106. COMPOSITIONS, COATING OR PLASTIC
89

CROSS REFERENCE

Examiner

(No Model.)

J. W. McKNIGHT.

CEMENT AND CONCRETE PAVEMENT.

No. 271,582. Patented Jan. 30, 1883.

Fig. 1.

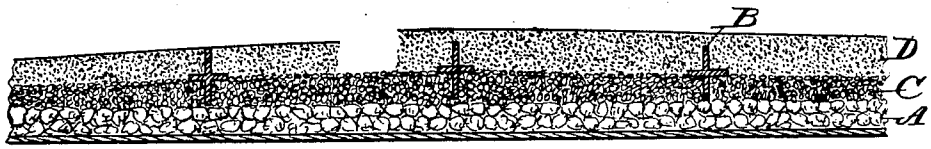


Fig. 4.

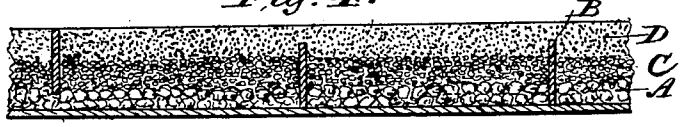


Fig. 2.

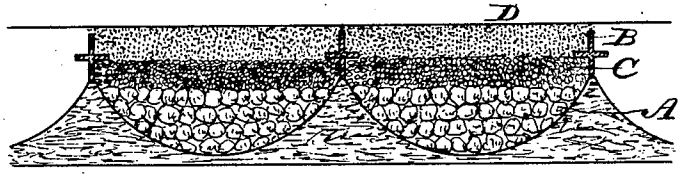


Fig. 3.

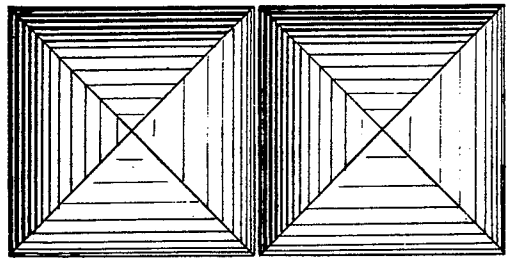


Fig. 5.



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UNITED STATES PATENT OFFICE.

JOHN W. McKNIGHT, OF WASHINGTON, DISTRICT OF COLUMBIA.

CEMENT AND CONCRETE PAVEMENT.

SPECIFICATION forming part of Letters Patent No. 271,582, dated January 30, 1883.

Application filed January 4, 1883. (No model.)

To all whom it may concern:

Be it known that I, JOHN WESTLEY McKNIGHT, a citizen of the United States, residing at Washington, in the District of Columbia, have invented new and useful Improvements in the Construction of Pavements, of which the following, when taken in connection with the accompanying drawings, forms a full, clear, and exact description.

Figure 1 is a sectional view of my improved pavement. Fig. 2 is a sectional view of a modified form of pavement. Fig. 3 is a bottom view of Fig. 2. Fig. 4 is a sectional view, in which plain metal or strips of other material are used for dividing the pavement into compartments. Fig. 5 is a sectional view of a modified form of pavement when laid on brick or other arches.

The object of my invention is to construct a pavement for roadways or sidewalks which will be solid and compact, which will present a smooth and even wearing-surface, and at the same time admit of upheavals by frost and the expansion and contraction caused by thermal changes without doing violence to a very extended portion of the pavement. The great objections to cement or concrete pavements which are laid in a continuous mass is that they are liable to crack and be broken up by the expansion and contraction incident to the thermal changes and by upheavals from frost. Many attempts have been made to obviate the cracking and breaking up of cement and concrete pavements. They have been laid in a mass or in a continuous sheet and the surface divided into sections or blocks by partially cutting through the upper or wearing surface by means of a suitable tool, so that the pavement will be weaker at these points of severance and will more readily yield to the upward pressure exerted by the freezing and thawing of the earth beneath the pavement. Cement and other pavements have been laid in sections with tarred paper and other analogous material interposed between the joints, so as to admit of the ready separation of the blocks when subjected to the pressure heretofore referred to; but such methods of construction are objectionable, for the reason that the cavities or spaces left between the blocks, however small they may be, will admit water and dampness to the sub-bed, and thus furnish the elements which will in a short time destroy the pavement.

It is the object of my present invention to obviate these defects and as far as possible produce a pavement which will be more durable and more readily repaired than those heretofore constructed; and to accomplish this end my invention consists in dividing the sub-bed into sections by means of bars made of metal, pressed or rolled paper or straw pulp, or other suitable material, said bars being placed a short distance below the upper or wearing surface of the pavement and extending down to or nearly to the bottom of the sub-bed.

