July 21, 1925. 1,546,540

C. R. HUNT

PROCESS OF SURFACING HIGHWAYS

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Fig. 1.

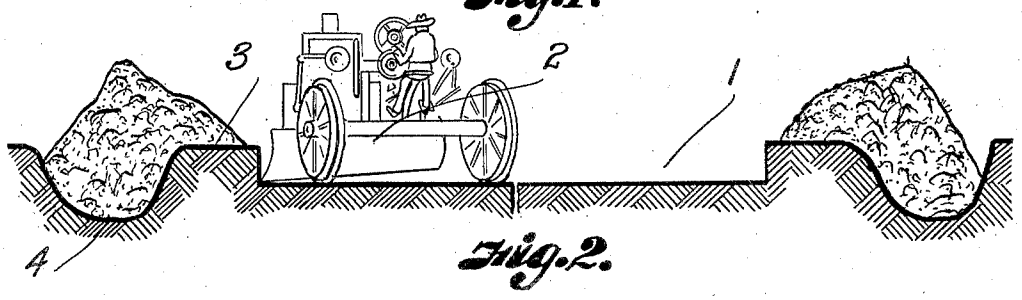


Fig. 2.

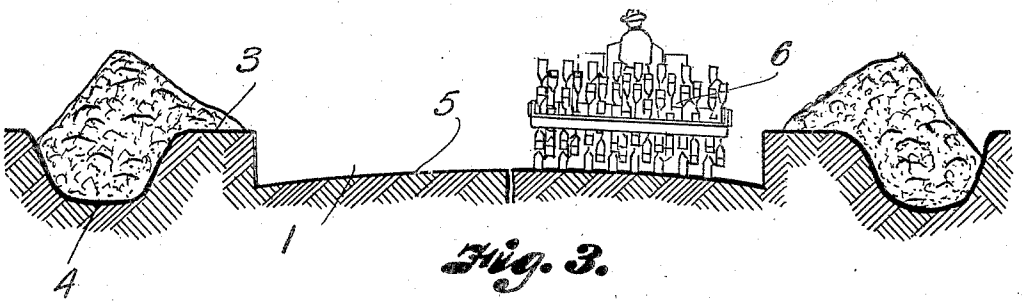


Fig. 3.

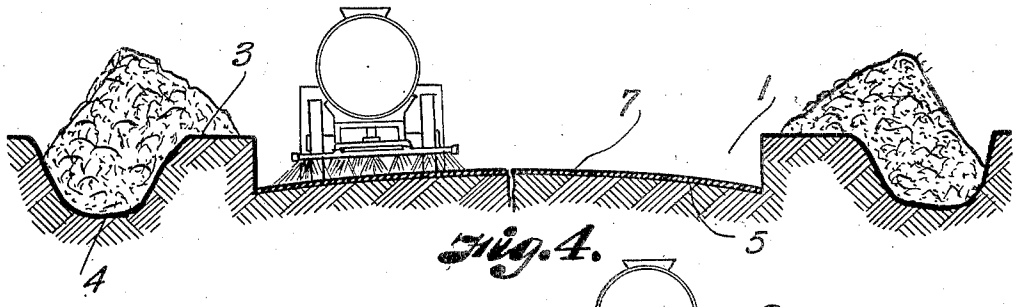


Fig. 4.

