

# UNITED STATES PATENT OFFICE.

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SURFACING MATERIAL AND PROCESS OF PRODUCING THE SAME.

1,008,433.

Specification of Letters Patent.

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No Drawing.

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*To all whom it may concern:*

Be it known that I, MICHAEL A. POPKESS, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented new and useful Improvements in Surfacing Material and Process of Producing the Same, of which the following is a specification.

My invention consists in a process of producing a water-proof surfacing material, suitable for use in paving roadways, etc., by combining, in the manner hereinafter specified, ordinary soil, clay or loam, as distinguished from crushed stone, gravel or sand, with a bituminous asphaltic binder, and in the resulting material which is homogeneous, dense yet malleable and water-proof, and hence forms an ideal yet economical material for the purposes intended. Heretofore paving or surfacing materials of this general class have been formed of rock, crushed stone, gravel or sand, or combinations of those substances, which have, of course, to be specially prepared and conveyed to the place of use, and are then mixed with a binder, such as asphalt or other bituminous substance. It has always been an accepted fact that earthy material *per se* is a waste product in permanent road or street construction, because of the difficulty in holding such material in place, and because it becomes dusty in dry weather and muddy in wet weather.

My invention consists in taking such earthy material and a bituminous binder and combining them in such a way as to form a waterproof substance, which, when compacted by pressure, is homogeneous, coherent, dense yet malleable, absolutely dustless under friction, and practically indestructible. As I have stated, surfacing materials of this class, have been usually formed of rock, crushed stone, gravel or sand, or combinations of those substances, mixed with a binder, such as asphalt or other bituminous substance, but in such cases the particles of rock or sand, whether large or very fine, are simply coated with the binder, which is held in a free state in the interstices between the particles of road metal, and becomes hard and brittle in winter and soft in summer. The binder so held soon wears away, especially under present conditions of rapid automobile traffic, leaving the

road metal exposed, to be ground up into dust, so that the surface rapidly disintegrates under traffic. I desire to particularly disclaim as my invention such processes of forming surfacing material. Attempts have also been made to produce a dustless and waterproof roadway by harrowing up the surface and sprinkling asphaltic base oils thereon, but experience has shown that only an imperfect admixture is obtained in that way, and that the surface is not durable, the oil only serving as a temporary dust layer. The earth, soil or loam, composing the surface of ordinary roadways, contains a large amount of moisture, in other words, is cold and damp, and, consequently, the bituminous binder, when the sprinkling method is followed, chills and congeals as soon as it comes into contact with the earthy material, the result of which is to cause it to mix unevenly with said material, so that the resultant surface is more or less ununiform, some portions having sufficient or too much binder and other portions having none or too little. In order to obtain a uniform and complete impregnation of the binder, I have discovered that the earthy material, must be substantially free from stone, gravel or sand, must be thoroughly dried, and in addition, must be hot and in a finely divided, practically dust-like state when the binder is introduced. Even ordinary loam or clay cannot be properly impregnated with the binder unless first very finely divided and unless in a substantially dry condition, because otherwise it will simply ball up into lumps which become coated with the binder, and there will not be a thorough and even incorporation or impregnation of the binder.

In contradistinction to the fact, above mentioned, that the binder merely coats particles of stone and sand, being held in a free state, I have discovered that, when a bituminous binder is incorporated with ordinary soil, loam or clay, substantially free from sand and the like, and practically all in the form of dry dust, it becomes, after being compacted, a homogeneous, coherent substance, the binder being no longer in the free state, but incorporated in such a way that it is not affected by or caused to ooze out under the heat of the sun. The consequence is that a surfacing material composed of this substance is not only water-

proof and dustless, presenting a smooth and dense surface, but will not soften under heat and retains its original form permanently.

5 The process which I have just described is independent of any particular machine or apparatus for carrying it out, but, for commercial purposes, it is desirable to use a machine which can be easily transported to or  
10 near to the place where the material is to be used.

It is desirable, I have found, that the earthy material should be so broken up or finely divided, as by repeated violent im-  
15 pact, that the particles will be reduced to substantially the form of flying dust, and the binder may be sprayed into the material while in such form, although this is not a necessary step in the process in order to ob-  
20 tain the desired result.

