

dividing the sulphurized product thus obtained into relatively small particles or granules which may be dispersed with substantial uniformity throughout friction elements of the character herein contemplated.

A suitable formula which may be followed in making friction elements for normal heavy duty service, in the practice of the present invention, is the following, in which all parts indicated are by weight:

Example No. 1

Parts by weight	
Heat polymerized vegetable drying oil (linseed)	8.4
Oil modified phenol-formaldehyde resin	8.4
Lead formate	9.0
Potassium dichromate	1.0
Vulcanized butadiene-acrylonitrile copolymer synthetic rubber-like elastoprene (finely divided dust-like particles, vulcanized with ten percent sulphur, by weight)	4.0
Pyrobituminous material (soft coal, finely divided)	15.0
Asbestos fiber	65.0
Sulphur	2.5

A suitable formula which may be followed, in the practice of the present invention, in making friction elements which may be subjected to exceptionally severe heavy duty service, is the following, in which all parts indicated are by weight:

Example No. 2

Parts by weight	
Crude (natural) rubber	5.75
Reclaimed rubber	8.00
Sulphur	3.25
Rubber accelerator (benzothiazyl disulphide)	0.25
Zinc oxide	2.0
Carbon black	4.0
Graphite	7.0
Lead sulphate	15.0
Blanc fixe	7.5
Phenol-formaldehyde resin	12.0
Vulcanized butadiene-acrylonitrile copolymer synthetic rubber-like elastoprene (finely divided dust-like particles, vulcanized with ten per cent sulphur, by weight)	3.0
Powdered lead	8.0
Brass chips	10.0
Asbestos fiber	26.0

A suitable formula which may be followed, in the practice of the present invention, in making friction elements for use as brake linings upon passenger automobiles, light trucks, and the like, is the following, in which all parts indicated are by weight:

Example No. 3

Parts by weight	
Crude (natural) rubber cement	13.25
Oil modified phenol-formaldehyde flexible resin	12.0
White lead	7.5
Pyrobituminous material (soft coal, finely divided)	10.0
Sulphur	1.5
Vulcanized butadiene-acrylonitrile copolymer synthetic rubber-like elastoprene (finely divided, dust-like particles, vulcanized with ten per cent sulphur, by weight)	3.0
Asbestos fiber	65.0

The compositions illustrated in the foregoing Examples Nos. 1 and 2 may be converted into heavy duty type friction elements by intimately mixing the ingredients thereof and forming the resulting mixture into friction element shapes and then effecting the cure of the organic bonding agent, as by the application of heat alone, or by the application of both heat and pressure. Thus, in the manufacture of friction elements employing the composition which is illustrated in the foregoing Example No. 2, a temperature of from about 300° F. to about 325° F., and the application of a pressure of about two thousand pounds per square inch, for about four hours, are suitable, it being understood that the preferred or optimum temperature, pressure and application time stated above may be varied somewhat depending in part upon the particular composition and the specific temperature, pressure and application time employed. However, in the manufacture of friction elements employing either the composition which is illustrated in the foregoing Example No. 1, or the composition which is illustrated in the foregoing Example No. 3, the application of heat alone is sufficient to effect the cure of the bond and a typical example of suitable progressively increasing temperatures and application times which may be employed is as follows: Three hours at 225° F.; three hours at 275° F.; three hours at 300° F.; and three hours at 315° F.

As pointed out hereinbefore, the hardness and heat resistance and related properties and characteristics of the finely divided or dust-like particles of the butadiene-acrylonitrile copolymer friction-stabilizing material, which are referred to in the foregoing Examples Nos. 1 to 3, inclusive, may be readily varied and controlled by selecting and employing in the making of said finely divided friction-stabilizing particles, for a given sulphur content, a synthetic rubber-like elastoprene material of the butadiene-acrylonitrile copolymer type containing a predetermined or preselected percentage of acrylonitrile as a component of the copolymer material. Thus, the relative hardness and heat resistance of said finely divided or dust-like particles of friction-stabilizing material may be increased by employing in the making of said particles a butadiene-acrylonitrile copolymer containing a relatively high percentage of acrylonitrile as a component of the copolymer material as is true, for example, in the case of "Hycar OR" (5-15 or 25), "Chemigum" (X and I), and in certain of the materials known as "Stanco" and in the materials known as "Standard" and "Perbunan." On the other hand, if desired, the relative hardness and heat resistance of said finely divided particles of friction-stabilizing material may be decreased by employing in the making thereof a butadiene-acrylonitrile copolymer containing a relatively low percentage of acrylonitrile as a component of the copolymer material as is the case, for example, of "Hycar Ninene B," and in certain of the materials known as "Stanco."

It may be added, at this point, that the percentage of acrylonitrile in the various butadiene-acrylonitrile copolymer materials or elastoprenes referred to above, varies from a lower range of the order of approximately fifteen per cent, by weight, in the case of "Hycar Ninene B" and in certain of the materials known as "Stanco," to an upper range of the order of approximately fifty per cent, or slightly less, by weight, in the case of "Hycar OR" (5) and in certain of the materials