Patented Apr. 12, 1938 2,113,794

UNITED STATES PATENT OFFICE

2,113,794

ROAD SURFACING PRODUCT

Pierre Marcel André Léauté, Puteaux, France, assignor to Societe de Recherches et de Perfectionnements Industriels, Puteaux, France, a corporation of France

No Drawing. Application January 9, 1934, Serial No. 705,919. In France January 9, 1933

3 Claims. (Cl. 106—31)

This invention relates to a process and product for use in the surfacing of roads and more particularly to an improved process for preparing such a product.

The word "tar" is hereinafter used in its widest sense, that is to mean a totally or partially non-gaseous distillate of coal, wood, petroleum, shale or similar materials. The terms "tar-pitch" and "tar-bitumen" are used hereinafter to mean respectively a mixture of tar and pitch or a mixture of tar and bitumen.

It is known more particularly for the surfacing of roads to use tars with additions of bitumen or pitch incorporated in the tar by melting it. The rate at which this addition is made varies according to the initial content of pitch in the tar; to obtain good results, it is the present practice to add a total content of approximately 70 to 75% of pitch or bitumen to the mixture tar-pitch or tar-bitumen. This addition of melted bitumen or pitch involves an additional expense. Furthermore, the incorporation in the tar of melted bitumen or pitch requires a complicated process, as the fusion of bitumen or pitch can only be effected at substantially high temperatures and requires a rather long time.

It has been found preferable to incorporate the bitumen or the pitch in a solid state in the form of fine powder rather than in the melted state. However, difficulty is encountered in incorporating with the tar finely divided bitumen or pitch owing to the easiness with which these last matters reagglomerate. It has been found that the last mentioned difficulty may be eliminated by incorporating with the tar a powder also containing in addition to the pure bitumen or pitch, a coal filler.

According to the invention the coal filler is incorporated in substantial quantity, its proportion comprising between 10% to 40% of the total volume of the product.

The part played by the coal filler in the final product is very important because the coal far from being an inert filler, substitutes partially in the product for the pitch or bitumen as a road surfacing material so that the pitch or bitumen content of the product can be lowered to a very great extent with respect to that of tar-pitches or tar-bitumens used without "filler", which as a result effects, in addition to the technical advantages hereinafter described, a considerable economy.

One method of carrying out the process according to the invention is hereinafter described by way of example.

A mixture of 90% of coal and 10% of dry bitumen is finely pulverized; this mixture is incorporated at about 50° C. with a tar containing only about 55% of pitch in the approximate proportion of 55 parts by volume of the tar to 45 parts by volume of powdered coal-bitumen. If the bitumen is melted by heating this product at about 100° C., either in the spreading or pouring apparatus itself or before introducing the product, a mass is produced containing in addition to its natural pitch about 5% of bitumen and 40% of coal "filler". A modification in the process hereinbefore described consists in replacing the 10% of bitumen by 10% of coal pitch, and in this case the process hereinbefore described results in the example set forth in a product consisting of 60% of tar rich in pitch and 40% of coal filler. There are cases where tar previously enriched with bitumen or pitch is easily obtainable; such is especially the case where plants are available for incorporating bitumen or pitch with tar and where it is desired to continue to use them. The products of the process of the invention can then be obtained by incorporating the coal filler alone with an enriched tar-bitumen or tar-pitch mixture, previously produced in existing plants. Thus for example an excellent result is obtained by first preparing a mass containing 12 to 15% bitumen and 88 to 85% of dehydrated coal tar and then incorporating in this mass a coal filler in such proportion that the final mixture contains 35 to 40 parts by volume of the filler per 100 parts by volume of the total. This product has so low a viscosity that it can be poured by pulverization upon the road at a temperature of about 150° C. by the apparatus usually employed for surface spreading.

Anther example is that in which tar previously enriched with coal-pitch without bitumen is first prepared. Such tars enriched with pitch are obtained either in carrying out the ordinary dehydration of coal tars beyond simple dehydration in such manner as to increase the proportion of pitch with respect to oils, or by reconstituting synthetically a tar rich in pitch by mixture with middle or heavy oils and pitch. Such tars are known as "prepared" tars. Similarly tars which naturally or artificially have a pitch or bitumen content greater than or equal to 65% are known as "tar-pitches" or "tar-bitumens".

If the tars employed contain a quantity of pitch equal to 65% at least of the tar-pitch mixture the products according to the invention may be obtained by the incorporation with these tars of a coal "filler" in the proportion of 30 to 40%

of the volume of the final mixture, without other addition of pitch; if these tars contain less than 65% of pitch, the products according to the invention may be obtained by the addition of pitch (or of bitumen) in the desired proportion to attain or exceed the content of 65% hereinbefore indicated, the incorporation of pitch or bitumen being effected either in the melted state or preferably in the pulverized state in mixture with the powdered carbonaceous filler, or again they may be obtained according to another process which is hereinafter described. To mix the "filler" with bitumen or pitch, the bitumen or pitch may be liquefied by means of a solvent having a boiling point below 100° C. and then poured the bitumen or pitch thus rendered fluid into an aqueous liquor containing a coal filler more or less pure. The bitumen or pitch thus rendered fluid is intimately mixed with the coal and in the raising of the temperature between the boiling point of the solvent and that of water permits of the recovery of the solvent. Complex grains of bitumen (or of pitch) and of coal (these two bodies being for example in the proportion of 15 to 25 for the bitumen or pitch against 85 to 75 for the coal) are then formed, which are so large and hard as to be easily separable from the aqueous liquor, then dried.

According to the circumstances these complex grains are left as they are or then separated afresh by pulverization, and are utilized according to the process hereinbefore described for their incorporation with tar.

