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ROADWAY AND METHOD OF MAKING THE SAME

Filed March 6, 1926

Fig. 1.



Fig. 2.



Fig. 3.



Fig. 4.

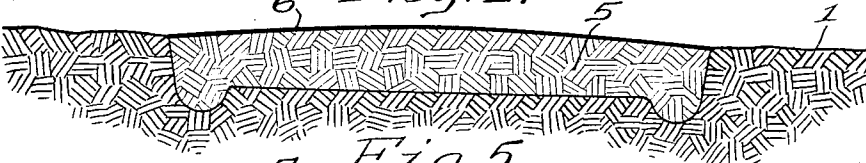


Fig. 5.



Fig. 6.

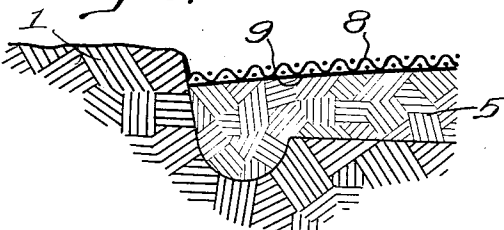


Fig. 7.

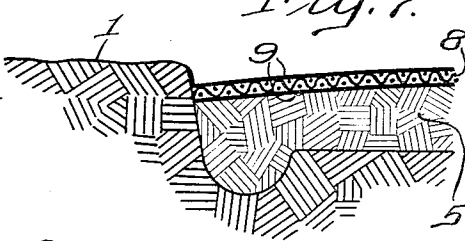
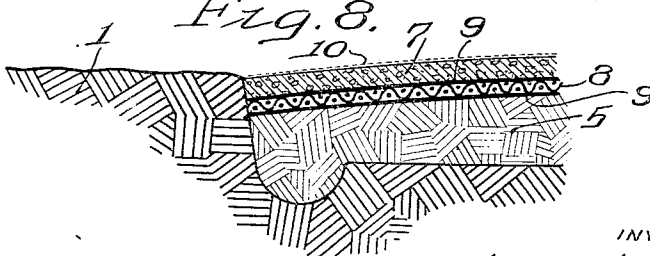


Fig. 8.



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ROADWAY AND METHOD OF MAKING THE SAME

Application filed March 6, 1926. Serial No. 92,954.

My invention relates to roadways for vehicular travel and to the method of making such roadways, particularly in those localities which may be remote from a source of stone suitable for the foundation or in a locality where an expensive stone or cement foundation is not warranted by the amount and kind of traffic which the road is designed to support and bear, for my invention has, among its objects, the utilization of the very materials that are removed from the earth to provide a space for the foundation of the roadway, as the foundation material upon which is laid a suitable surfacing material.

A further object of my invention is to so treat the ordinary earth and soils of the locality in which the road is to be laid as to make therefrom a foundation which will be a suitable and adequate substitute for a cement or rock foundation where, for good and sufficient reasons, the expense of a crushed rock or cement foundation is not warranted.

A further object of my invention is to make a good serviceable, highly satisfactory roadway which will support, without breaking down, comparatively heavy vehicular travel, at an exceedingly low cost of road material, freight and labor.

Other objects of my invention will appear in the specification and claims below.

In the drawings forming a part of this specification and in which the same reference characters are employed throughout the various views to designate the same parts,

Fig. 1 shows a section of land in which my improved road is to be made, the dotted line being an indication of the depth or level to which the earth is to be excavated and the part enclosed by the dotted line indicates the earth to be removed.

Fig. 2 shows the roadway excavated and the earth removed from curb to curb to form the roadbed.

Fig. 3 shows the manner in which drains may be further excavated on opposite sides of the road and adjacent the curbs where draining is necessary or desirable.

Fig. 4 shows the foundation filled in to the excavation shown in Fig. 3 and a surfacing applied to the top thereof.

Fig. 5 is a view similar to Fig. 4 but in which is substituted a heavier surfacing than that shown in Fig. 4.

Fig. 6 is a cross-sectional view of a roadway

in which the foundation is in place as in the previously illustrated forms but in which an expanded metal or chicken wire is laid over the entire surface of the foundation.

Fig. 7 shows the next step in the completion of the road illustrated in Fig. 6 wherein the chicken wire is covered with a layer of asphaltic material and is rolled to the foundation.

