

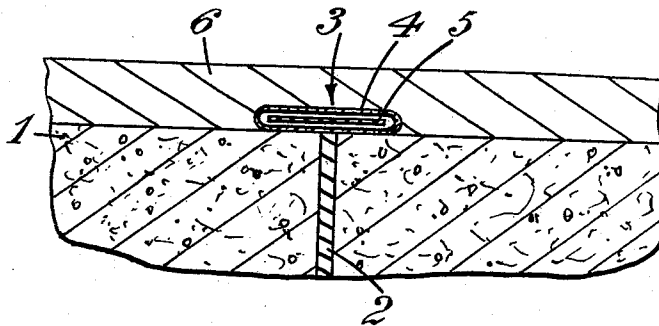
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ROADS AND THE LIKE

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1

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ROADS AND THE LIKE

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This invention is for improvements in or relating to roads and the like and is concerned with structures of the type comprising a concrete base layer and an adherent surface layer known as "black top" or "flexible pavement" which comprises a tarry or bituminous material.

Such roads are usually constructed by first laying a concrete base on a suitable foundation and after curing of the concrete applying a surface layer of a bituminous macadam or asphalt which is generally laid at an elevated temperature of about 193° to 250° C., or stone and the like coated with tar or cutback bitumen which may be laid at ambient temperatures. On setting, the surface layer adheres to the concrete base and forms the wearing surface of the road. If required, the degree of adhesion of the surface layer to the upper surface of the concrete may be increased by the application of a suitable adhesive material.

As concrete expands or contracts under the influence of temperature and climatic changes, it is the practice to provide transverse, and sometimes longitudinal breaks or gaps in the concrete base to allow freedom of movement without distortion of the base. Such breaks in the base are known as expansion joints and are usually filled with bituminous material. Further, during the curing and settling of freshly laid concrete, contraction occurs and undesirable breaks or cracks often appear in the surface of the base. These breaks also are usually filled with a bituminous material.

When a surface layer is applied to a concrete base having such breaks in its surface, the surface layer, in time tends to crack in positions corresponding to the underlying breaks due to relative movements of the concrete masses each side of the breaks.

Such cracks in the surface layer are most undesirable since they permit seepage of water beneath the surface layer and rapidly cause deterioration of the road surface and the foundation.

In British patent specification No. 812,215, there is described a method of surfacing a concrete base or foundation structure for a road or like construction wherein relatively thin metallic sheet material is laid over expansion gaps and/or cracks in the structure prior to the application of a surfacing layer to prevent the surfacing layer from adhering to the foundation structure in the vicinity of the gaps or cracks.

Although the method of the prior art is effective to some degree in preventing cracking of the surface layer there is scope for improvement since the surface layer is inclined to adhere to the metallic sheet material and expansion or contraction of the surface layer immediately above the sheet material is restrained.

An object of the present invention is to provide an improved means for reducing the tendency of the surface layer to crack when applied to a concrete base having breaks, for example expansion joints, in its surface.

Accordingly, the present invention includes a road or like structure comprising a concrete base layer and an adherent surface layer of a tarry or bituminous material wherein one or more breaks in the concrete base layer are each covered with a bridging member having at least on the upper surface thereof in contact with the surface layer, a polymeric material which is substantially resistant

2

to tarry and bituminous products and has a softening point above the temperature at which the surface layer is laid.

A preferred polymeric material for use in the present invention, particularly in respect of surface layers laid at elevated temperatures is polycaprolactam (known as Nylon 6) which has a softening point at about 221° C.

Examples of other suitable polymeric materials are the condensation product of hexamethylene diamine and adipic acid (known as Nylon 66) which has a softening point at about 277° C., polytetrafluoroethylene such as is marketed under the Registered Trademark "Teflon" and has a softening point at about 327° C., polychlorotrifluoroethylene such as is marketed under the Registered Trademark "Hostaflon" and has a softening point at about 221° C. and the polymer of 3,3 bis(chloromethyl) oxacyclobutane such as is marketed under the Registered Trademark "Penton" and has a softening point at about 210° C.

Such polymeric materials are found to be substantially non-adherent to tarry and bituminous materials so that the surface layer of the road or the like immediately above the bridging member is free to move with respect to the bridging member. It is found that this degree of freedom substantially prevents the cracking of the surface layer at places corresponding with underlying breaks in the concrete base layer. Further, the polymeric materials, apart from being unaffected by the elevated temperatures at which surface layers are usually applied and the aromatic and aliphatic products in the surface layers, are able to withstand prevailing climatic conditions for a considerable period without deterioration of their properties.

Polyethylene is unsuitable for use in the present invention, even when the surface layer is laid at ambient temperatures, since it rapidly deteriorates in the presence of aromatic and aliphatic hydrocarbons present in tarry and bituminous materials.

