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[54] **SURFACE LAYER FOR ROADWAYS AND A PROCESS FOR PREPARING SAID LAYER**

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[51] **Int. Cl.**[2] **E01C 11/24**

[58] **Field of Search** ..... 404/17, 19, 20, 72, 82; 106/281 R, 273 R

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[57] **ABSTRACT**

The invention concerns a new liquidtight rough surface layer for roadways, for example roads and highroads, and the process for preparing said surface layer.

According to this process there are spread in the hot state on the roadway about 4–20 kg/sq.m of a grout comprising, by weight, about 12–30% of a hydrocarbonaceous binder, about 20–40% of filler, and about 30–60% of fine sand, and, immediately after the spreading of the grout and before the cooling thereof, projecting on its surface hard granulates or particles constituting gripping elements.

2 Claims, No Drawings

SURFACE LAYER FOR ROADWAYS AND A PROCESS FOR PREPARING SAID LAYER

The present invention relates to a new type of surface layer for roadways, in particular roads and highways or motorways, whereby it is possible to conciliate properties which were heretofore incompatible, such as the roughness, the liquidtightness and the resistance to heavy traffic, even in the early part of its life, for a relatively low cost compared to that of conventional layers. The invention also concerns a process for preparing said surface layer.

Faced with the high number of accidents due skidding, specialists have considered this problem but have not found satisfactory solutions up to the present time.

The conventional solutions belong to two types:

1. The surface layers in which there is spread on the roadway a hot fluxed bitumen or a cold emulsion of closely similar doses of 1 kg/sq.m of residual binder, and then, immediately after, the layer of binder is covered with gravel which are adhered by the binder.

These surface layers are cheap and they have in the early part of their life good roughness but they are rarely very liquidtight and above all, they cannot be employed on roadways having a large traffic of vehicles owing to considerable projection of gravel. Upon aging, the binder rises in the skeleton constituted by the gravel and they loose their roughness.

2. The type which is the most usually employed on roadways having a large traffic or vehicles is constituted by a mixture of gravel, sand and filler coated with hydrocarbonaceous binder and spread in the hot state at thicknesses of 3 to 20 cm.

This method has afforded users up to the last few years an even surface having a correct profile. But with increase in the traffic of vehicles this surface rapidly becomes polished. It must be renewed at high expense and, above all, the aforementioned coated product is, owing to its method of manufacture and the manner in which it is employed, either impermeable but has low roughness or permeable but has a roughness which could be improved.

Now, the liquidtightness is essential to good performance of the roadway and the roughness is also essential to the safety of the user.

An object of the present invention is to provide a new surface layer for roadways which conciliates liquidtightness with roughness and a process for preparing said surface layer.

The surface layer according to the invention comprises a layer of about 4–20 kg/sq.m of a solidified grout comprising by weight about 12–30% of a hydrocarbonaceous binder, about 20–40% of filler and about 30–60% of fine sand in which are set hard granulates or particles constituting gripping elements which project above said layer.

Another object of the invention is to provide a process for preparing the surface layer defined hereinbefore, comprising spreading in the hot state on the roadway 4–20 kg/sq.m of the grout defined hereinbefore and, immediately after this spreading and before the cooling of the grout, projecting the hard granulates or particles on its surface.

Further features and advantages of the invention will be apparent from the ensuing description.

According to the invention, there is first spread in the hot state on the roadway to be coated about 4–20 kg/sq.m of a grout comprising, by weight, 12–30% of a hydrocarbonaceous binder, about 20–40% of filler and about 30–60% of fine sand having preferably a particle size of 0.1–0.5mm.

The spreading is carried out preferably at a temperature between about 130° and 220°C.

The binder employed comprises advantageously by weight 60–80% of bitumen having a penetration of 20/**30** to 80/**100**, **10**–30% of heavy anthracenic oil or a chrysene oil (distilling for example between 250° and 400°C) and 2–10% of an elastomer such as butadiene-styrene polymer, butyl rubber, copolymers of ethylene and vinyl derivatives, chlorinated rubber etc.

The filler and the sand are materials conventional in this technique.

