is obvious that asbestos paper may be employed instead of rag felt as a base. In this case the preservative is of immense value in protecting the organic sizing materials, such as starch, and dextrine which are used to give strength to the asbestos sheet. Burlap or cotton fabrics may also be used as a base for the sheet of material, burlap being especially benefited by the types of saturant and coating above explained since it is normally readily subject to decay when exposed to the weather or used under ground.

I claim:

1. A sheathing material comprising a fibrous base saturated with a compound comprising asphalt, stearin pitch and creosote.

2. A sheathing material comprising a fibrous base saturated with a compound comprising asphalt, stearin pitch and creosote, and coated with a compound comprising asphalt and petroleum grease.

3. A sheathing material comprising a fibrous base saturated with a compound comprising asphalt, stearin pitch and creosote, and coated with a compound comprising asphalt, petroleum grease and paraffine.

4. A sheathing material comprising a fibrous base saturated with a compound comprising asphalt, stearin pitch, creosote and a resinous distillate.

5. A sheathing material comprising a fibrous base saturated with a compound comprising asphalt, stearin pitch, creosote, and pine-tar pitch.

6. A sheathing material comprising a fibrous base saturated with a compound comprising asphalt, stearin pitch, creosote, pine-tar pitch and pine tar.

7. A sheathing material comprising a fibrous base saturated with a compound comprising asphalt, stearin pitch, creosote and a resinous distillate, and said saturated base being coated with a compound comprising asphalt and a stable grease.

8. A sheathing material comprising a fibrous base saturated with a compound comprising asphalt, stearin pitch, creosote and a resinous distillate, and said saturated base being coated with a compound comprising asphalt and petroleum grease.

9. A sheathing material comprising a fibrous base saturated with a compound comprising asphalt, stearin pitch, creosote and a resinous distillate, and said saturated base being coated with a compound comprising asphalt, petroleum grease and paraffine.

10. A sheathing material comprising a fibrous base saturated with a compound comprising asphalt, stearin pitch, creosote, and pine-tar pitch, and said saturated base

being coated with a compound comprising asphalt, petroleum grease and paraffine.

11. A sheathing material comprising a fibrous base saturated with a compound comprising the ingredients named in Formula S substantially in the proportions stated, and coated with a compound comprising the ingredients named in Formula C substantially in the proportions stated:

Formula S: 50 pounds soft asphalt, 35 pounds pine-tar pitch, 5 pounds pine tar, 5 pounds creosote, 5 pounds soft stearin pitch.

Formula C: 87 pounds air-blown asphalt, 1.5 pounds paraffine, 11.5 pounds petroleum grease.

In testimony whereof, I have hereunto set my hand.

DOZIER FINLEY.