Where the break in the concrete is relatively small in width, the bridging member may consist of a single sheet of the polymeric materials although it is preferable to support the polymeric sheet with an underlying sheet of a suitable stiffening material such as a metallic sheet, for example of hard tempered aluminium or copper, which may be secured to the polymeric sheet and which is capable of withstanding the elevated temperature to which it may be subjected during the laying of the surface layer and capable of withstanding the climatic conditions without substantial deterioration.

In a further form of the invention, the bridging member comprises a length of flattened tubing of the polymeric material which is laid with its longitudinal axis parallel with the break in the concrete base layer. However, in the preferred form of the invention the bridging member comprises a length of flattened tubing of the polymeric material having inserted inside the flattened tubing a sheet of a stiffening material capable of withstanding the conditions to which the bridging member will be subjected. The stiffening material minimises the sagging of the tubing over the break and may conveniently be a metallic sheet or foil of, for example, hard-tempered aluminium or copper.

The bridging member preferably overlaps each of the edges of the break by a distance at least equal to the width of the break.

The invention may also be employed in repairing roads where a crack has already appeared in a surface layer corresponding with an underlying break in the concrete base layer. In such a case, a strip of the surface layer is removed to expose the break and a strip of the concrete base either side of the break, a bridging member is laid over the break and the depression is then filled in with fresh tarry or bituminous material up to the level of the road surface.

The invention also includes a method of constructing a road or like structure comprising laying a concrete base layer followed by overlying with an adherent surface layer of a tarry or bituminous material wherein one or more breaks in the base layer are each covered prior to the application of the surface layer with a bridging member which overlaps the edges of the break, the bridging member having at least on the upper surface to be coated by the surface layer, a polymeric material which is substantially resistant to tarry and bituminous products and has a softening point above the temperature at which the surface layer is applied to the concrete base layer.

Following is a description by way of example and with reference to the accompanying drawing of a method of carrying the invention into effect.

Example

Referring to the drawing, which is a diagrammatic longitudinal section of part of a road, a concrete base layer 1, having an expansion joint 2 one inch in width and plugged with a bituminous material, was laid on a suitable foundation and after curing, a bridging member 3 was laid over the joint. The bridging member 3 consisted of a length of tubing 4 in the flattened state having a width of ten inches, a wall thickness of two thousandths of an inch and manufactured from polycaprolactam known as Nylon 6 which had a softening point at about 221° C. A stiffening member 5 consisting of a strip of hard tempered aluminium foil 0.005 inch in thickness and seven inches in width was enclosed within the tubing 4. The bridging member 3 was placed centrally over the joint 2 with its longitudinal axis parallel with the joint 2.

A surface layer 6 of asphalt, two inches in thickness, was then laid at a temperature of about 200° C. upon the concrete base layer 1 and over the bridging member 3 and was consolidated by rolling. On cooling, the surface layer 6 adhered to the base layer.

After a period of six weeks, it was observed that the surface layer 6 was continuous over the area of the expansion joint.

In a control section of the road where the procedure was repeated except that the bridging member 3 was omitted, it was observed that after a period of six weeks the surface layer 6 showed signs of cracking along a line corresponding with the expansion joint 2 beneath.

I claim:

1. A road structure comprising a concrete base layer having at least one break and overlaid with an adherent surface layer the adherent surface layer comprising a binding material selected from the group consisting of tar and bitumen, in which road structure at least one break in the concrete base layer is covered with a bridging member which overlaps the edges of the break, the bridg-

ing member having a synthetic polymeric material at least on the upper surface thereof in contact with the surface layer the synthetic polymeric material being non-adherent and substantially resistant to tarry and bituminous products and having a softening point above the temperature at which the surface layer is applied to the concrete base layer and being selected from the group consisting of polycaprolactam, a condensation product of hexamethylene diamine and adipic acid, polytetrafluoroethylene, polychlorofluoroethylene and a polymer of 3,3 bis(chloromethyl) oxacyclobutane.

2. A road structure as claimed in claim 1 in which the bridging member comprises a sheet of the synthetic polymeric material.

3. A road structure as claimed in claim 2 in which the bridging member is supported by an underlying stiffening member.

4. A road structure as claimed in claim 3 in which the stiffening member is a metallic sheet of metal selected from the group consisting of hard-tempered aluminium and copper.

5. A road structure as claimed in claim 1 in which the bridging member comprises a length of flattened tubing of the synthetic polymeric material.

6. A road structure as described in claim 5 in which a stiffening member is inserted into the length of flattened tubing.

7. A road structure comprising a concrete base layer having at least one break and overlaid with an adherent surface layer the adherent surface layer comprising a binding material selected from the group consisting of tar and bitumen in which road structure at least one break in the concrete base layer is covered with a bridging member which overlaps the edges of the break, the bridging member comprising a length of flattened tubing of polycaprolactam in which is inserted a sheet of hard-tempered aluminium.

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