The grout must adhere to the subjacent layer and must not become unstuck upon cooling, which therefore presupposes a coefficient of expansion in the neighbourhood of that of the support. This is ensured by means of the filler and the fine sand introduced in sufficient proportions. The adherence and the good compatability with the support are obtained owing to the presence of the heavy anthracenic oil or chrysene oil in the bituminous binder. Although this means is the simplest and cheapest, the invention is not intended to be limited thereto. Thus, it is also possible to employ the conventional plasticizers of the binders for roadway surface layers. Moreover, the presence of such oils enables the temperature of the wetting of the granulates of the gripping layer and of the supports, and also the spreading temperature, to be lowered.

The binder must have at all the temperatures usually encountered on the roadway between −15° and +50°C, sufficient properties of cohesion to retain the surface granulates even in respect of heavy traffic circulation and intensity. This requires a binder which is not fragile at low temperatures and which remains sufficiently viscous at high temperatures to refrain from rising in the granulates which would reduce the roughness of the surface layer.

This may be achieved in accordance with the invention by the addition to the binder of an elastomer compatible with the bitumen. Among those mentioned hereinbefore, one of the most advantageous is the "Cariflex" (commercial name of a sequenced polymer of styrene and butadiene manufactured by the company Shell-Chimie).

As soon as the grout has been spread and before it has cooled, there are thrown onto its surface hard granulates adapted to serve as gripping elements for vehicles travelling on the roadway. It is advantageous that the amount of granulates spread represent from 70 to 75% of the surface to be treated, which avoids superimposition of granulates which would then be insufficiently adhered to the grout.

Although uncoated granulates may be employed, there are preferably employed granulates pre-coated by a conventional method with hard residual bitumen (having for example a penetration of 20/**30** to 60/**70** and advantageously 40/**50**) preferably employed in a proportion of about 0.5 to 1% by weight of the granulates.

This pre-coating may be carried out either in the cold state with cationic emulsions of bitumen or preferably in the hot state with bitumen which may have received a filler.

The pre-coating must be such that it does not allow the gravel to agglomerate which would have an adverse effect on an even spreading. On the other hand, it must permit the perfect gripping of the granulates by the surface of the binder. This may be attained either by employing cold materials in summer periods or hot materials in winter periods. The objective is to reach the suitable temperature for wetting and gripping for the system comprising the considered grout and the granulates.

The following examples, to which the invention is not intended to be limited, are given by way of an illustration of the invention.

EXAMPLE 1

There is spread on a roadway at a temperature of 150°C, 6 kg/sq.m of a grout comprising:

bitumen (penetration 40/50)	18.75	parts by weight
chryseneoil (250 to 400°C)	5	parts by weight
Cariflex	1.25	parts by weight
calcareous filler	25	parts by weight
siliceous sand 0.1/0.5 mm.	50	parts by weight.

After this spreading, the surface is gravelled with 10 l/sq.metre of granulates or particles of 12/16 mm pre-coated with 0.5% by weight of bitumen having a penetration of 40/50.

The granulates are at a temperature 60°C at the moment of application.

EXAMPLE 2

There are spread on a roadway 8 kg/sq.m of a grout comprising:

bitumen (penetration 60/70)	18 parts by weight
petroleum oil distilling beyond 300°C.	5 parts by weight
butyl rubber	3 parts by weight
calcareous filler	25 parts by weight
sand 0.1/0.5 mm.	49 parts by weight.

Immediately thereafter, there are spread over the surface 12 litres/sq.m of granulates or particles of 15/20 mm pre-coated with 0.5% by weight of bitumen having a penetration of 40/50.

The granulates are spread at a temperature of 100°C.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A liquidtight and rough surface layer for roadways comprising a layer of about 4–20 kg/sq.m of a solidified grout comprising, by weight, about 12–30% of a hydrocarbonaceous binder, which comprises, by weight, 60–80% of a bitumen having a penetration of 20/30 to 80/100, 10–30% of an oil selected from the group consisting of a heavy anthracenic oil and a chrysene oil, and 2–10% of an elastomer; about 20–40% of filler and about 30–60% of find sand; and hard granulates set in said grout layer and constituting gripping elements and projecting above said grout layer.

2. A surface layer as claimed in claim 1, wherein the elastomer is selected from the group consisting of a butadiene-styrene copolymer, an ethylene-vinyl derivative copolymer, a butyl rubber and a chlorinated rubber.

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