No. 675,430. Patented June 4, 1901.

F. J. WARREN.

PAVEMENT OR ROADWAY.

(Application filed Jan. 9, 1901.)

(No Model.)

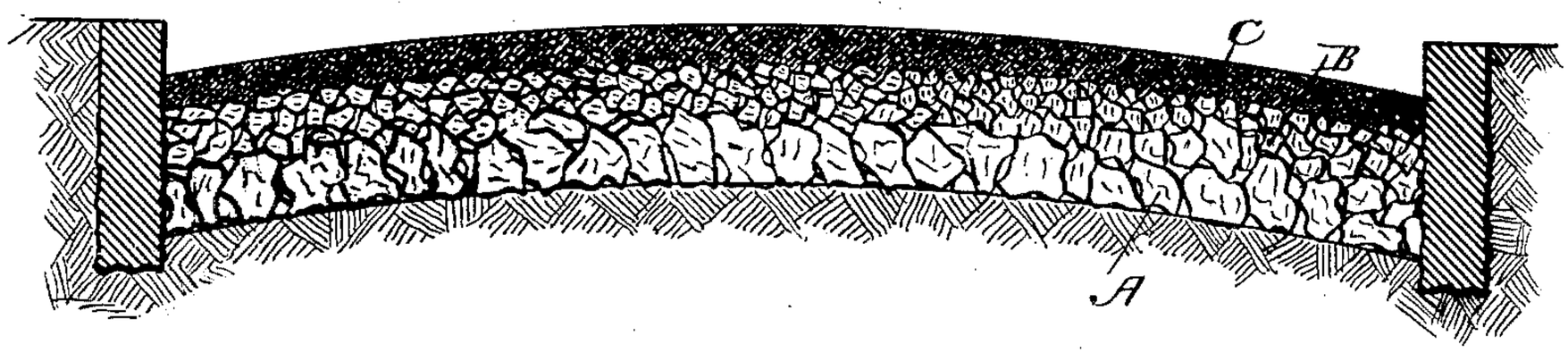

Fig. 1.

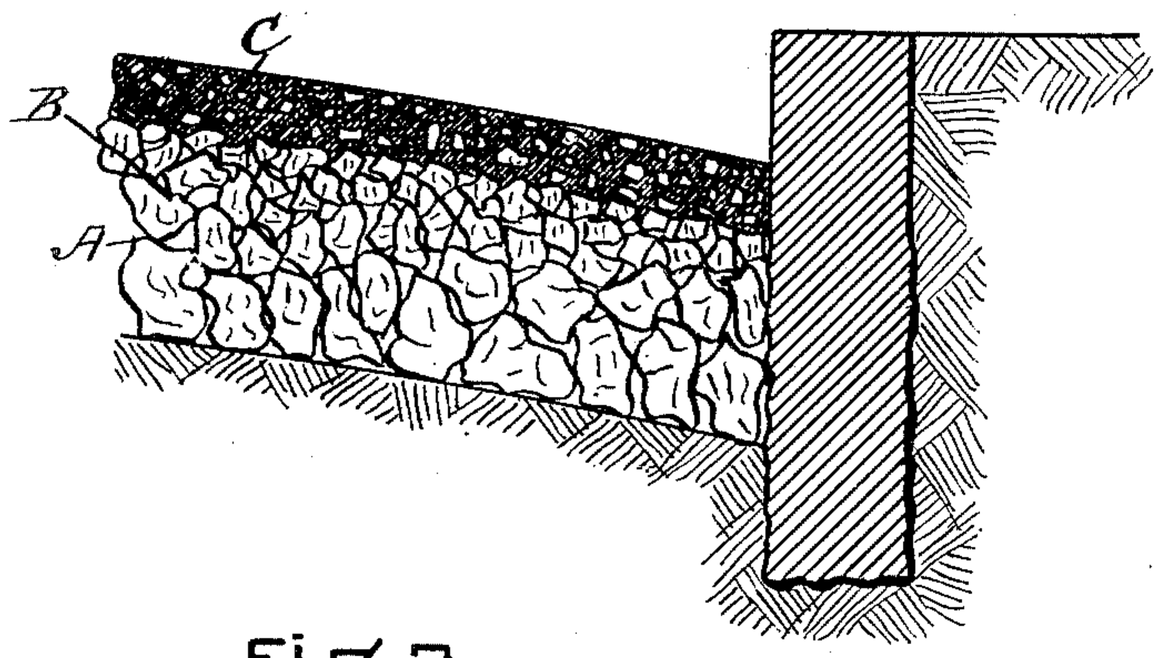

Fig. 2.