Having thus described my invention, what I claim is:—

1. The process of producing a homogeneous, water-proof and malleable material, suit-  
25 able for surfacing roadways and the like, which consists in taking ordinary soil, loam or clay, substantially free from sand and gravel, subjecting it to a disintegrating treatment, which reduces it to the fineness of  
30 dust, and impregnating it with a bituminous binder, whereby the binder is absorbed by the dust and the resulting material, after compacting, contains no free binder and will not crack or disintegrate under traffic.

35 2. The process of producing a homogeneous, water-proof and malleable material, suitable for surfacing roadways and the like, which consists in taking ordinary soil, loam or clay, substantially free from sand and  
40 gravel, subjecting it to a disintegrating action and at the same time to heat, thereby reducing it to the condition of fine dust, and impregnating it with a bituminous binder, whereby the binder is absorbed by  
45 the dust and the resulting material, after compacting, contains no free binder and will not crack or disintegrate under traffic.

3. The process of producing a homogeneous, water-proof and malleable material, suit-  
50 able for surfacing roadways and the like, which consists in taking ordinary soil, loam or clay, substantially free from sand and gravel, subjecting it to repeated violent im-  
55 pacts so as to break it up into fine dust, and impregnating it with a bituminous binder, whereby the binder is absorbed by the dust and the resulting material, after compacting, contains no free binder and will not crack or disintegrate under traffic.

60 4. The process of producing a homogeneous, water-proof and malleable material, suitable for surfacing roadways and the like, which consists in taking ordinary soil, loam or clay, substantially free from sand and  
65 gravel, subjecting it to repeated violent im-

pacts in the presence of heat, so as to break it up into fine dust, and impregnating it with a bituminous binder, whereby the binder is absorbed by the dust and the re-  
70 sulting material, after compacting, contains no free binder and will not crack or disintegrate under traffic.

5. The process of producing a homogeneous, water-proof and malleable material, suit-  
75 able for surfacing roadways and the like, which consists in taking ordinary soil, loam or clay, substantially free from sand and gravel, subjecting it to a disintegrating action which converts it into the form of fly-  
80 ing dust, and spraying it with a bituminous binder before it is allowed to settle, whereby the binder is absorbed by the dust and the resulting material, after compacting, contains no free binder and will not crack or  
85 disintegrate under traffic.

6. The process of producing a homogeneous, water-proof and malleable material, suit-  
85 able for surfacing roadways and the like, which consists in taking ordinary soil, loam or clay, substantially free from sand and  
90 gravel, subjecting it to a disintegrating action in the presence of heat whereby it is converted into the form of flying dust, and spraying it with a bituminous binder before  
95 it is allowed to settle, whereby the binder is absorbed by the dust and the resulting material, after compacting, contains no free binder and will not crack or disintegrate under traffic.

7. The process of producing a homogeneous, water-proof and malleable material, suit-  
100 able for surfacing roadways, etc., which consists in taking earthy material substantially free from sand and the like, disintegrating it until it is reduced to a fine dust,  
105 mixing it with a liquid bituminous binder and compacting it by pressure, whereby the material obtained forms a waterproof, dustless, homogeneous yet malleable coating, which will not disintegrate or deteriorate  
110 under the influence of traffic or temperature.

8. The process of producing a water-proof material, suitable for surfacing roadways, etc., which consists in taking ordi-  
115 nary soil, loam or clay, subjecting it to a disintegrating treatment which reduces it to that degree of fineness necessary for a thorough incorporation therewith and even distribution therethrough of a liquefied bi-  
120 tuminous binder, impregnating it with such binder, and then compacting it by pressure, whereby it becomes a coherent, homogeneous, dense yet malleable material, eminently adapted for the purposes intended.

9. The process of producing a water-  
125 proof material, suitable for surfacing roadways, etc., which consists in subjecting an absorbent earthy material, substantially free from sand and gravel, to a disintegrating  
130 treatment to reduce it to such a degree of

fineness as to render it capable of thorough incorporation with a liquefied bituminous binder, impregnating it evenly with such a binder and subjecting the resulting material to pressure, whereby it is rendered coherent, homogeneous and dense yet malleable.

10. As a new article of manufacture, a water-proof material suitable for use in surfacing roadways, and the like, the same being composed solely of absorbent earthy material, substantially free from sand and gravel, and a liquefied bituminous binder, intimately mixed and compacted together, the

earthy material being previously disintegrated to such a degree of fineness as to render it capable of absorbing and combining with the binder to form a coherent, homogeneous, dense yet malleable substance.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

MICHAEL A. POPKESS.

Witnesses:

R. W. MYERS,  
L. R. WRIGHT.