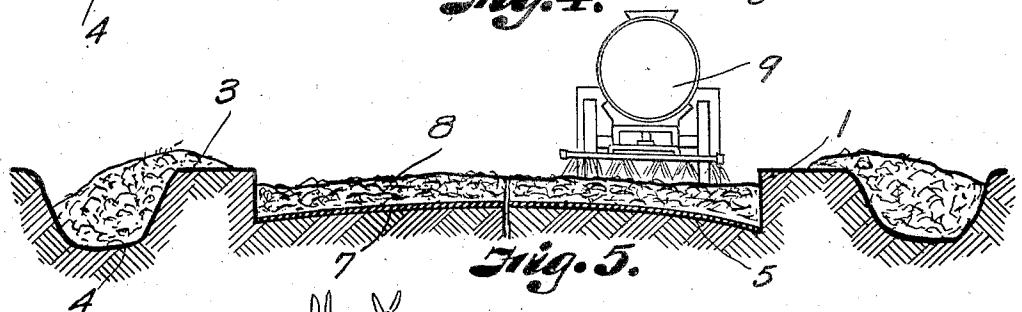
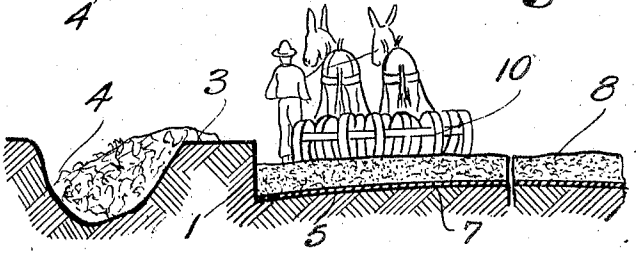


Fig. 5.



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Fig. 6.

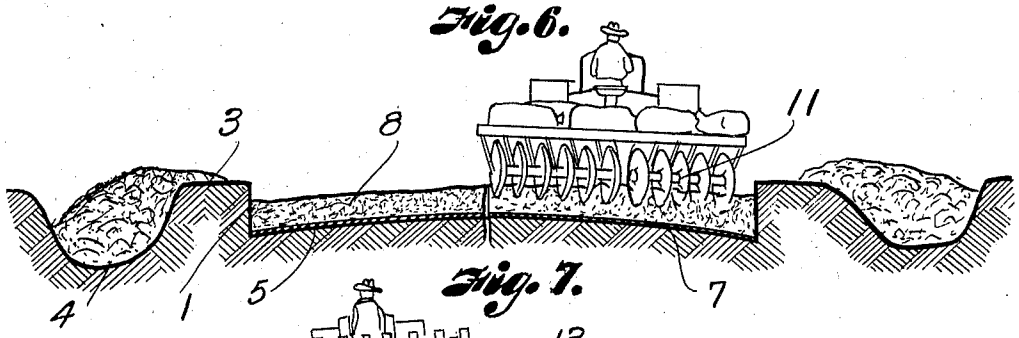


Fig. 7.

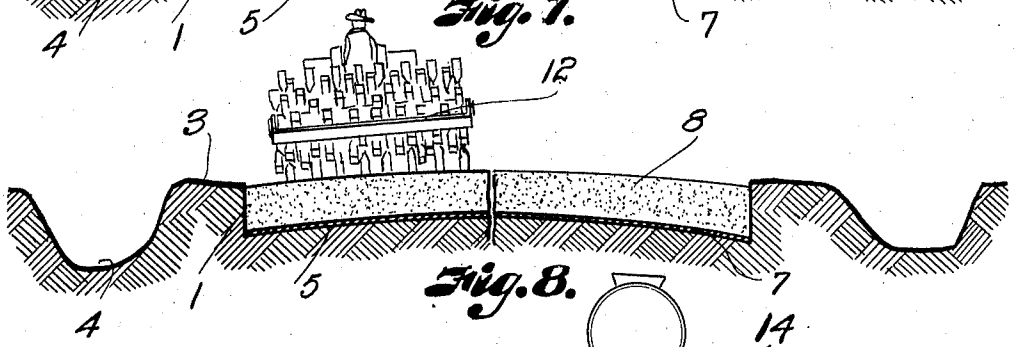


Fig. 8.

