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ASPHALT-ASBESTOS MASTIC AND METHOD FOR PRODUCING SAME

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This invention relates to an asphalt mastic and to a method for producing the same. The invention relates particularly to an asphalt mastic containing a fibrous material such as asbestos which is adapted to be used as a flooring, to coat refrigeration pipes and refrigerator walls, to provide a finish coat over cork or magnesia insulation and in general, to be employed as a protective coating and also to be used for filling cracks, for caulking and the like.

It is an object of our invention to produce an asphalt mastic which may be readily troweled when applied to the surface to be coated and which is relatively cheap to produce.

Another object of the invention is to produce an asphalt mastic in which the asphalt is evenly distributed over the aggregate or fiber contained in the mastic and to produce a mastic which is entirely homogeneous.

The present day commercial asphalt mastics are generally prepared by mixing Pickering (clay) type emulsified asphalt with, for example, such materials as asbestos fiber, and water. In this process, melted asphalt is mixed with a slurry of a colloidal mineral such as bentonite in water to produce an asphalt in water emulsion and the asbestos is then added to the emulsion. This mixture is then troweled over the material to be protected. When the mixture dries out a hard coating results comprising the asbestos fiber, asphalt and the emulsifying agent, i. e. clay. It has been found that when this type of emulsion is examined under microscope, the mastic consists of a suspension of asbestos fiber and water intermixed with small particles of asphalt which, however, are not fixed upon the fiber. We have discovered that a superior product may be produced and one which is easy to apply, that is, will not adhere to the trowel when applied to the surface to be coated and one in which the asphalt adheres to the asbestos fibers so that when set up the resultant membrane contains a more even dispersion of asphalt since every fiber is coated with asphalt. This phenomenon increases the homogeneity of the mastic.

In general, we may produce an asphalt mastic forming the subject of our invention by mixing a fibrous material such as asbestos fiber, with water until the fiber is uniformly moist. This mixture is then commingled with emulsified asphalt and is thoroughly mechanically mixed in such an apparatus, as, for example, a pug mill, until the emulsion has completely broken down and all the asphalt is deposited upon the fibers. The mastic is then ready to be applied to the surface to be coated.

An important feature of the invention resides in the addition of small quantities of de-emulsifying agents such as sulphuric acid and more particularly, hydrated lime or calcium hydroxide, to the mastic in such cases where the emulsion, after a reasonable amount of working, such as by trowelling indicates that the complete deposition of the asphalt upon the fibers has not occurred. In order to prevent the material from becoming sour, we may add a small amount of 40% formalin solution to the mastic.

After the deposition of the asphalt upon the fibers, a certain amount of water is added and, finally, a certain quantity of finely divided diatomaceous earth. The finely divided diatomaceous earth acts as a lubricant so that improved trowelling characteristics are obtained.

It is another important feature of the invention to add a small amount of a stabilizer, preferably sodium caseinate, that is, casein containing a small amount of sodium hydroxide, to the asbestos fiber and water mixture prior to the introduction of emulsified asphalt into the mixture. If the asbestos fiber is dispersed in water and then mixed with the asphalt emulsion without addition of sodium caseinate to the moistened fibers, the resultant mixture may become lumpy due to too rapid breaking of the emulsion and is difficult to trowel even when diatomaceous earth is added. However, by adding the sodium caseinate (containing sodium hydroxide) to the asbestos-water mixture prior to admixture with emulsified asphalt, a fine grained mixture of good texture which is relatively soupy is obtained. The prior addition of the sodium caseinate to the moistened asbestos fibers prevents the asphalt from breaking out in large lumps or globules upon the surface of the asbestos fibers. When the asphalt emulsion is added to a solution of asbestos containing sodium caseinate, the emulsion is intimately dispersed with the asbestos forming a homogeneous mixture of water, asphalt in minute particles, asbestos and sodium caseinate. The latter mixture may then be broken slowly to the desired consistency for trowelling either before or after addition of diatomaceous earth or without the addition of diatomaceous earth. This may be accomplished by adding a de-emulsifying agent slowly to the mixture such as sulphuric acid, slaked or unslaked lime, calcium chloride, or Portland cement. This disperses the minute globules or particles of asphalt onto the asbestos with an outside water

film which makes the asphalt-asbestos mastic readily trowelable.

The following is a more detailed description for producing an asphalt-asbestos mastic forming the subject of our invention. However, it will be observed that the following description is merely illustrative of one mode of carrying out our invention and is not to be considered as limiting.