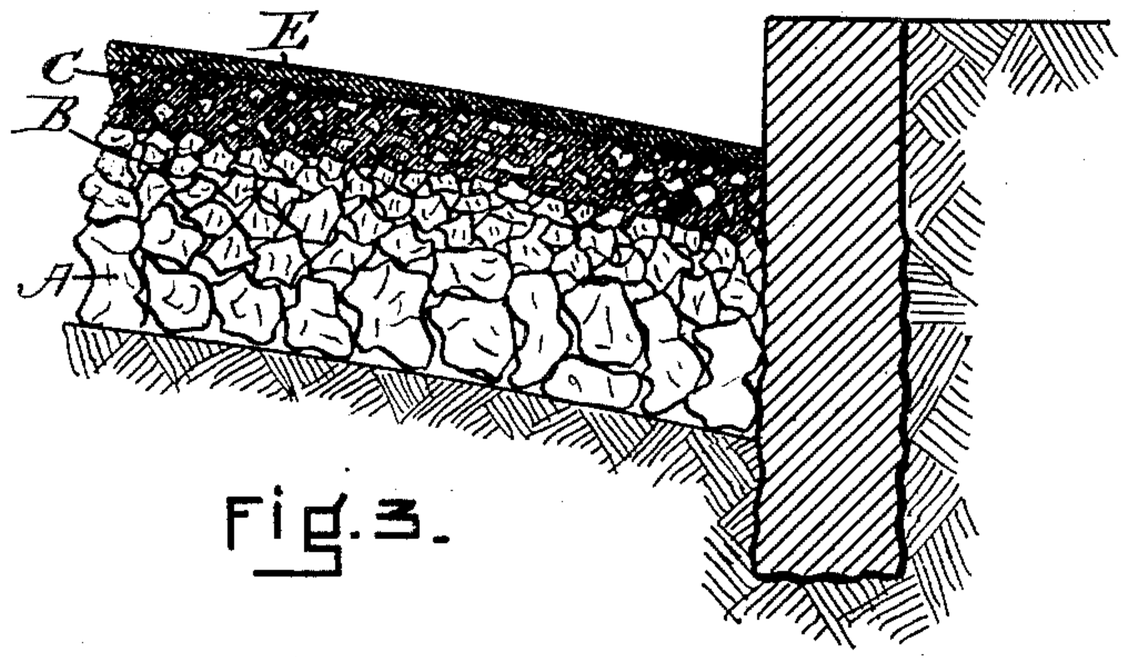

Fig. 3.

WITNESSES.

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PAVEMENT OR ROADWAY.

SPECIFICATION forming part of Letters Patent No. 675,430, dated June 4, 1901.

Application filed January 9, 1901. Serial No. 42,626. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK J. WARREN, a citizen of the United States, residing at Newton, in the county of Middlesex and State of Massachusetts, have invented a new and useful Improvement in Pavements or Roadways, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification, in explaining its nature.

The invention relates to a pavement or roadway having a foundation layer of stone such as is used in ordinary Macadam or Telford roads or a combination of the two, and upon which is arranged one or more layers of smaller stone coated or partly coated with coal-tar, coal-tar pitch, asphalt, or a mixture of them or other equivalent bituminous material, and which is thoroughly rolled preparatory to receiving a finishing or binding layer consisting of crushed or broken stone or gravel mixed with fine crushed screenings, sand, gravel, or other equivalent earthy matter in such proportion that the fine particles of stone, sand, or gravel in said surface or binder layer will readily enter and fill the large voids and spaces in and between the larger stone and gravel, the said last-named ingredients being first thoroughly mixed with or without heating and preferably by suitable machinery with coal-tar, coal-tar pitch, asphalt, or a mixture of them or equivalent bituminous material, thoroughly incorporated with them and in such proportions as to form a solid impervious bituminous wearing surface or binder united by pressure and by permeation with the intermediate course or layer of stone upon which it is erected, and with the voids and spaces therein the under surface of the said surfacing or binder layer knits. This surfacing or binding layer is preferably of uniform thickness throughout and consolidated by means of pressure or a heavy steam-roller.

The invention will now be described in connection with the drawings, wherein—

Figure 1 is a view in vertical section of a pavement having the features of my invention. Fig. 2 is a detail view in section, enlarged, of Fig. 1. Fig. 3 is a detail view in section, enlarged, of a modification.

The foundation layer of stone A may be of the Macadam order or the Telford arrangement or a combination of the two, and it is laid in any usual way. Upon it is arranged the layer B of smaller stone, which preferably are coated or partly coated with coal-tar, coal-tar pitch, asphalt, or a mixture of them or other equivalent bituminous material. The stones composing this layer will vary in size from two inches in diameter to six inches in diameter, and the layer is thoroughly rolled into the foundation layer and will when completed furnish a surface which is coarse and a constituency which is more or less cellular in character. Upon and into this prepared surface is then thoroughly rolled a heavy layer of specially-prepared ingredients which have reference to their packing and binding character with regard to each other and also with respect to the character of the surface which is to receive it and of the voids, cells, or spaces in it. This layer is a binding or surfacing layer, and it is constituted to unite with the rough surface of its supporting-layer by entering the spaces, channels, and voids between the stones thereof to a very considerable extent and so as to fill them. It is further constituted to make a continuous, homogeneous, solid layer of its own composition above the line of union with the layer below and to provide a hard, firm, solid, waterproof, tenacious, non-friable covering for the foundation, and the surface of which may serve as the finished surface of the pavement or may act to receive a finishing-surface of a somewhat different character. It is obvious from what I have said that this layer must be very carefully prepared, as upon it hinges the effectiveness of the invention. It is composed of a mixture of relatively coarse particles one-half inch to three inches in diameter, intermediate particles one-tenth inch to one-half inch in diameter, and fine particles (an impalpable powder) to one-tenth inch in diameter, suitably proportioned, graded, and thoroughly mixed, either hot or cold, with an incorporated composition of coal-tar, coal-tar pitch, asphalt, or other equivalent bituminous material or a combination of them. The ingredients are such as will pass through screens having a three-inch mesh, a half-inch mesh, one-tenth of an inch mesh, one-fortieth of an inch mesh, one-eightieth of an

