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ARTHUR B. CHAPIN, OF CHICAGO, ILLINOIS, ASSIGNOR TO REPUBLIC PAINT AND VARNISH WORKS, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS

PLASTIC COMPOUND AND METHOD OF MAKING SAME

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My invention relates to a durably plastic compound for use particularly in automobile body construction (although it is susceptible of other uses) as a cement, as a waterproofing and insulating substance, as a means, specifically, for bedding glass or making air and water-tight the joints or seams between the parts of the automobile or other structure and cushioning the parts so joined and preventing squeaking noises due to the inevitable weaving of the body; and the primary objects of the invention are to provide a plastic adhesive material which may be formed in relatively thin strands, strips, or ribbons, of very considerable length and of any desired cross-section by being forced through a die, and when so formed, will have sufficient tenacity and cohesiveness so that the strands may be handled, in using them for cementing or other like purposes, without being broken or deformed; to provide a material which will not melt or sag, or, on the other hand, become hard or brittle at high temperatures, for example at the temperatures at which the enamel or other coating on the body is baked, or become undesirably hard or brittle at low winter temperatures; to provide a material which will be proof against all but very strong acids and alkalies, which will be and remain sticky and will have and retain a certain amount of resiliency, so as to cushion the parts between which it is placed and prevent squeaking, which will be water-proof, will prevent the rusting of metal parts against which it may be placed and which will have the other desirable qualities and properties to be referred to more particularly in the following specification describing my invention in certain preferred embodiments. By the term "durably plastic" as applied to the composition I mean that the material will retain a considerable degree of softness, or plasticity, after the lapse of months or even years.

The material consists of a base made in part at least of oils, preferably vegetable oils, to which may be added asphalts or pitches, with which body is incorporated, in intimate mixture therewith and uniformly distributed therethrough, a quantity of finely divided fibrous material, preferably short asbestos fibres.

I preferably employ an oil or oils of the drying or semi-drying classes the viscosity of which is increased by heating or by oxidation through blowing together with a non-drying oil or oils which acts to give the product its sticky character and to prevent complete solidification of the drying oil. The asbestos fibres are used in such quantity that they will constitute approximately 44 per cent, more or less, of the finished product by weight. The asphalts, when used, diminish the cost of the product.

The following are specific exemplifications of the invention:

Example No. 1.—The ingredients, by weight, are as follows:

	Per cent
Tung oil	20.33
Castor oil	29.26
Asbestos fibre	44.71
Lithopone	5.70
	100.00

In compounding this substance the tung oil is first heated to a temperature somewhat below the polymerizing temperature of the oil, for example to approximately 425° Fahrenheit. The heating is continued at this temperature for about two and one-half hours. It is then mixed cold with the other ingredients, preferably in a worm mixer, this type of mixer being employed because of the stiffness of the mixture. The compound, when the ingredients have been thoroughly mixed together so that the asbestos fibres are evenly distributed through the oil base, will be sufficiently plastic so that the material may be formed into ribbons, strands or strips, either round, flat or angular in cross-section, which will be relatively thin in proportion to their length. For example, it is possible to thus extrude the material, under high pressure through a suitably apertured die, into strands two to three feet in length, two inches wide, and $\frac{1}{32}$ of an inch in thickness, which strips or ribbons will hold their shape without breaking and without substantial deformation when handled in the cementing opera-

tions for which the strips are intended. The material is sticky so that it will readily adhere to glass or metal, but its cohesiveness is such that the strips will not coalesce or stick together to such an extent as as to be incapable of ready separation, when they are piled up one on the other. The material is quite resilient so that when placed between the parts of an automobile, for example, it will provide a cushion and prevent squeaking. The material will not run or melt or sag at temperatures of from 250 to 300 degrees Fahrenheit nor will it harden or become brittle at these temperatures. On the other hand, it does not become brittle or fracture even at very low winter temperatures, for example, minus 60° Fahrenheit. It is slightly affected by strong acids, such as nitric and concentrated sulphuric acid, but will not be injured by ordinary weak acids. It is also little affected by alkalies.

Because of these properties the material can be used to great advantage in the construction of automobiles for bedding or cementing the window panes, and at the joints between metal panels or the body or between any of the metal or wood parts of the car, for cementing, air-proofing, insulating, waterproofing and squeak preventing purposes. The material may be molded by extrusion from the die of a gun in strands, strips or ribbons of the desired length and proper cross-section and these strips taken to the different departments or assembly stations and laid along the edges of the parts to be joined to which they will adhere so that the part with its edges thus carrying the plastic compound may be put into place with a minimum of labor.

A somewhat cheaper material having for the most part the characteristics of the material just described may be compounded as follows:

Example No. 2.—The ingredients employed in their preferred proportions, by weight, are the following:

	Per cent
Solid petroleum base asphaltum (parolite)	14.87
Gilsonite	6.08
Liquid petroleum base asphaltum	5.13
Rosin	0.31
Tung oil	1.92
Blown soya bean oil	5.76
Blown castor oil	0.34
Asbestos fibre	43.24
Kerosene	15.47
Naphtha	6.88
	100.00

It will be observed that in accordance with this exemplification of the invention asphaltums are substituted, in part, for the vegetable oils. This necessitates the use of solvents (kerosene and naphtha) and makes it desirable to use a flux such as rosin, particularly if a hard asphalt-like gilsonite is used.