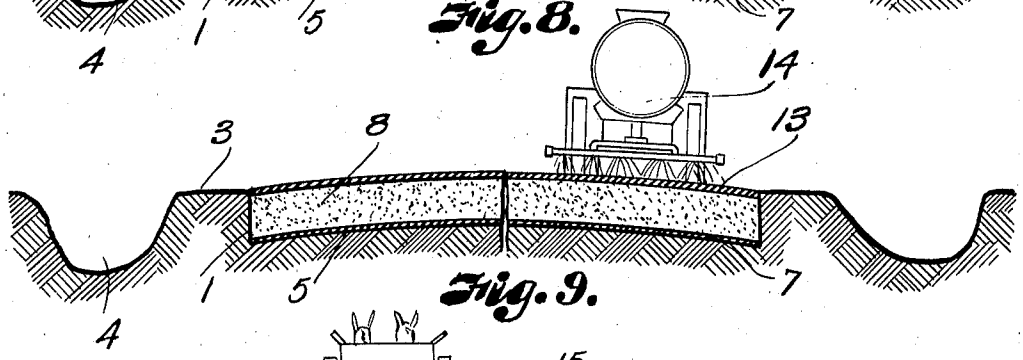


Fig. 9.

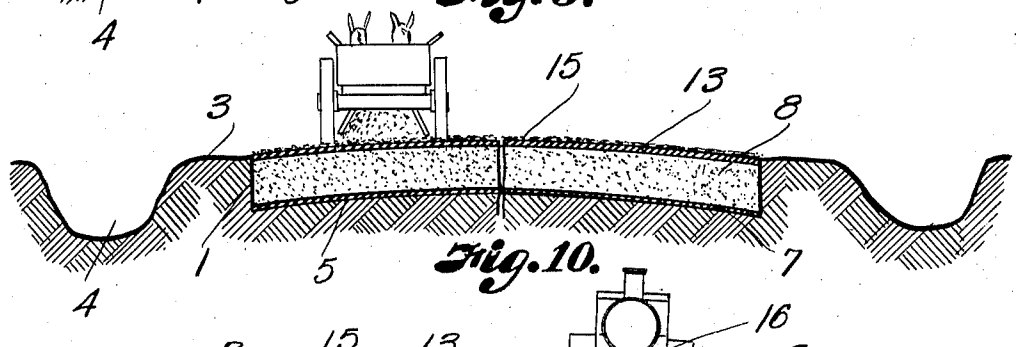
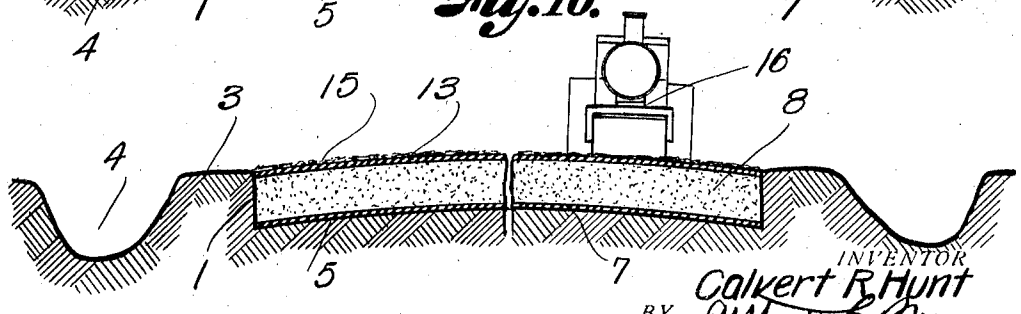


Fig. 10.



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Patented July 21, 1925. 1,546,540

UNITED STATES PATENT OFFICE.

CALVERT R. HUNT, OF KANSAS CITY, MISSOURI.

PROCESS OF SURFACING HIGHWAYS.

Application filed September 12, 1921. Serial No. 500,104.

To all whom it may concern:

Be it known that I, CALVERT R. HUNT, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in Processes of Surfacing Highways; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

This invention relates to highways and particularly to a method for making the same.

The primary object of the invention is to construct a highway, such as a road or the like, in a comparatively inexpensive manner but which will have considerable durability and which will have the characteristics of a hard, dry dirt roadway capable of resisting deterioration due to the elements.

It is the primary object of my invention to provide a method whereby the removed earth from the trench may be utilized as material for the highway and in order to prepare this material, I impregnate it with a binder impervious to moisture, then compact and confine it between two coats of sealing material, such as asphaltum or the like.

The novel manner of carrying out the invention will be apparent hereinafter, reference being had to the accompanying drawings, in which

Fig. 1 is a view showing the step of removing the earth from the trench.