inch mesh, and one two-hundredth of an inch mesh. Of the ingredients passing through a screen of three-inch mesh and remaining upon a screen of one-half-inch mesh I take about seventy parts. Of the ingredients passing through a screen of a one-half-inch mesh and remaining upon a screen of one-tenth-inch mesh I take twenty parts and the same as to screens of one-tenth-inch mesh and one-fortieth-inch mesh. I take four parts of screens of one-fortieth-inch mesh and one-eightieth-inch mesh, three parts of screens of one-eightieth-inch mesh and one two-hundredth-inch mesh, and of material passing through a screen of one-two-hundredth-inch mesh one part. To one hundred parts, by weight, of these ingredients, in the proportions above stated, there are added about six parts of the coal-tar, coal-tar pitch, asphalt, or a mixture of them or other equivalent bituminous material, which, preferably, has been heated in a separate vessel, and the ingredients and the bituminous material are intimately intermingled. The percentage of the bituminous material to the aggregate of ingredients may be varied and to obtain the best results must be varied as the shape and size of the larger particles in the aggregate vary and also with the degree of purity of the bituminous material used.

The surface of the roadway may or may not be covered with a thin coating of bituminous mixture of sand, gravel, screenings, or gravel mixed with coal-tar or other equivalent material.

Referring again to the drawings, C represents the layer of prepared ingredients, and E, Fig. 3, the thin finishing-coating above referred to.

I am aware that tarred Macadam pavements or roadways have been used in which the several courses of stone are coated with tar in an effort to hold the top course of tarred stone about two inches in size in position by spreading over and rolling into the surface a fine mixture of sand and tar; but this only partially fills the voids in the top course of stone, leaving voids in the lower portion of this course of stone, so that under traffic the stones become displaced and lose the essential solidity desired. I am also aware that asphalt-pavement mixtures have been made with particles of sand and pulverized stone carefully graded in size from about one-tenth of an inch in diameter down to an impalpable powder, so as to secure the least possible voids and greatest possible density within those limits.

By my improvement I obviate the difficulty of lack of solidity of the top course of the tarred Macadam pavements as now laid by thoroughly mixing and incorporating with the larger particles of the aggregate finer particles of crushed stone or sand or other equivalent, so graded as to give a minimum of voids, which are then filled with coal-tar, coal-tar pitch, asphalt, or other equivalent bituminous material, forming a solid bituminous concrete wearing-surface and which I prefer to lay from one to three inches or more in thickness. By using in the concrete coarse particles of stone or gravel from about one-half inch to about three inches in diameter and medium particles of the same from one-tenth inch to one-half inch in diameter my invention provides a composition having fewer voids, and therefore requiring less of the bituminous material to make a solid concrete, than is now used in surface mixture for asphalt or other bituminous pavements.

The concrete mixture which I have described may also be used as an intermediate or binder course between hydraulic-cement, concrete, bituminous-concrete, or broken-stone foundation and the wearing-surface of an ordinary asphalt pavement and is an improvement on binder courses previously used, for the reason that it forms a more solid and impervious binder course.

Having thus fully described my invention, I claim and desire to secure by Letters Patent of the United States—

1. In a tar, asphalt or bituminous, Macadam roadway or pavement, a wearing surface or binder course composed of coarse particles one-half inch to three inches in diameter, intermediate particles one-tenth inch to one-half inch in diameter and fine particles (an impalpable powder) to one-tenth inch in diameter in about the proportions named and intimately combined either hot or cold with coal-tar, coal-tar pitch, asphalt or other equivalent bituminous material and rolled upon a prepared foundation to form a union therewith and a solid, water-tight, bituminous consistency, substantially as set forth.

2. The combination in a pavement or roadway of a foundation layer of large stone, a suitable layer of small stone coated with bituminous material and rolled to a union with the larger stone and a rough surface and a layer of composition comprising coarse particles one-half inch to three inches in diameter, intermediate particles one-tenth inch to one-half inch in diameter and fine particles (an impalpable powder) to one-tenth inch in diameter in about the proportions indicated, mixed hot or cold with coal-tar, coal-tar pitch, asphalt or other equivalent bituminous material spread upon and rolled into the prepared foundation making union with the surface thereof and filling the voids and spaces therein whereby it is knitted thereto and whereby also a solid, water-tight bituminous surfacing is provided.

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Witnesses:
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