In compounding the material four base substances are formed as follows:

The first base is made by melting the solid petroleum asphaltum, liquid petroleum asphaltum and approximately five per cent of gilsonite, the ingredients being heated and stirred until the melting and mixture is complete. The mixture is then thinned with kerosene. Preferably, I employ, and intend by the term kerosene, the petroleum oil fraction of 37° Baumé, which has an initial boiling point of 370° F., 50% distilling over at 434° F., 96% at 492° F.

The second base is made by mixing and heating together the balance of the gilsonite (1.08%), the tung oil and rosin. The heating temperature should be about 500° F., which is below the polymerizing temperature of the tung oil and the heating is to be continued until the ingredients are thoroughly cooked and mixed together. The heat increases the viscosity of the tung oil. The mixture, when sufficiently cool, is thinned with naphtha. By naphtha I intend the petroleum fraction of 48° Baumé which has an initial boiling point of 298° F., 50% distilling over at 388° and 96% at 467° F.

To form the third base the raw soya bean oil is blown with air to increase its viscosity to about that of molasses.

The fourth base is made by blowing refined castor oil to increase its viscosity to about that of molasses.

These four bases are mixed together in the cold with the asbestos fibres, preferably in a worm mixer, the mixing being continued until a heavy homogeneous sticky paste is obtained with the asbestos fibres uniformly dispersed therethrough.

The product of Example 1 is of a light gray color, although it may be given any desired color by varying the pigment used, while the product of Example 2 is black. It is, however, considerably more expensive to make because of the relatively large quantities of vegetable oils used.

After considerable experimentation with the products as above described I am convinced that in order to obtain the best results, having in view the desirable properties of the products as above indicated, it is best to follow one or the other of the two specific formulas above set forth, both as to the ingredients and their proportions. However, it is possible to obtain plastic compositions of some utility at least by varying the proportions, within certain limits, from those given above and even if some substitutions are made in the ingredients themselves.

In both compounds it is possible to substitute other fibres for asbestos fibre, such for

example as cellulose fibre, but my experience goes to show that asbestos fibre is better than any other. It aids to give the material its tenacity, elasticity and its capacity for adhering or taking a grip upon glass, metal or other smooth surface.

Referring to product of Example 1, it is possible to use other drying or semi-drying oils in place of tung oil, for example linseed oil, soya bean oil, perilla oil, sunflower oil or even fish oil, although the odor of the latter might be objectionable.

In place of castor oil one can use other non-drying oils such as olive, cottonseed, peanut oils or even mineral oils such as paraffin oil. Paraffin oils, however, tend to prevent the proper drying and bonding of lacquer or enamel finishes that may later be applied over the surface treated and therefore are not so desirable.

The asbestos fibre content may be varied from 40 per cent to 48 per cent, the drying oil (tung oil) from 18 per cent to 22 per cent and the non-drying oil (castor oil) from 28 per cent to 32 per cent.

The tung oil, that is the drying oil, gives the substance its body and the non-drying oil, castor oil, appears to prevent the drying oil from oxidizing completely. Therefore if too much of the non-drying oil is used the material is too sticky and thin. If not enough is used the material becomes too brittle and friable.

In the product of Example 2 one can use other natural asphalts such as elaterite, grahamite or Trinidad asphalt for the gilsonite. Solid petroleum asphaltum is usually obtainable in soft, medium or hard grades. The formula implies a medium grade of this substance. If hard petroleum asphaltum is used there should be less gilsonite and if a soft grade there should be more gilsonite. It is possible to substitute for up to about 20 per cent of the total asphalt content a like amount of resinous pitches, such as pine tar pitch, and petroleum pitches may be substituted for the solid and liquid petroleum base asphalts.

As in the other exemplification of the invention, other drying, semi-drying, or non-drying oils may be employed for the oils of these classes specifically mentioned.

The rosin is used as a flux and to prevent the tung oil from polymerization. The fluxing function is not essential but preferable. To prevent polymerization one might use linseed oil fatty acids, corn oil fatty acids or other organic acids.

The asphaltum content may vary from 24 per cent to 28 per cent. The tung oil may vary from one per cent to three per cent, the soya bean oil from three per cent to seven per cent. The small quantity of blown castor oil not substantially in excess of 1% is desirable but not essential. This ingredient may vary from a trace to one per cent. The solvents are largely evaporated. The quantities used may vary 10% either way.

In some of the claims which follow the term "drying oils" is used in the broad sense to cover either drying or semi-drying oils, that is all oils having more or less the characteristics of a drying oil.

I claim:

1. A plastic compound comprising an intimate mixture of the following ingredients in proportions by weight, based upon the whole compound, as follows: asphalt 24 per cent to 28 per cent; drying oil 4 per cent to 8 per cent; asbestos fibres 40 per cent to 48 per cent; light petroleum solvent 20 per cent to 24 per cent.