100 parts by weight of asbestos fiber are mixed with 150 parts of water until the fiber is uniformly moist; then about 5½ parts of a water solution containing 10% casein and 0.5% caustic soda are added slowly to the moistened asbestos fiber and thoroughly mixed therewith. To this mixture are added 180 parts of asphalt emulsion containing approximately 55% by weight of asphalt which has been stabilized with sodium caseinate. The addition is made slowly and with suitable stirring until the mixture becomes a thick paste of unbroken emulsion and asbestos.

In order to break the asphalt onto the asbestos fibers, approximately 50 parts of a slurry containing 33% hydrated lime are added. We have found that slaked lime is the most satisfactory material for breaking the asphalt particles onto the asbestos fibers because it breaks down the emulsion most evenly and also because it tends to hold water in the mass and make it more readily trowelable. However, we do not limit ourselves to the use of slaked lime, since other material as unslaked lime, calcium chloride or Portland cement may be employed for the purpose of breaking the emulsion. Finally, one part of commercial 40% formalin solution is added to the mixture, which acts as a preservative for the casein so that the material will not become sour. After the emulsion has broken and the asphalt has deposited upon the asbestos fibers, we may then add about 40 to 50 parts of water, as desired, to bring the mixture to the desired trowelling consistency.

After the addition of the water to the foregoing asphalt-asbestos mastic, approximately 20 parts of finely divided diatomaceous earth is mixed with the asphalt-asbestos mastic and this mixture is then applied to the surface to be protected, such as, for example, when covering cork or magnesia insulation. The mixture is preferably trowelled and is applied to the surface to be coated in thicknesses of, say $\frac{1}{16}$ to $\frac{1}{8}$ in. thick. Upon hardening, a smooth surface coating is produced in which the asphalt is distributed evenly over the fibers, thus increasing the homogeneity of the mastic.

The asphalt emulsion heretofore mentioned which was added to the asbestos, water and sodium caseinate mixture may be produced by melting at a temperature of, say 320° F., 60 to 62 parts by weight of asphalt produced from Poso Creek residuum and having a penetration at 77° of 40 to 50 (A. S. T. M. Method D—5—25), after which the melted asphalt is passed through a mixing device comprising, for example, a centrifugal pump into which an aqueous solution of sodium hydroxide containing about 0.30 to 0.35% by weight of sodium hydroxide and in which the solution is thoroughly mixed with the melted asphalt. At this point, the alkali content of the mixture is about 0.12 to 0.14% sodium hydroxide. The agitation by means of the circulating pump is continued until the asphalt is finely dispersed in the caustic soda solution. This emulsion is then cooled to approximately 85 to 95° F. by circulating through cooling coils and then a solution of sodium caseinate which has been prepared by mixing with 20% by weight of casein with the proper amount of cold water, digesting for about one to two hours and then adding 1% by weight of sodium hydroxide with additional agitation is injected into the cooled emulsion as the latter is being circulated in and out of the emulsifying tank through the centrifugal pump. The amount of casein solution is gauged so that approximately only 1% of casein is incorporated into the asphalt emulsion. Then a small amount of commercial 40% formaldehyde solution or formalin is mixed with the asphalt emulsion. To this mixture is next added further quantities of water so that the asphalt content is reduced to approximately 55 to 56%. This emulsion may then be stored and used as needed.

While we have disclosed the addition of stabilizer to the asphalt emulsion and also to the asbestos fiber, it will be observed that sodium caseinate need not be added to the asphalt emulsion and that the required amount of casein may be added only to the moistened asbestos.

Instead of employing casein as a stabilizing agent for the asphalt emulsion or for adding to the moistened asbestos fiber, we may use other protein type materials such as glue and blood albumen or carbohydrate materials as starch, gum acacia, agar agar, algin, gum tragacanth, pectin, Irish moss, etc. As preservatives for the stabilizer in order to prevent the asphalt emulsion or the asphalt-asbestos mastic to form fermentation or other decomposition, we may employ other preservatives than the formaldehyde or formalin as above mentioned, such as cresol, phenol, sodium benzoate and the like.

Instead of producing the emulsified asphalt as above, that is, by emulsifying the sodium hydroxide alone, we may employ other emulsifying agents such as rosin or rosin oil soaps, sodium stearate, sodium palmitate and salts such as sodium phenate, carbonate, sodium silicate and the like. The asphalt emulsion may be stabilized as desired.

Instead of producing an asphalt mastic containing asbestos fibers as disclosed above, we may produce asphalt mastics containing other fibrous materials as paper pulp or rag pulp, manila, jute, coconut, cotton, wool, hair or other fibers. Also, instead of applying the invention to the production of an asphalt mastic containing a fibrous material, we may apply the invention to produce mastics containing ground minerals as limestone, jasper, clay or diatomaceous earth either free from fibrous materials, or in admixture with such fibrous materials.

