F. A. BROTSCH, Jr.

PAVEMENT.

APPLICATION FILED APR. 16, 1919.

1,421,901. Patented July 4, 1922.

Fig. 1

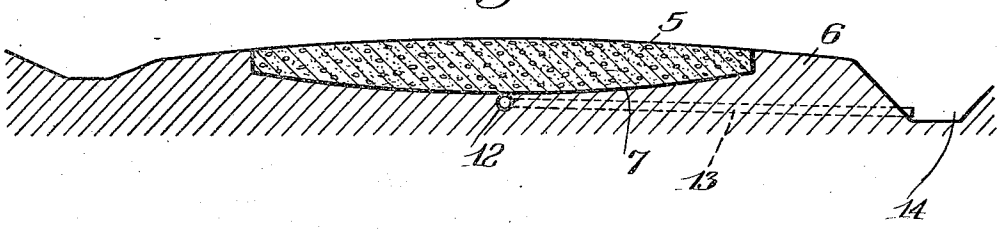


Fig. 2

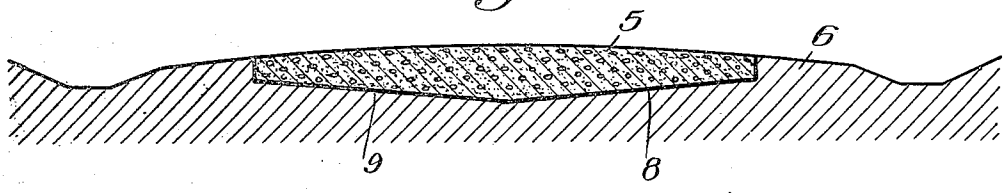
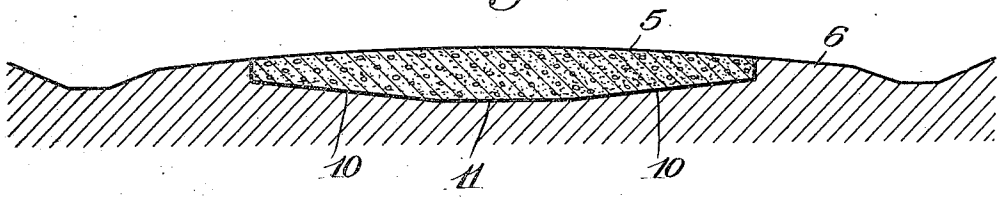


Fig. 3



WITNESSES:

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PAVEMENT.

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To all whom it may concern:

Be it known that I, FREDERICK A. BROTSCH, Jr., a citizen of the United States, residing at Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Pavements; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the reference numerals marked thereon.

This invention relates to pavement construction and more particularly to a form of construction for the body of a pavement or road, of concrete or other suitable material, and of the sub-grade which supports it.

One object of the invention is the provision of an efficient form of construction, affording the most effective arrangement of the material for resisting the loads and corresponding stresses imposed, combined with the economy of material. Another object is to provide a durable form of construction for the pavement body and for the sub-grade supporting it, adapted to overcome the injurious action of the weather. To these and other ends the invention consists in certain improvements and combinations of parts, all as will be hereinafter more fully described, the novel features being pointed out in the claims at the end of the specification.

In the drawings:

Figure 1 is a transverse sectional elevation of the pavement and the sub-grade therefor.

Figure 2 is a similar view showing a modified form of the under surface of the pavement and the sub-grade.

Figure 3 is a similar view showing still another modification of these parts.

The present invention comprises a pavement body 5 of concrete, asphaltic compositions, bituminous macadam or similar material or combinations thereof capable of being firmly united to form a substantially rigid mass or body, laid upon a surface 6, which may be a newly formed bed, or the old bed of a previous road.

It has been a common practice in the construction of such pavements to form the body of the pavement with a flat or plane under surface laid on a plane sub-grade, so that, except for the slight crown provided on the upper surface of a road to drain off moisture, the body has been of substantially uniform thickness transversely thereof, and the sub-grade, being flat, was not readily drainable.