Fig. 8 shows the last step in the road illustrated in Figs. 6 and 7 wherein a surfacing of asphaltic paving, such as amiesite, is laid over the asphaltum coated chicken wire and united thereto and to the foundation by the intermediate layer of paving material with the metallic chicken wire or expanded metal incorporated therein.

The thickness of the reticular metal is, of course, greatly exaggerated in Figs. 6, 7 and 8 for the sake of clearness.

In carrying out my invention, I first excavate the earth 1 to form a shallow trench 2 to the full width of the road to be made, the excavation being, for example, to a depth of from 6 to 8 inches. Where, from the character of the land there is a liability of the presence of a good deal of water, I dig trenches, 3, 3 in the bottom of the excavation 2 along the sides thereof and next to the curb 4 to form side drains, as clearly shown in Fig. 2.

I then take the soil that has been removed from the roadway and heat it in any suitable manner, to a temperature of 200° C. to drive off a substantial amount of the water of the clay and other hydrous materials in the soil, for when the water of the clay and other hydrous mineral materials in the earth is so driven off or expelled, the change effected in the clayey materials so treated is practically a permanent one. The more or less anhydrous clay or similar materials thus produced does not again become hydrous upon exposure to water. They no longer become plastic when mixed with water, but water runs through them almost as freely as it does through a stone foundation.

The excavated soil may be heated to a temperature of substantially 200° C. by employing a revolving patch heater, using a blast of burning oil. These patch heaters are of well-known construction and need no further detailed description. However, the earth may be heated in any other convenient manner

to expel the water contained therein, and to thereby impart to the clay water resisting properties.

After having been so heated, the earth is spread upon the roadbed 2' and may be compacted in any suitable manner, as by rolling, tamping or ramming. When the excavation 2 has been provided with the trenches or drains 3, they are also filled with the heat-treated earth or soil so that the foundation 5 will extend the full width of the road from curb to curb.

The foundation is preferably made with a crown on the top surface thereof.

The foundation 5 of de-hydrated water-resisting or non-absorbent soil may be given a surface finish so as to make it better withstand the wear of traffic, to make it more readily shed or resist water, and to prevent the formation of dust.

I may, therefore, sprinkle upon the foundation, a water-resisting or repellent substance, such as zinc stearate, a very small quantity of which will greatly increase the water repelling properties of the heat-treated earthy material. Such metallic salts or fatty acids, keep the upper layers of dried treated soil free of water and non-plastic, they tend to prevent the absorption of water by the roadbed and when the surface is laid therein they contribute to a better bond between the foundation and the surfacing.

To further insure the prevention of the foundation 5 from becoming plastic and soluble, I may mix with the heat-treated soil, or I may treat the top surface of the foundation 5 after it has been put in place, with a small amount of slaked lime (either hydrated lime or air slaked lime) or with carbonate of lime.

The surfacing of the foundation 5 thus formed may be effected in a variety of ways dependent, to a great extent, upon the nature of the traffic to which the road will be subjected in the future. For light traffic, the surface of the foundation 5 may be provided by merely oiling the surface of the foundation 5. The foundation 5 having been formed and compacted, a road oil may be applied to the surface thereof. In Fig. 4, the finished road is shown as being provided with an oil surfacing 6. The road oil penetrates into the foundation and covers the surface particles with oil, so applied, thus forming a water-resisting, dust preventing surface.

For heavier traffic thereover, the surface may be coated with a heavier bituminous course or layer 7, by laying liquid asphalt or a thin coal tar pitch thereon and sprinkling the same with small stones, and rolling the same into the surface of the foundation, or the surface course 7, may be of the well known amiesite construction.

In the preferred form of my invention and in which the surface of the road is to be a permanent one and capable of withstanding

heavy traffic, I first place and form the foundation 5 of water resisting earths obtained, as above described, by heating the soil excavated in preparing the roadbed, and has been above described in connection with Fig. 4, and then I may place thereon sheets or strips 8 of expanded or woven metal. Chicken wire of about one inch mesh is very well adapted for the purposes of my invention when the broken or screened stone of the aggregate is of a size to pass through a $\frac{3}{4}$ inch mesh screen. But the size of the mesh or foraminous or reticular metal would vary somewhat with the sizes of the stones used in the aggregate.

The expanded or woven metal 8 is preferably galvanized to resist oxidation of the metal and so galvanized it would last for some time even if not subjected to further treatment, but in practice I prefer to coat the same thoroughly with asphalt, which is a water resistant, and will preserve the iron from rusting for a very long period of time.