Fig. 2 is a view showing the trench crowned and compacted.

Fig. 3 is a view showing the application of a layer of moisture-impervious material for closing the capillaries and voids.

Fig. 4 is a view showing some of the material redistributed into the trench and treated with a moisture-proof binder.

Fig. 5 is a view showing the material being turned over to mix the same with the binder.

Fig. 6 is a view showing the material being pulverized.

Fig. 7 is a view showing the mixed binder and earth being compacted or tamped.

Fig. 8 is a view showing the application of a sealing coat.

Fig. 9 is a view showing the application of a finishing coat, and

Fig. 10 is a view showing the highway being finally rolled.

In carrying out the invention I prefer to prepare a trench 1 by plowing to the desired depth and then pulverizing the plowed up earth which may be removed by a suitable means, as a road grader 2, and piled upon the shoulders 3 or in the side ditches 4 (see Fig. 1).

The trench is then crowned to give the desired curvature 5, as shown in Fig. 2, and this sub-grade 5 is then tamped or rolled, or both, until the surface ceases to yield. I prefer to use a tamping machine as indicated at 6 in Fig. 2.

When the crown or sub-grade has been suitably compacted, I apply a sealing coat 7 or stratum of material impervious to moisture to seal the capillaries and voids and thereby prevent moisture from working up into the body of the road bed to be subsequently laid. I find that liquid or plastic asphaltum admirably serves as a suitable medium for the sealing coat and I prefer to use asphaltum in the liquid form as it more readily spreads and associates itself with the crown.

The next step is to spread earth over the coat 7 in the form of a layer 8, shown in Fig. 4, preferably for several inches. Any suitable earth may be employed but for economy I may utilize the previously removed earth. Upon this earth thus laid, as shown in Fig. 4, I may apply a binder of suitable moisture-proof material as, for example, asphaltum, and this may be distributed by a spraying machine 9 of approved construction.

I have found that about one-fourth gallon per square yard of surface for each application is good practice.

After the first application of the binder, the material is turned over by a suitable means as, for example, a spring toothed harrow 10, as shown in Fig. 5, and then a disk harrow 11 may pass over the material to pulverize it. Then a second application of the binder is applied in the proportions of about one-fourth gallon per square yard. The material is again turned over with a spring toothed harrow and then pulverized

by the disk harrow 11 or by some other suitable means and the application of the binder, the spring harrow or its equivalent and the disk harrow or its equivalent is practiced until the requisite amount of binder is applied, say about three gallons per square yard. This amount may be varied, however, dependent upon the character of the earth forming the road bed.

When sufficient binder has been applied to the earth, it is kneaded by a suitable means, for example, a light tamping machine 12, shown in Fig. 7; a good example of tamping machine being shown in the patent to Ross and Deal, No. 891,954 of June 30, 1908. The teeth on the tamping machine, however, will have a relatively slight cross sectional area because the purpose at this stage of the process is to knead or thoroughly intermix the binder and the earth to impregnate the earth with the binder.

When the earth has been kneaded to the proper consistency, another stratum of earth is distributed over the surface and the steps outlined in Figs. 4, 5 and 6 are repeated, it being desirable, however, that the pulverizer for the second stratum will penetrate the first so that there will be an intermixed, homogeneous mass, forming the main body of the road and the kneading tamper will, by preference, penetrate the second stratum into the first to eliminate stratification of the applied applications of the earth and binder.

The applications of layers of earth and binder, as well as the turning over, according to Fig. 5 and the pulverizing, according to Fig. 6, with the kneading according to Fig. 7, may continue until the desired thickness of the road bed is reached. However, ordinarily, two applications will be sufficient.

When the final application of earth and binder has been applied, heavier tamping machines may be utilized to compact the material within the trench 1 and the tamping may continue until the road bed ceases to yield, which is usually indicated by the fact that the tamping machines ride to the surface of the bed. Then a sealing coat of suitable material, such as ashpaltum, is applied, preferably about one-fourth to one-half gallon per square yard of earth. The sealing coat 13 may be applied by a suitable machine, as indicated at 14, Fig. 8.

