United States Patent [19]

Guittard

[11] **3,850,791**

[45] **Nov. 26, 1974**

[54] **ASBESTOS-BASED FRICTION MATERIAL**

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[22] Filed: **Mar. 20, 1974**

[21] Appl. No.: **453,103**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 326,480, Jan. 24, 1973, abandoned.

[52] **U.S. Cl.** ..... **162/145**, 162/153, 162/155, 188/251 A, 192/107 M

[51] **Int. Cl.** **D21h 5/18**

[58] **Field of Search** ..... 162/153, 155, 145, 146; 192/107 M; 188/251 R, 251 A

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[57] **ABSTRACT**

An asbestos-based paper or board material has a fibrous component which includes from 0.8 to 25% by weight of amosite asbestos and 6 to 96% by weight of chrysotile asbestos, based on the total weight of the material, and is particularly useful for the manufacture of friction materials comprising from 20 to 40% by weight of a bonding agent and from 60 to 80% by weight of the asbestos-based paper or board material. The paper may additionally comprise organic fibre and inorganic filler other than asbestos.

8 Claims, No Drawings

ASBESTOS-BASED FRICTION MATERIAL

CROSS REFERENCE TO RELATED APPLICATION

This application is a continuation-in-part of my earlier copending application Ser. No. 326,480 filed Jan. 24, 1973, now abandoned.

This invention relates to asbestos-based paper materials and composites produced therefrom.

It is known to produce asbestos paper and board from chrysotile or anthophylite asbestos in admixture with other fibrous and particulate materials. Such papers and boards are impregnated with a suitable bonding agent, for use as friction linings and other friction materials.

When such linings are intended to operate in a liquid medium such as oil, for example, it is essential that they should have high permeability whilst still retaining a high coefficient of friction under operating conditions.

Presently produced asbestos-based papers and friction materials made therefrom are, in general, considered satisfactory, although much effort continues to be expended in developing improved materials with a view to improving the manufacture and/or properties.

It has now been found that improved asbestos-based papers and friction materials made therefrom can be provided if certain selected quantities of amosite asbestos are used to replace in whole or in part the previously used forms of asbestos.

Accordingly, the present invention provides an asbestos-based paper or board material having a fibrous component which includes from 0.8 to 25% by weight (based on the total weight of the paper or board material) of amosite asbestos.

The use of amosite asbestos fibres within the range specified (and more particularly within the preferred ranges specified) facilitates the preparation of the paper or board by improving the speed of filtration of the water content of the slurry from which the paper or board is produced. In addition, it is found that the use of amosite asbestos makes it possible to obtain paper or board having higher permeability than similar materials without amosite; this improved permeability is also a property of friction materials made from the paper or board. The improvements achieved become really perceptible when the amount of amosite is approximately 2% by weight, and in the majority of applications no further advantage is obtained by using more than 20%.

Preferably, therefore, the paper material contains from 2 to 20%, and more preferably from 2 to less than 10%, by weight of amosite asbestos. Use of more than 10% of amosite leads to risk of formation of knots, fibrous fluff or other irregularities in the paper or board structure.

It has been found that the high permeability is retained when the fibrous component also includes chrysotile asbestos. The presence thereof makes it possible to increase the resistance to tearing of the paper or board.

In order to obtain the full advantage of the mechanical properties conferred by chrysotile asbestos, it is advisable to "open" the fibres, for which the use of chemical dispersing agents is widely used. We have found that the presence of amosite asbestos in a composition containing chrysotile asbestos has the effect of opening

the chrysotile asbestos, even in the absence of a dispersing agent, although it is still preferred to use a dispersing agent for the purposes of this invention.

The above advantages are exhibited at their best when the composition or slurry from which the board or paper is made (and hence the board or paper itself) contains, by weight, from three to seven times more chrysotile asbestos than amosite asbestos. That is, the paper or board preferably contains from 6 to 96% by weight chrysotile asbestos, more preferably from 39 to 51%, in addition to the amosite asbestos.

The paper or board may contain from 0 to 90% by weight of organic fibre, for example a cellulosic fibre, such as sulphite cellulose and preferably from 35 to 60%, and it may additionally contain from 0 to 20% by weight of a filler, more preferably from 5 to 10% by weight of an inorganic filler, other than asbestos.

The present invention also provides a friction material comprising from 60 to 80% by weight of an amosite asbestos-based paper as aforesaid, and from 20 to 40% by weight of a bonding agent.