The asphaltum covered or coated, reticulated metal is laid on the foundation 5 over the entire roadway and may be rolled into the foundation or left free between the foundation 5 and the top surfacing to be placed thereon. I prefer to lay the sheets or strips 8 on the roadway either coated with asphaltum or merely galvanized and to roll it into the surface of the foundation 5 after the surface has been sprinkled with a thin asphaltum composition 9 for in that way I may finally bind the metal fabric 8 to both the upper and lower courses or layers of the road.

Over the expanded metal or chicken wire 8 so placed, coated and rolled into the foundation, I provide the layer 7 or surfacing of several inches of asphaltic paving material, such as amiesite or screened broken stone so mixed with asphalt that every piece of the stone is completely coated with asphalt. This surfacing 7 is spread over the surface 9 cold and is rolled or tamped so that the fabricated metal 8 is united to the surface 7 and securely unites the foundation course 5 with the surfacing course or layer 7. A layer of sand 10 may be sprinkled over the upper course 7 and rolled into the upper course. I may sprinkle the surface of the upper course before or after the above rolling or compressing, with a hydrated lime and/or with carbonate of lime, and/or with stearate of zinc to harden the asphalt and increase the water resisting properties of the road.

The expanded metal or chicken wire fabric serves to lock, bind or hold together the two main layers or strata 5 and 7 of the road, but it also acts very effectively to distribute over a greater area or surface, the load passing over the road. The amiesite paving or a cold asphaltic pebble, or rock pavement is not a rigid paving. The pieces of rock are held in place by the asphaltic composition but

these pieces may move and yield slightly under a load. The wire netting or expanded metal distributes this load over a greater area of the foundation and holds the surfacing from spreading under the wearing pressure to which it is repeatedly subjected by vehicular traffic.

The heat treated earth foundation 5 acts substantially the same as a rock foundation. It permits any water which may be under the waterproof asphaltic surfacing to work its way out into the drain 3, and the drains 3 generally collect and allow any water which would otherwise enter under the surfacing from the earth at the sides of the roadway to seep or drain away. The water repellent materials, such as stearate of zinc, also check and to a great extent prevent water from entering the foundation course from the drains 3.

The lime or carbonate of lime, which may be added to the heat-treated earth also improves the bond between the courses of my improved roadway by its hardening or toughening action on the asphaltic materials.

It is to be clearly understood that the heating of the clayey earth to a temperature of substantially 200° C. is not merely for the purpose of drying or driving off the free water which may be mechanically mixed with the clay, but also for expelling water which is chemically united with and forms a part of the hydrous clay. When so heated properties of the clay are changed and the clay is rendered anhydrous or anhydrous in part, i. e., some of the water combined with the clay is expelled, and this change is substantially permanent. The clay does not go back to a hydrous condition on exposure to moisture, but remains water repellent and in this condition is suitable as the hard material content of foundation material.

Having thus described my invention, what I claim and desire to protect by Letters Patent of the United States is:

1. A roadway comprising a compact foundation course consisting of water-repellent clayey earth having intermixed therewith a relatively small quantity of stearate of zinc and a surface course of asphaltic paving material which does not require heating to be laid.

2. A roadway comprising a foundation course consisting of substantially anhydrous clayey earth having intermixed therewith lime and stearate of zinc, and a surfacing course of asphaltic material.

3. A roadway comprising a foundation layer or course consisting of dry clayey soil which does not substantially absorb water, a yielding surface layer of asphaltic composition, and a reticular sheet of metal coated with asphalt between said surface layer and said foundation and operative to bind the surface layer to said foundation and to dis-

tribute the load passing over said roadway over a relatively large area of said foundation.

4. A roadway comprising a foundation course consisting of the dry clayey earth excavated from the road to make the bed and which is substantially non-absorbent of water, a sheet of reticulate metal coated with asphalt and embedded in the yielding surface of said foundation course and a surface of asphaltic composition capable of being laid cold and containing aggregate, also embedded in the surface of said foundation and extending through the interstices of said sheet metal.

5. A roadway comprising a foundation course consisting of water-repellent clayey earth which will not become plastic when mixed with water and intermixed with a small quantity of stearate of zinc, a yielding surface course of asphaltic paving material capable of being laid cold, and a reticular sheet of metal binding said surface course to said foundation course and operative to distribute the load of traffic on said roadway over a relatively large area of said foundation.