In finishing the road bed I prefer to apply a finishing coat of earth, sand, gravel or the like about one-half inch thick, as indicated at 15 in Fig. 9, spreading the same over the surface of the top sealing coat and rolling by a suitable machine, as indicated at 16 in Fig. 10. The highway is now finished.

An important step in the process is to thoroughly impregnate the earth with the asphaltum. The application of the asphaltum and the turning over by the harrows will not cause the earth to become impregnated with the binder. In order to effect an efficient impregnation it is necessary that the earth be thoroughly kneaded and I have found that a tamping machine having tools of relatively small cross section, which will penetrate through the mass, mechanically forces the binder into the earth so that an efficient impregnation takes place as distinguished from a mechanical mixture. When the earth has become impregnated, it will thoroughly compact and form into a hard bed, thereby providing an efficient highway.

By utilizing the earth removed from the trench as the main body of the road bed, the construction can be carried on at a relatively small cost and while I prefer to pulverize the material immediately after it is plowed and before it is thrown over on the shoulders or ditches to the side of the trench, this is not an essential step because the pulverizing may be conducted after the bottom sealing coat is applied to the trench and the earth moved back into it.

Attention is called to the fact that the tamping machines which compact the road bed tamp from the bottom toward the top because the tamping tool penetrates into the material and compacts it from the bottom progressively toward the surface at a uniform cross sectional density, the operation being finished when the tamping tools have floated to the top of the road bed due to the fact that the material ceases to yield under the action of the tools.

What I claim and desire to secure by Letters Patent is:

1. The method of building roadways consisting of forming a base by compacting the earth between the lines of the roadway and coating the compacted earth with waterproofing material, introducing earth and asphaltum onto the base, compacting the mixture of earth and asphaltum from the bottom upwardly by repeated tampings, and applying a sealing substance to the top of the compacted mass.

2. The method of building roadways consisting of forming a base by compacting the earth between the lines of the roadway and coating the compacted earth with waterproofing material, introducing earth and asphaltum onto the base, compacting the mixture of earth and asphaltum from the bottom upwardly by repeated tampings, applying more earth and asphaltum onto the compacted mass, harrowing through the upper layer into the lower layer of earth and asphaltum, compacting the upper layer from the bottom upwardly by repeated tampings, and applying a sealing substance to the top of the compacted mass.

3. The method of building roadways con-

sisting of forming a base by compacting the earth between the lines of the roadway and coating the compacted earth with waterproofing material, introducing earth onto the base, applying a binder to the introduced earth, harrowing the earth to pulverize the earth and mix the binder therewith, kneading and tamping the earth to complete the mixture of the binder therewith and compact the mixture from the bottom upwardly, and applying a sealing substance to the compacted mass.

4. The method of building roadways consisting of forming a base by compacting the earth between the lines of the roadway, introducing earth onto the base, applying a binder onto the introduced earth, harrowing the introduced earth to pulverize the same and mix the binder therewith, kneading and tamping the mixture to compact the same from the bottom upwardly, applying more earth and binder to the compacted mixture, harrowing through the upper layer of earth and asphaltum into the compacted mixture, compacting the harrowed material from the bottom upwardly by tamping, and applying a sealing substance to the compacted mass.

5. The method of building highways and the like, which consists in providing a trench, compacting the bottom of the trench to seal the capillaries therein, applying a sealing coat over the bottom of the trench, introducing earth into the trench, applying asphaltum to the earth, finely dividing the earth, kneading it to impregnate it with the asphaltum, compacting it from the bottom upward to uniform density, and applying a top sealing coat to the compacted mass in the trench.

6. The method of building highways and the like, which consists in removing earth to provide a trench, compacting the bottom of the trench, sealing the bottom of the trench with a material impervious to moisture, returning at least some of the removed earth into the trench, applying asphaltum to the earth, finely dividing the earth in the trench, kneading it to impregnate it with the asphaltum, compacting it to uniform density from the bottom upward, and applying a top sealing coat to the compacted mass in the trench.

In testimony whereof I affix my signature.

CALVERT R. HUNT.