2. A plastic compound consisting of an intimate mixture of the following ingredients in proportions by weight, based upon the whole compound, as follows: natural and petroleum base asphalts 24 per cent to 28 per cent; drying oil 1 per cent to 3 per cent; semi-drying oil 3 per cent to 7 per cent; non-drying oil from approximately 0.34 per cent to 1 per cent; asbestos fibre 40 per cent to 48 per cent; light petroleum solvent 20 per cent to 24 per cent.

3. A plastic compound consisting of an intimate mixture of the following ingredients in substantially the proportions by weight, based on the whole compound, as follows: solid petroleum base asphaltum 14.87 per cent; gilsonite 6.08 per cent; liquid petroleum asphalt 5.13 per cent; rosin 0.31 per cent; tung oil 1.92 per cent; blown soya bean oil 5.76 per cent; blown castor oil 0.34 per cent; asbestos fibre 43.24 per cent; kerosene 15.47 per cent; naphtha 6.88 per cent.

4. Method of manufacturing the compound of claim 3 which consists in the following steps; heating solid petroleum asphaltum, liquid petroleum asphalt and a portion of gilsonite until the ingredients are melted and mixed and then thinning the mixture with kerosene; heating another part of gilsonite, drying oil and rosin to a temperature of just below the polymerizing temperature of the drying oil and thinning the mixture with naphtha; blowing a semi-drying oil to increase its viscosity; blowing a drying oil: and mixing the four above mentioned substances together in a cold state and incorporating the asbestos fibre therewith.

5. Plastic compound comprising an intimate mixture of the following ingredients in substantially the proportions by weight, based on the whole compound, as follows: tung oil 1 per cent to 3 per cent; blown soya bean oil 3 per cent to 7 per cent; asbestos fibre 40 per cent to 48 per cent; and petroleum solvent 20 per cent to 24 per cent.

6. Plastic compound comprising an intimate mixture of the following ingredients in

substantially the proportions by weight, based on the whole compound, as follows: tung oil 1 per cent to 3 per cent; blown soya bean oil 3 per cent to 7 per cent; blown castor oil 0.34 per cent to 1 per cent; asbestos fibre 40 per cent to 48 per cent; and petroleum solvent 20 per cent to 24 per cent.

7. A durably plastic adhesive composition of matter comprising an intimate mixture of the following ingredients: solid petroleum base asphaltum, gilsonite and liquid petroleum asphaltum dissolved in a light petroleum solvent; a drying oil rendered viscous by heating; and asbestos fibres.

8. A durably plastic adhesive composition of matter comprising an intimate mixture of the following ingredients: solid petroleum base asphaltum, gilsonite and liquid petroleum base asphaltum dissolved in a light petroleum solvent; tung oil rendered viscous by heating; a blown semi-drying oil; and asbestos fibres.

9. A plastic composition containing a mixture of asphaltum dissolved in a light petroleum solvent; tung oil rendered viscous by heating; another blown drying vegetable oil; and finely divided fibrous material dispersed in the above stated mixture.

10. Method of making a plastic composition which comprises: dissolving a portion of asphaltum in a light petroleum solvent; heating another portion of asphaltum with tung oil to a temperature slightly below the polymerizing temperature of the oil and dissolving the mixture with a petroleum solvent; blowing a drying oil to give it viscosity; and mixing the foregoing products with a finely divided fibrous material.

11. Method of making a plastic composition which comprises: dissolving a portion of asphaltum in a light petroleum solvent; heating another portion of asphaltum with a drying oil to a temperature slightly below the polymerizing temperature of the oil and dissolving the mixture with a petroleum solvent; blowing another portion of drying or semi-drying oil to make it viscous; and mixing the foregoing products with finely divided fibrous material.

12. A durably plastic compound comprising an intimate mixture of ingredients in proportional quantities, by weight based on the compound, as follows: a drying oil 18 per cent to 22 per cent; a nondrying oil 28 per cent to 32 per cent; asbestos fibres 40 per cent to 48 per cent.

13. A durably plastic compound consisting of an intimate mixture of ingredients in proportional quantities, by weight based on the compound, as follows: a drying oil 18 per cent to 22 per cent; a nondrying oil 28 per cent to 32 per cent; asbestos fibres 40 per cent to 48 per cent; and a mineral pigment approximately 5 per cent.

14. A durably plastic compound comprising an intimate mixture of ingredients in proportional quantities, by weight based on the compound, as follows: tung oil 18 per cent to 22 per cent; castor oil 28 per cent to 32 per cent; asbestos fibres 40 per cent to 48 per cent.

15. A durably plastic compound consisting of an intimate mixture of the following ingredients in substantially the quantities, by weight based on the compound, as follows: tung oil 20.33 per cent; castor oil 29.26 per cent; short asbestos fibres 44.71 per cent; mineral pigment 5.70 per cent.

16. Method of manufacturing the compound of claim 13 which consists in heating the drying oil to a temperature of approximately 425° F. and then mixing the drying oil thus made viscous with the non-drying oil, asbestos fibre and pigment.

ARTHUR B. CHAPIN.