6. The method of constructing a roadway in clayey soil which consists in excavating and leveling the soil to form a roadbed, heating the soil removed in making the roadbed to a relatively high temperature to render the same non-absorbent of water, placing a compacted course of said non-absorbent soil on said roadbed to form the foundation course or layer, increasing the water resisting properties of said anhydrous soil by adding thereto a small quantity of stearate of zinc and providing said foundation course with a bituminous wearing surface.

7. The method of constructing a roadway in clayey soil which consists in excavating and leveling the soil to form a roadbed, heating the soil removed in making the roadbed to a relatively high temperature to render the same substantially anhydrous, placing a compacted course of said substantially anhydrous soil on said roadbed to form the foundation course or layer, and providing said foundation course with a bituminous surface, placing on said foundation a reticular sheet of metal, coating said metal sheet with asphalt, and laying on said metal sheet a yielding surface layer of bituminous material.

8. The method of forming a roadway in clayey soil which consists in providing a roadbed, heating the soil removed in making said roadbed to a temperature of substantially 200° C., placing a compacted course of said soil, after it has been so heated, on said roadbed to form the foundation course, sprinkling asphalt over the surface of said foundation course, placing a reticular sheet of metal over the entire surface of said foundation course, rolling said reticular sheet into

the surface of said foundation course and then placing upon said reticular sheet a yielding surface course of bituminous material.

9. The method of forming a roadway in clayey soil which consists in providing a roadbed, heating the soil removed in making said roadbed to a temperature of substantially 200° C., placing a compacted course of said soil, after it has been so heated, on said roadbed to form the foundation course, sprinkling asphalt over the surface of said foundation course, placing a reticular sheet of metal over the entire surface of said foundation course, rolling said reticular sheet into the surface of said foundation course and then placing on said foundation over said reticular sheet a yielding surface course of bituminous material, and sprinkling hydrate of lime over said surface of the layer of bituminous material.

10. The method of constructing a roadway in clayey soil which consists in excavating the soil to form a shallow trench for the full width of the road, heating the soil so removed to a temperature of substantially 200° C., adding to the soil, after it has been so heated, stearate of zinc and hydrated lime forming a compacted foundation course in said trench of said anhydrous soil, placing on said foundation course a yielding surfacing of bituminous composition.

11. The method of making a road in clayey soil which consists of heating the earth removed in making the roadbed to a high temperature to change the clay and similar minerals therein, so that they will not become plastic in the presence of water, placing on the roadbed a compact foundation course of said earth, after it has been so heated, scattering over the foundation so placed a small amount of water repellent and asphalt hardening materials, applying to the surface of said foundation a yielding layer of bituminous material containing an aggregate and to the top surface of said upper bituminous course a layer of sand.

12. The method of making a road in clayey soil which consists in digging a shallow

trench in the earth to the depth of from six to eight inches and for the full width of the road to form a roadbed, digging deeper trenches at the sides of the roadbed adjacent the curb to form drains, heating the soil excavated in making the roadbed to substantially 200° C., placing on the roadbed a compact foundation course consisting of said soil, after it has been so heated, said course having a slightly crowned upper surface extending over the full width of the roadbed and filling said side drains, adding to the soil so placed relatively small quantities of hydrated lime and stearate of zinc, placing on the surface of said foundation course so formed a yielding surface layer of asphalt, sprinkling aggregate on the asphalt surface of said foundation and compacting said asphalt and aggregate by rolling.

13. A roadway comprising a foundation course of clayey soil which is non-plastic in the presence of water, a yielding wearing surface course of bituminous material, and a sheet of reticular metal, protected by an asphalt coating, lying between said course, and uniting said courses, and operative to distribute the load imposed on the surface course, over a relatively large area of said foundation, and to prevent said wearing course from spreading under the vehicular traffic to which the roadway is subjected.

14. A roadway comprising a foundation course of clayey soil and containing a small quantity of water repellent materials, a yielding wearing surface course of bituminous material, and a sheet of reticular metal, protected by an asphalt coating lying between said courses, uniting said courses and operative to distribute the load imposed on the surface course, over a relatively large area of said foundation course, and to prevent said wearing course from spreading substantially under the vehicular traffic to which the roadway is subjected.

In witness whereof, I have hereunto set my hand this fourth day of March, 1926.

SAMUEL S. SADTLER.