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METHOD OF IMPREGNATING THE BASE OF FRICTION ELEMENTS.

No Drawing.

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This invention relates to a method of impregnating the base of friction elements, said base consisting essentially of fibrous asbestos, with a suitable binder, and more particularly to the method of incorporating this binder with the base material.

One of the usual methods of making friction elements having an asbestos fibre base, consists primarily in introducing a suitable binder substance into the raw material, which may be in the form of woven tape made from asbestos yarn, or in the form of blanks cut from a sheet of felted asbestos made on a wet machine. This binder substance, which may be asphalt, or a drying oil, is usually introduced by first dissolving or thinning it with a suitable solvent, such as gasoline; then impregnating the asbestos fibrous material therewith, and finally heat-treating the impregnated material to drive off the solvent and allow the binder material to coat the fibres and fill the interstices between the fibres, after which heat treatment is continued, if necessary, to harden and toughen the binder substance.

The purpose of using the solvent is twofold. First—to lower the viscosity of the binder in its primary form so that it may impregnate easily and thoroughly, which viscosity in the case of a solid asphalt, such as gilsonite, is very great, even at high temperatures; and second—to dilute the binder substance so that when thorough impregnation of the base does take place, a too great quantity of binder will not be deposited in the fibres to melt and smear when the elements are later heated by friction in actual operation on a brake or in a clutch. As noted above, the solvent used is generally an organic liquid such as gasoline or benzol, which by its nature actually dissolves and thins asphaltic and oily substances. These solvents are fairly expensive because of their method of manufacture from the raw materials containing or producing them, and the solvent cost in a process such as outlined above is generally a major part of the total saturant cost. Fire risk is also an important factor wherever such volatile inflammable materials are used.

The method developed herein may consist essentially in utilizing a dispersion of the desired binder substances in water, which may be in the form either of a colloidal suspension or an emulsion, wherein the average

particle size is preferably smaller than the openings between the fibres of the base material, and the electrical charge on the particles may be of such polarity that the dispersing medium and the dispersed particles contained therein may easily enter and permeate the fibrous base without undue filtration of the particles on the surface.

A dispersion such as shown above may partake of all the necessary qualities of a solution except the molecularly small particle size in the latter. However I have found that a range of particles of sizes from 0.2μ to 0.05μ more or less, will easily penetrate and permeate the fibrous materials it is desired to fortify.

A dispersion or emulsion having the desirable characteristics mentioned above is not a new composition of matter, and may be produced by those skilled in the art of emulsions and dispersions by the use of several mechanical devices, such as the Plauson colloid mill, the Premier colloid mill, and more common comminuting devices such as ball mills, etc. The detailed methods of production of this material are not relevant to the intent of this specification and therefore do not entail description.

One method of utilizing this material for the production of brake lining may be as follows: The raw asbestos tape is preferably freed from naturally contained oily materials, which, if present, would hinder the entrance of the watery medium, by dissolving them out with a solvent and then drying out the solvent, or by washing them out in an aqueous soap solution and drying out the water. The raw asbestos may be then allowed to saturate completely in a dispersion of gilsonite in water containing about 25% gilsonite by weight, wherein the gilsonite particles preferably have an average diameter less than 0.5μ and are charged negatively. After being completely saturated, and after the tiny gilsonite particles have flowed through all the interstices with the aqueous medium, the tape is scraped so as to remove any surface excess of saturant, and then dried at say, 250° to 300° F. more or less, for a period of say, one to two hours more or less, to remove the water, leaving about 10%–15% gilsonite on the basis of the original weight. Upon removal from the dryer preferably while still hot, the saturated tape may be passed between pressure rolls, and compressed

to the desired finished size. This pressure and rolling, fluxes and softens the hot gilsonite, and causes the particles to unite into a continuous film uniformly disseminated through the fibres which then acts as a strong high friction, water-repellant binder for the finished brake lining. It is not essential that the asphalt be entirely fluxed at this point, for heat and friction encountered in service will also further the fluxing action.

This method is also applicable to the introduction of fluid oily substances such as varnish bases consisting of varnish gums and drying oils, fluid asphalts and pitch, etc., except that in this case the mixture with water is termed "emulsion" and the oil in water emulsion is considerably more viscous than the dispersion of a solid material in water. This increased viscosity merely necessitates a longer saturating period. Also, this type of material usually needs no mechanical fluxing as the particles are sufficiently mobile, when the water medium is removed, to flux automatically. Where drying oils or fluid asphalts are used, it is customary to subject the dried material to a further high temperature heat treatment to harden the binder,

and thus make it more suitable for use in a friction element.

The intent of this specification as shown above, is to describe a novel general method of introducing a water resisting binder into friction element base materials, wherein the commonly used method of dissolving and thinning the binding substance with a suitable organic solvent has substituted therefor the use of a water dispersion or emulsion of these substances having certain required characteristics as indicated above.

By the term "waterproof binder" as used in the claim I intend to include those binding substances disclosed in the foregoing specification.

I claim as my invention:

A step in the process of producing friction elements comprising saturating a previously formed or fabricated asbestos mass with a waterproof binder dispersed in an aqueous vehicle wherein the binder particles are materially smaller in size than the pores in the fabricated fibrous mass, and have a negative electric charge.

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