UNITED STATES PATENT OFFICE.

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PLASTIC SURFACING MATERIAL AND THE PROCESS OF PRODUCING SAME.

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To all whom it may concern:

Be it known that I, JOHN C. MERTENS, a citizen of the United States, and a resident of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Plastic Surfacing Material and the Process of Producing the Same, of which the following is declared to be a full, clear, and exact description.

My invention relates to plastic surfacing material and to the process of producing the same, and its primary object is to produce a surfacing material, such as is suitable for use in paving roadways and the like, which shall be waterproof, tough, tenacious and dense, and yet malleable. Heretofore paving materials of this general class have been formed of a filler comprising rock, crushed stone, sand or gravel, or combinations of those substances mixed with a binder such as asphalt or other bituminous substances. In those paving materials the asphalt or bituminous substance acts merely as a binder between the surfaces of the rock, crushed stone, sand or gravel and cements them together as it were. It has also been proposed to use soil, clay or loam as a filler. The principal objection to pavements commonly in use, which employ a bituminous binder, is that when subjected to the rays of the summer's sun they become soft and plastic, and when subjected to cold weather, they become very brittle, and the surface breaks readily when subjected to traffic. It is the aim of the present invention to eliminate these objectionable features by providing a waterproof pavement capable of withstanding wide ranges of temperature, whereby the surface may remain even, smooth and unbroken, subject only to the wear occasioned by the traffic.

The invention consists therefore in a new and improved process of producing surfacing material, suitable for paving roadways and the like, which consists in combining pulverized or finely divided limestone (to which may be added a portion of finely pulverized shale) with a hot liquefied bituminous binder, and in the resulting material which is homogeneous, yet malleable, waterproof, tough, tenacious and dense, and consequently forms an ideal surfacing material for the purpose of paving roadways and the like.

In carrying out the present invention I take finely pulverized limestone, substantially free from sand, gravel, clay or soil, (to which may be added, if desired, a portion of finely pulverized shale), heat the same, and when hot impregnate the same with a hot liquefied bituminous binder, such as asphalt, by thoroughly mixing the ingredients. While the exact proportions of the ingredients employed are not essential to this invention, broadly considered, yet I have found that by using approximately 16 per cent. bitumen to 84 per cent. of finely divided limestone, most excellent results are obtained. After the composition has been thoroughly mixed, it may be compacted by pressure as for instance by rolling it to form a pavement, which is waterproof, homogeneous, tough and tenacious, dense yet malleable, absolutely dustless under friction and practically indestructible. I have found it desirable to use a high penetration asphalt, which is more readily absorbed by the filler and makes the resulting material malleable at all times and does not soften in summer, for the reason that the bitumen is wholly perfectly absorbed by the filler.

In order to obtain a uniform and complete impregnation with the hot liquefied bituminous binder, I have discovered that the filler, that is to say, the finely divided limestone, must be thoroughly dry, and in addition, must be hot when the binder is introduced. This material cannot be properly impregnated with the hot liquefied bituminous binder unless it is very finely pulverized and unless in a substantially dry condition.

In contra-distinction to the fact above mentioned, namely, that heretofore a bituminous binder merely acts to coat the pieces of rock, crushed stone, sand or gravel, and is left in a free state, I have discovered that when a hot liquefied bituminous binder is incorporated with a finely pulverized limestone, the resulting product becomes, when compacted, a waterproof, homogeneous, tough and tenacious substance, the binder being absorbed in the finely divided particles in such a way that it is not affected or caused to soften under high temperatures such as the heat of the summer's sun, nor is it affected by water, and the consequence is that a surfacing material composed of the substances specified and combined as hereinbefore described is not only waterproof and dustless, presenting a smooth and dense

surface at all temperatures, but positively retains the form given it when rolled or compacted into shape.

The process which I have described is independent of any particular machine or apparatus for carrying out the same, but the ingredients can be mixed in the ordinary asphalt plant. For commercial purposes, it is desirable to use pulverized limestone and shale, such as is now being manufactured by numerous cement plants throughout the country, inasmuch as this material is obtainable at such cement plants and is very cheap because of its being a raw material, and can be transported in open cars at a low cost. The only reason for combining the shale with the limestone is that all cement plants, in manufacturing raw material for cement, mix about 14 per cent. shale with the limestone; this shale is not necessary in the making of my roadway surfacing material, inasmuch as it does not benefit or injure the products in any way; in other words it may be added to the pulverized limestone or left out as is found convenient or expedient.

To those familiar with the art to which this invention pertains, it will be readily apparent that paving material produced in accordance with the above specified process and containing the materials specified, or their equivalents, more nearly approaches a state of perfection than any other paving material known at the present time, for the reasons that my present paving material is waterproof, tough and tenacious, dense and malleable and absolutely uniform because the pulverized limestone, after being heated, readily absorbs the hot bitumen when mixed therewith. With the use of finely pulverized limestone the resulting material does not fracture under the impact or friction of traffic, whereas in my experience I have found that the reason for other classes of bituminous pavements wearing out is that the mineral aggregate of which such roadway paving materials are composed, is a very hard, brittle substance such as rock, crushed stone, gravel or sand mixed with bitumen of apparently very low penetration, which becomes very hard and brittle under low temperatures, and the bitumen and mineral aggregates are fractured under the action of traffic, and are ground up into dust which is either blown or washed away. I am aware that it has been proposed to produce a surfacing material from soil, clay or loam mixed with asphalt, but the resulting material in my opinion, is not waterproof, since soil, clay and loam have a great affinity for water, and soon absorbs moisture and water, and the pavement becomes soft and plastic. I therefore disclaim the use of sand, gravel, rock, or crushed stone other than limestone or shale or soil as a base or filler for my surfacing material.

The process which has been particularly described admits of substitutions and variations of the ingredients and proportions, wherefore the right is reserved to all substitutes and ingredients and proportions as are equivalent to those which are mentioned in the appended claims.

I claim as new and desire to secure by Letters Patent:—

1. The process of producing surfacing material, suitable for paving roadways and the like, which consists in mixing together pre-heated, hot pulverized limestone and shale, substantially free from other rock, or crushed stone and sand, or soil, and hot liquefied bitumen in the proportion of 84 per cent. limestone and shale and 16 per cent. bitumen.

2. The herein described process of producing surfacing material, suitable for paving roadways and the like, which consists in mixing hot finely divided limestone and shale, substantially free from other rock or crushed stone and sand, gravel or soil, with pre-heated, hot liquefied bitumen, and thereby thoroughly impregnating the limestone and shale with the bitumen.

3. A new composition of matter, suitable for use in surfacing roadways and the like, comprising a filler composed exclusively of pulverized limestone and shale, and a binder of bitumen, all pre-heated and mixed together while hot, and thereafter compacted.

JOHN C. MERTENS.