An interesting case is that where the tar used is tar from the distillation of coal at low temperature, produced either in the manufacture of gas in the Glower West or Woodall-Duckham vertical retorts, or in the distillation of coal below 750° C. for the manufacture of anthracite substitutes, etc. Or again, the case where this tar is derived from crude petroleum: in these different cases it is necessary as has been hereinbefore described to add tar insufficiently rich in pitch or bitumen of the quantity desired of pitch or bitumen in order to obtain the minimum content of 65% of pitch and bitumen in the tar-pitch or tar-bitumen mixture.

A particular case consists in starting with a tar very poor in pitch, for example, a middle or heavy oil (creosote, anthracene oil, etc.) and to obtain the minimum content of 65% hereinbefore indicated with bitumen only or with petroleum pitch to the exclusion of pitch from coal.

In an example products conforming to the invention which have given good results have been obtained in the form of a mixture comprising 60 to 65% of a tar-bitumen (itself formed of a mixture of 85% of bitumen or of petroleum pitch and of 15% of creosote) and from 35 to 40% of coal filler. This product may be spread on the road almost under the same conditions as the bitumen or the petroleum pitch which enters to the extent of 85% into the composition of the tar-bitumen hereinbefore referred to, but it has over it the advantages hereinafter described of the products according to the invention.

Another particular and very important case is that in which there are utilized materials which by reason of their high viscosity do not lend themselves without special precautions to the incorporation of the optimum percentage of filler. There is advantage, however, of incorporating the maximum possible amount of filler for carrying to their maximum also the advantages hereinafter described that the filler gives to road surfacing. In the case of the coal filler, the optimum percentage is that which corresponds to the proportions of 35 to 45 parts by volume of filler per 65 to 55 parts by volume of tar; the percentage of 40 parts by volume of coal filler per 60 of tar is specially advantageous. Notwithstanding this high content of filler the mixture should maintain at the temperatures of spreading which are always used (about 75 to 125° C.) a viscosity curve in the neighbourhood of that of tars at the same temperatures, so that it is possible to employ for spreading existing apparatus without appreciable modification.

This offers no difficulties if the incorporation is effected in a sufficiently fluid tar. On the other hand certain tars specially among the "prepared" tars create difficulties because they are too viscous owing to the fact that the proportion of oil has been taken away to too great an extent in the course of their preparation. This is especially the case with tars whose viscosity, measured in accordance to the French Ecole des Ponts & Chaussées method, is higher than about 30 seconds at a temperature of 18° C. If to such tars a proportion of about 40% of filler be incorporated, the mixture obtained becomes too viscous to be spread at the usual temperatures for spreading. To avoid this disadvantage without being obliged to reduce the filler content, or to increase the temperature of the product, which would be prejudical to the quality of the product, it has been found that the viscosity of the product may be sufficiently lowered by adding to the mixture a fluxing oil in the proportion, comprising between 0% and 10% of the total volume of the product. For instance, a mixture of 55% of very viscous tar with 40% of coal filler and 5% of fluxing oil, will be easily spreadable while presenting all the quantities acquired by the incorporation of the coal filler.

The fluxing oil may be a middle oil derived from the carbonization of coal but it can also be an oil derived from petroleum, from shale and the like. Fuel oil especially gives good results. The evaporation of the volatile constituents after the spreading of the product is then effected more slowly and the tar "filler" thus constituted has almost the same characteristics as those of a bitumen.

The addition of fluxing oil to the product avoids the difficulty encountered in the case where it is necessary to use as a filler, a coal inappropriate for this purpose, for example, a coal which loses certain of its constituents in a colloidal solution at a low temperature, for example of 125° C.; owing to the fluxing agent the mixture possesses a viscosity suitable for pouring or spreading at a temperature, sufficiently lower than that at which the colloidal solution takes place.

The product according to the invention is applied in the first place to the re-surfacing of roads either as the first surfacing or as a repairing surface; the pouring or spreading is done by gravity, by pulverizing under pressure, by centrifuging or the like and may be completed by the pouring or spreading of gravel and by rolling. The road surfaces thus obtained have the advantage that they dry rapidly, do not then sweat, become hard, breakable and friable only after a much longer time than when tar is used alone. Moreover, because of the high content of coal filler which reduces to a minimum the proportion of tar in the surfacing substance the gravel is embedded less quickly in the mass so that the surfacing has remarkable anti-slip properties.

The invention is applied also to tar macadams, to bituminous concretes, and to all other similar products. A particular case where excellent results can be obtained is that in which the filler is obtained by fine pulverization (for example to a 100 mesh) from a coal of low ash content and rich in volatile matter.

What I claim is:

1. A fluid product for the surfacing of roads spreadable in a thin layer at a temperature of between 75° C. and 150° C., constituted by a mixture of a bituminous body chosen from the group tar-pitch and tar-bitumen, with a high proportion of a finely pulverized coal filler comprised between 10% and 40% of the total volume of the product, said coal filler forming a stable suspension in the bituminous body without solution of the constituent parts of its particles.

2. A fluid product for the surfacing of roads spreadable in a thin layer at a temperature of between 75° C. and 150° C., constituted by a mixture of tar-bitumen containing at least 65% bitumen, with a high proportion of finely pulverized coal filler comprised between 10% and 40% of the total volume of the product, said coal filler forming a stable suspension in the tar-bitumen without solution of the constituent parts of its particles.

3. A fluid product for the surfacing of roads spreadable at a temperature of between 75° C. and 150° C., constituted by a mixture of tar-pitch containing at least 65% pitch, with a high proportion of finely pulverized coal filler comprised between 10% and 40% of the total volume of the product, said coal filler forming a stable suspension in the tar-pitch without solution of the constituent parts of its particles.

PIERRE MARCEL ANDRÉ LÉAUTÉ.