In the present embodiment of the invention the under surface of the pavement body is given a convex form so that it is thicker at its center than at its edges, and the central portion of its under surface, as well as the central portion of the sub-grade is lower than the side portions. This convex form or shape of the under surface of the pavement is preferably obtained by giving the latter in sectional view the shape of a convex curve 7, formed by an arc of a circle, ellipse, parabola or similar figure, as shown in Figure 1. While this is the preferred form, it is to be understood, however, that the advantages of the latter may be obtained to a degree by forming the under surface of two straight lines 8—9 inclined downwardly from the sides of the pavement and intersecting at its center as shown in Figure 2. Another possible construction is that shown in Figure 3 in which the inclined lines 10 shown in Fig. 2 intersect a horizontal line 11 adjacent the center of the pavement, and it is contemplated that various other similar modifications may be employed affording the advantages hereinafter explained.

The usual load is applied adjacent the center of the pavement, and in the common form of construction described above, in which its under surface is formed by a plane surface, the pavement has frequently failed through the development of longitudinal cracks or faults along its central portion, and otherwise, due to insufficient thickness of material at the portion of greatest stress, as well as to deterioration of the material through lack of drainage of the sub-grade, and other causes which it is the object of this invention to overcome.

The convex shape of the pavement body comprised in the present invention has the advantage of thickening, and therefore strengthening, the material at the central portion of the structure where the load is applied, by concentrating the material in this portion and, preferably, thinning it at the sides of the pavement where less pressure is applied, so as to form a transverse sectional shape of substantially truss-like character.

By properly proportioning the shape in conformity with this principle, the strength is greatly increased without requiring any more material, and moreover, the steel reinforcement frequently employed may be omitted, whereby the cost of construction is substantially reduced. Not only is the pavement strengthened by increasing its thickness at the portion of greatest loading and stress, but the convex shape of its under surface, in coaction with a similar formation of the sub-grade, forms an effective cradle-like support which tends to direct the stresses under loading toward the center of the structure and to reduce the tension at the central portion of its upper surface, thereby reducing the tendency to develop longitudinal faults or cracks.

The lowering of the central portion of the under surface of the pavement furthermore tends to cause the material of which it is composed to settle toward the central portion while in a plastic state during formation, so that its density is increased at its central portion thus increasing the strength at the portion where most required.

The lowering of the central portion of the under surface and also of the sub-grade affords the additional advantageous feature of facilitating the drainage of these surfaces, the importance of which is well known, for the presence of moisture of itself has a damaging effect on the materials of the pavement and furthermore increases the destructive action of frost expanding upwardly and thereby cracking the structure. The concave shape not only tends to direct the upward pressure of the frost toward the sides of the pavement but obviously causes the drainage of moisture toward the central portion of the sub-grade, where a drainage means is provided comprising, preferably, a tile pipe line 12 from which the water is discharged at intervals through lateral piping 13 to a drain 14 at one side.

The flow of the water across the under surface of the pavement from its sides to its center induced by this drainage system carries the soil along with it and deposits it in such vacant spaces as may exist, thus tending to build up and maintain a solid bearing and uniform supporting surface.

The various features described, which are applicable to pavements generally and in conjunction with many varieties of material, combine to produce a very advantageous and superior form of construction.

I claim as my invention:

1. A road pavement of rigidly combined material having a lower surface which is convex in shape transversely of the road throughout its length to provide varying thickness of material greater adjacent the center of the pavement than at the sides.

2. A pavement of rigid material of substantially uniform thickness in longitudinal sectional planes and having a lower surface which is convex in a transverse direction to provide varying thickness of material greater adjacent the center of the pavement than at its sides.

3. A pavement of rigid material having its upper and lower surfaces convex in shape in a transverse direction throughout its length to afford a transverse sectional form for the pavement body of substantially truss-like character.

4. A pavement of rigidly combined material having an under surface which is convex in shape in one direction throughout its extent in the other direction to provide a substantially truss-like cross section and a subgrade having a concave surface corresponding with the under surface of the pavement for supporting the latter.

5. A road pavement of rigid material having an under surface of a transversely convex shape throughout its length providing a substantially truss-like cross section and a cradle-like subgrade having a surface conforming in shape with the under surface of the pavement for receiving the same and providing uniform support for the pavement.

6. A pavement of rigidly combined material having an under surface of transversely convex shape throughout its length providing a substantially truss-like cross section lower at its center than at its sides, and drainage means adjacent the center of said undersurface of the pavement.

7. A pavement of rigidly combined material having an under surface, of transversely convex shape providing a substantially truss-like cross section lower at its center than at its sides, a subgrade for said pavement having a transversely convex surface corresponding to the under surface of the pavement, drainage means in said sub-grade adjacent the center of the undersurface of the pavement, and lateral discharge means for said drainage means.

FREDERICK A. BROTSCH, JR.