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METHOD OF MAKING COMPOSITION FRICTION ELEMENTS

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3 Claims. (Cl. 18—47.5)

This is a division of my application Serial No. 387,818 filed August 22, 1929, (now Pat. No. 1,882,702 Oct. 18, 1932).

The invention relates generally to the art of braking and more particularly to the manufacture of a novel friction element for use in brakes, clutches and other assemblies.

The object of the invention is to provide a novel method of making a composition brake element which is relatively rigid but yet has sufficient elasticity to enable it to be readily fitted to a brake head or shoe, a brake band, or other support.

And a further object of the invention is to avoid the necessity of making composition brake elements accurately to conform with the curvature of the support upon which they are mounted by providing an improved method of producing a novel element having a limited amount of inherent flexibility.

The invention is more especially useful in making composition brake liners in strip form and in a generally arcuate shape to fit brake heads or shoes and brake bands or other supports, and I will describe the invention as used for this purpose although it may also be used in making relatively thick brake blocks and other braking elements for various purposes.

It has been common practice heretofore to use a binder, generally a drying oil, in friction compositions, but it has not been practicable to use a sufficient amount of oil to produce a liner having any material flexibility and at the same time thoroughly cure the liner in any available commercial baking process. I have overcome this difficulty and have enabled the use of a sufficient amount of oil to produce a relatively flexible liner by adding sulfur to the composition mixture. I have added sulfur in the proportion of from 2% to 20% by weight of the amount of oil in the composition. For example, to 18 parts of oil I have added sulfur over a range from 0.36 part to 4.5 parts and I have found that added sulfur in the proportion of 15% of the amount of oil present appears to be the most desirable proportion to use. That is to say 3 parts of sulfur are added to 20 parts of drying oil. When less than 15% of sulfur is used there is apt to be some difficulty in properly curing the material; if more than 15% of sulfur is used the excess will distill out and be lost. Different compositions may enable or require a variation in the proportion of sulfur to oil and different binders may enable or require similar variations in the sulfur proportion. In all cases, however, it is desirable to use as much added sulfur as the amount of binder will permit without adversely affecting the curing step. To increase the flexibility of the finished product small quantities, up to 5 parts, of castor oil, cylinder stock oil, rosin, free fatty acids, or like materials, may be added to the mixture.

The following is an example of a composition which may be used in making a friction liner embodying my invention.

	Parts
Asbestos, short fibre	65
Pyrobituminous material, such as bituminous coal	25
Binder, such as raw linseed oil	18
Sulfur, 15% by weight of oil	2.7

In practicing my improved method I prefer to proceed as follows:—The sulfur is first added to the oil and mixed by stirring; the oil-sulfur mix is then added to bitmuminous coal and mixed; then the asbestos is added, and the whole is thoroughly mixed in any suitable mixing machine. I use ordinary flowers of sulfur or other finely divided sulfur, comminuted bituminous coal, and short fibre asbestos. Other quantities of these materials and other mixing procedure may be employed which will produce results equivalent to the materials and procedure indicated.

The mixture, without heating, can be rolled into a limp strip and cut into sections for curing, or it can be made in block form in a mold under pressure, and then cured or baked in an oven. A suitable heating schedule is four to five hours at approximately 125° F. and then five to six hours at approximately 300° F.

In quantity production it is desirable to cut the strip into sections of standard lengths as it comes from the strip machine and to place these sections upon arcuate forms by which they are supported in the curing oven. The limp sections will conform to the shape of the forms which are standardized in a general way to the shape of heads or shoes or bands or other supports in commercial use, or they may be easily pressed to the forms and held thereon by means of clips. It is not necessary to shape the liner to the precise curvature of the support on which it is to be used because the liner has some flexibility and can be shaped snugly to the support in mounting it thereon. This applies to continuous strip liners, which are referred to as such, as well as to those made in the form of relatively short and thin blocks. The composition may

be molded in relatively thick blocks in accordance with my invention and they will have the advantage of that flexibility which my improved composition affords. The invention is of special importance from a production standpoint because it enables liners to be made quickly and at relatively low cost by rolling in a continuous strip which can be cut up into sections of any length required; and it is also specially important because it provides a composition braking element having sufficient flexibility to enable it to be fitted to its support.

Where I have referred to the product of my invention herein as a composition friction liner it is to indicate a useful embodiment, but it can be made as a brake element in many different forms, including clutch facings and the like, and in such sizes and shapes as may be required.

I claim:

1. The method of making a flexible composition friction element which consists in thoroughly mixing 18 parts of drying vegetable oil and 2.7 parts sulfur with 25 parts finely divided pyrobituminous material and 65 parts of short fibre asbestos, forming said mixture into shapes, and then curing said shapes in a baking oven without pressure for four to five hours at approximately 125° F. and then for five to six hours at approximately 300° F. to set the oil by sulfuration to bond the ingredients of the element.

2. The method of making a flexible composition friction element which consists in mixing suitable friction materials, an amount of vegetable drying oil that will effectively bond the friction materials after curing and more than would be oxidized by heat in curing, and sufficient sulfur to promote complete curing of the oil, forming the mixture into a shape, and subjecting the shape to heat without pressure to cure the oil by sulfuration.

3. The method of making a flexible composition friction element which consists in mixing suitable friction materials, an amount of vegetable drying oil that will effectively bond the friction materials after curing and more than would be oxidized by heat in curing, adding sulfur in the proportion of approximately 15% of the amount of oil present to promote complete curing of the oil, forming the mixture into a shape, and subjecting the shape to heat without pressure to cure the oil by sulfuration.

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