The friction material preferably contains from 1.2 to 16% by weight of amosite, more preferably from 3 to 10%; it preferably comprises from 20 to 70% by weight in total of fibrous component, more preferably from 55 to 65%, from 20 to 40% by weight of bonding agent and less than 20% by weight of filler, more preferably from 5 to 12%. The preferred bonding agent is a phenol formaldehyde resin.

Friction material according to this invention, at least in its preferred aspects, has better performance than hitherto available friction materials. For example, friction linings for use in automatic transmissions, in the preferred aspects of this invention, have smoother engagement characteristics, owing to the higher permeability of such linings.

The following examples are given to illustrate preferred embodiments of the invention, "parts" being parts by weight.

Example 1

4 parts of amosite AM3C fibre, 25 parts of chrysotile 5D, 34 parts of sulphite cellulose, 6 parts of coke and 6 parts of zinc oxide were formed into a 2% by weight aqueous slurry, and the slurry was cast, filtered and dried to form a paper, the filtration time being considerably shorter than for a similar slurry from which amosite was absent.

75 parts of the paper were impregnated with a varnish comprising a solution of 25 parts of a phenol formaldehyde resin in alcohol, and the varnish-impregnated paper was dried to form a friction lining material which exhibited excellent properties in operation. Firstly, it was easily cooled by the liquid in an automatic transmission, thus ensuring dissipation of heat, and secondly, the friction properties were excellent.

Example 2

By the same method as described in Example 1, a paper was made, comprising:

Amosite AM3C	8 parts
Chrysotile 5D	30 parts
Sulphite Cellulose	23 parts
Mica	4 parts
Silica	4 parts

and 70 parts of this paper were impregnated with 30 parts of phenol formaldehyde resin to form a friction lining having properties substantially equivalent to those of the material produced by Example 1.

Example 3

By the same method as described in Example 1, a paper was made comprising:

Amosite AM3C	6 parts
Chrysotile 5D	23 parts
Sulphite Cellulose	30 parts
Mica	2 parts
Iron Oxide	2 parts
Lime	2 parts

and 65 parts of this paper were impregnated with 35 parts of phenol-formaldehyde resin to produce a friction lining material having properties substantially equivalent to those of the material of Example 1.

I claim:

1. A friction material comprising a paper or board material impregnated with a synthetic thermoset resin, wherein said paper or board material constitutes from 60 to 80% by weight of the friction material and said resin constitutes from 20 to 40% by weight of the friction material, and said paper or board material consists essentially of

a. from 2 to 20% by weight (based on the weight of said paper or board material) of amosite asbestos;

b. from 6 to 96% by weight of chrysotile asbestos;

c. from 0 to 90% by weight of an organic fibre; and

d. from 0 to 20% by weight of an inorganic filler other than asbestos.

2. A friction material according to claim **1**, wherein said paper or board material contains less than 10% by weight of amosite asbestos, based on the total weight of the paper or board material.

3. A friction material according to claim **1**, wherein said paper or board material contains from 39 to 51% by weight of chrysotile asbestos, based on the total weight of the paper or board material.

4. A friction material according to claim **1**, wherein said paper or board material contains from 35 to 60% by weight of organic fibre, based on the total weight of the paper or board material.

5. A friction material according to claim **1**, wherein said paper or board material contains from 5 to 10% by weight of said filler, based on the total weight of said paper or board material.

6. A friction material according to claim **1**, consisting essentially of

i. a paper material constituted by

a. about 4% by weight of amosite asbestos (based on the weight of the paper material)

b. about 25% by weight of chrysotile asbestos;

c. about 34% by weight of cellulosic fibre;

d. about 6% by weight of coke and 6% by weight of zinc oxide,

said paper material being impregnated with

ii. about 25% by weight phenol formaldehyde, based on the weight of the friction material.

7. A friction material according to claim **1**, consisting essentially of

i. a paper material constituted by

a. about 8% by weight (based on the total weight of the paper material) of amosite asbestos,

b. about 30% by weight chrysotile asbestos,

c. about 23% by weight cellulosic fibre, and

d. about 4% by weight mica and 4% by weight silica,

said paper material being impregnated with

ii. about 30% by weight of phenol formaldehyde resin based on the weight of the friction material.

8. A friction material according to claim **1**, consisting essentially of

i. a paper material constituted by

a. about 6% by weight (based on the total weight of the paper material) of amosite asbestos,

b. about 23% by weight of chrysotile asbestos,

c. about 30% by weight of cellulosic fibre, and

d. about 2% by weight of mica, about 2% by weight of iron oxide and about 2% by weight of lime,

said paper material being impregnated with about 35% by weight, based on the weight of the friction material, of phenol-formaldehyde resin.

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