My invention consists, further, in certain other details of construction, which will be fully described, and pointed out in the claims.

Referring to the drawings, A designates the sub-bed or foundation-layer of the pavement, and is composed of broken stone, furnace-screenings, coal-cinders, broken brick, or other similar hard material, rammed down, and cemented with a composition hereinafter more fully described. I do not limit myself, however, to a foundation-layer of broken stone, cinders, and cement, such as hereinafter described, as any good foundation—such as a grouting of ordinary cement—and stone may be used to good advantage. This foundation may be laid on a smooth, well-prepared bed of earth, as shown in Figs. 1 and 4; or the earth may be hollowed out to form pockets for the reception of base A, as shown in Fig. 2; or it may be laid on the ordinary arches of brick or other material, as shown in Fig. 5.

B B are bars of metal, straw or paper-pulp, or other suitable material, which may be of plain form or be made angle, T, ×, or + shape. These bars may be wide enough to extend partly or entirely through the foundation-layer A, and are placed in position during the process of putting down the layer A, or after it is laid in position. I lay this improved pavement in alternate sections, after having made my foundation, as hereinbefore described. A second layer, C, of gravel or smaller broken stone, is then put down and well tamped between the bars hereinbefore described. This layer C is also cemented, so as to make this layer practically solid and impervious to moisture.

D is the top layer or wearing-surface, which

consists of hydraulic or other cement mixed with small particles of crushed or broken granite or other hard stone or iron slag and filings in a finely-divided state. This top course is by preference laid so as to cover up the bars or strips, as shown in left hand of Fig. 1.

The bars or strips serve a double purpose: first, they strengthen and give to the pavement a certain amount of rigidity, which is essential in much-traveled thoroughfares; second, they divide the pavement into cells or compartments partly, if not entirely, through the entire thickness of the pavement, so that in case of upheavals by frost the line of fracture will be confined to the spaces between the bars and be prevented from running in an angular direction.

When fractures occur in a pavement laid according to my plan it is a very easy matter to repair the same, for all joints made by these bars unite, instead of being broken, and by close observation it will be seen that the fractures in cement pavements where the joint is broken occur at that point and crack the slab irregularly across from the same. Consequently, should repairing become necessary, excavate the material between the bars or strips and put in new material without disturbing the balance of the pavement, which makes the expense of repairing my pavement very trifling.

In laying a pavement such as the one shown in Fig. 2 the ground is excavated so as to form pockets, which are preferably square at cross-sections, but tapering toward the bottom. Any number of these pockets may be made and filled with broken stone, &c., or grouting, in the same manner as in Fig. 1, the bars or strips being or not at the points of union between the pockets. The intermediate layer and wearing or surface course are now applied in the manner heretofore described.

A pavement thus constructed will be strong and durable. The base or bottom layer, being formed of inverted arches or cones, will stand greater pressure, and not be so liable to be lifted up by the action of the frost, while such action is confined within comparatively narrow limits.

The composition which forms a solution which I use in my foundation and surface, as well as adding more strength and tenacity to the hydraulic cement, is composed of silicate of soda, one gallon; cement or lime-water, sixteen gallons; native carbonate of magnesia, three pounds, more or less; chloride magnesium, sufficient quantity; ammonia-ferric alum, one-fourth pound; sulphuric acid, sufficient quantity; soft soap and glycerine, one pint; oxide of iron and duresco in solution, sufficient quantity. This solution will also prevent all efflorescence in this artificial stone, of whatever kind, and will form a cement that will unite all the faces of the stone together and make a compact mass.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A cement or concrete pavement or sidewalk having embedded therein bars or strips made of metal, pulp, (straw or paper,) as described, which separates the pavement into compartments, and also serves as a guide for controlling the lines of fracture incident to the action of thermal changes, as set forth.

2. A pavement or sidewalk consisting of the bottom course, A, intermediate course, C, and top course, D, combined with the bars B, made from metal or pulp, embedded in the several layers or courses, as set forth.

3. A cement or concrete pavement or sidewalk the bottom courses or sub-bed of which is composed of inverted arches or cones, which support the wearing or top course, as set forth.

4. A cement or concrete pavement or sidewalk the bottom course or sub-bed of which is composed of a series of inverted arches or cones, in combination with the top course, D, and metallic or other bars and strips, as set forth.

5. A cement or concrete pavement or sidewalk laid on brick or other arches, constructed with bars or strips on top of arches, as described and herein set forth.

6. A composition for binding broken stone, sand, and cement in the manufacture of artificial stone or concrete pavements, consisting of silicate of soda, cement or lime-water, native carbonate of magnesia, chloride magnesium, ammonia-ferric alum, sulphuric acid, soft soap and glycerine, solution of oxide of iron, and duresco.

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