The important consideration is that the stabilizer is added to the fibers and/or ground minerals and water prior to admixture with the asphalt emulsion. If desired, mineral aggregate, such as sand, crushed stone and gravel may be commingled with the mastic containing the fibers prior to applying the same to surfaces. In such cases, the aggregate may be added to the mastic subsequent to the breaking of the asphalt onto the fibers.

The foregoing exemplary description is not to be considered as limiting since many variations may be made within the scope of the following claims by those skilled in the art without departing from the spirit thereof.

We claim:

1. A paste which is adapted to be readily trowelled on surfaces comprising a fibrous material, asphalt, water, a stabilizing agent, a de-emulsi-

fying agent and a finely divided material which will adapt said mixture to be readily applied onto a surface by means of a trowel.

2. A paste which is adapted to be readily trowelled on surfaces comprising a fibrous material, asphalt, water, a stabilizing agent, a de-emulsifying agent and diatomaceous earth.

3. An asphalt-asbestos mastic comprising asbestos, asphalt, sodium caseinate, water and hydrated lime.

4. An asphalt-asbestos mastic comprising 100 parts by weight of asbestos, 150 parts of water, 5.5 parts of a solution containing 10% casein and 0.5% caustic soda and 180 parts of asphalt emulsion.

5. An asphalt-asbestos mastic as in claim 4 and containing approximately 50 parts of a slurry containing 33% hydrated lime.

6. An asphalt-asbestos mastic which is adapted to be readily trowelled on surfaces comprising asbestos, asphalt, water, sodium caseinate, hydrated lime and diatomaceous earth.

7. An asphalt-asbestos mastic adapted to be applied to surfaces by trowelling comprising 100 parts by weight of asbestos, 150 parts of water, 5.5 parts of a solution containing a stabilizing agent, 180 parts of asphalt emulsion containing approximately 55% of asphalt, 50 parts of a water slurry containing 33% of hydrated lime and 20 parts of diatomaceous earth.

8. An asphalt-asbestos mastic adapted to be applied to surfaces by trowelling comprising 100 parts by weight of asbestos, 150 parts of water, 5.5 parts of a solution containing 10% casein and 1.5% caustic soda, 180 parts of asphalt emulsion containing approximately 55% of asphalt, 50 parts of a water slurry containing 33% of hydrated lime, one part of 40% formalin and 20 parts of diatomaceous earth.

9. A method for producing asphalt mastics adapted to be readily trowelled on the surfaces to be coated with said asphalt mastic which comprises commingling a fibrous material with a quantity of water and a stabilizing agent, commingling said mixture with an asphalt emulsion to form a thick paste of unbroken asphalt emulsion and fibrous material, then breaking said asphalt emulsion by adding a de-emulsifying agent to permit asphalt to cling onto the fibers of said fibrous material and subsequently commingling said mixture with a finely divided granular material so as to adapt said mixture to be readily applied onto the surface by means of a trowel.

10. A method for producing asphalt mastics adapted to be readily trowelled on the surfaces to be coated with said asphalt mastic which comprises commingling a fibrous material with a quantity of water and a stabilizing agent, commingling said mixture with an asphalt emulsion to form a thick paste of unbroken asphalt emulsion and fibrous material, then mixing hydrated lime with said mixture to break said asphalt emulsion and to permit asphalt to cling onto the fibers of said fibrous material and subsequently commingling said mixture with a finely divided granular material so as to adapt said mixture to be readily applied onto the surface by means of a trowel.

11. A method for producing asphalt mastics adapted to be readily trowelled on the surfaces to be coated with said asphalt mastic which comprises commingling a fibrous material with a quantity of water and a stabilizing agent, commingling said mixture with an asphalt emulsion to form a thick paste of unbroken asphalt emulsion and fibrous material, then mixing hydrated lime with said mixture to break said asphalt emulsion and to permit asphalt to cling onto the fibers of said fibrous material and subsequently commingling said mixture with diatomaceous earth which is adapted to cause said mixture to be readily applied onto the surface by means of a trowel.

12. A method for producing an asphalt-asbestos mastic adapted to be applied to surfaces by trowelling comprising mixing 100 parts by weight of asbestos, 150 parts of water and 5.5 parts of a solution containing 10% casein and 1.5% caustic soda, mixing said mixture with 180 parts asphalt emulsion containing approximately 55% of asphalt, subsequently mixing said mixture with 50 parts of a water slurry containing 33% of hydrated lime and subsequently adding 20 parts of diatomaceous earth.

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