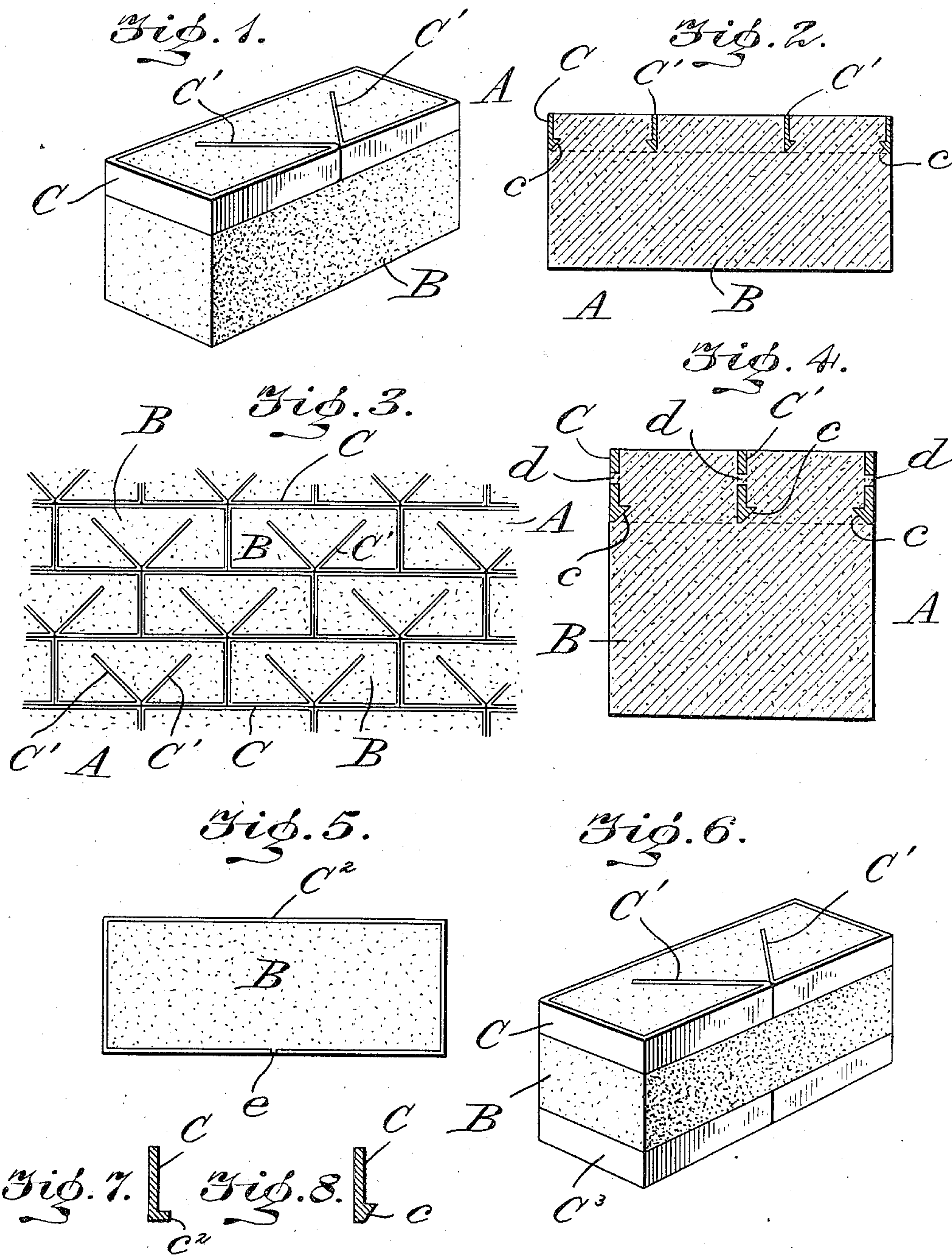


E. H. BENNERS.
COMPOSITE PAVING BLOCK.
APPLICATION FILED MAY 2, 1908.

948,808.

Patented Feb. 8, 1910.



WITNESSES

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Fig. 9.

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948,808.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, EDWIN H. BENNERS, a citizen of the United States, residing in Elizabeth, county of Union, and State of New Jersey, have invented a certain new and useful Composite Paving-Block, of which the following is a specification.

This invention is a paving block possessing certain features of novelty and utility, among which are a block of substantially homogeneous material having a metal reinforce at its top, and a similar block having a metal reinforce both at its top and bottom.

It has been attempted heretofore to embody a metal reinforce in paving blocks, but, in view of the particular composition employed in the construction of the block, or the location of the metal reinforce, or the method of combining it with the block, such blocks have not possessed substantial utility, or gone into any extended use.

It has been attempted, for example, to use a metal reinforce composition on a rigid or unyielding foundation, but this proved a failure, mainly, for three reasons. First, the metal reinforce did not adhere sufficiently to the material, usually an asphaltic composition, with which it was associated. Second, owing to the composition "chipping" out of the spaces between the metal, due to the facts that it was softer than the metal and the metal could not yield or sink into the rigid foundation. This left the metal projecting above the surface of the paving material proper, thereby resulting in an uneven wearing surface having metallic ridges which unfitted it for efficient service. Third, the blocks thus used were not homogeneous in composition, but were composed of an asphaltic wearing surface with metal reinforce, and a rigid base of stone and a bonding material, the result being that the asphaltic material would not combine or unite with the rigid base, and, consequently, said wearing surface would loosen from the foundation.

My invention overcomes the disadvantages inherent in the reinforced structures of the prior art for the reasons, first, that I employ blocks of homogeneous material, thereby precluding any separation between the wearing surface and the base of the block; second, I mold the blocks at high pressure, thereby securing a thorough union between the metal reinforce and the composition of the block; and, third, I provide means for anchoring

the metal reinforce in the block and yet permit the metal to expand and contract without becoming loose from the material of the block.

In the accompanying drawings I have illustrated different practical embodiments of the invention, but the constructions shown therein are to be understood as illustrative, only, and not as defining the limits of the invention.

Figure 1 is a perspective view of a composite paving block embodying this invention. Fig. 2 is a longitudinal section thereof. Fig. 3 is a plan view showing a part of a pavement composed of blocks constructed in accordance with the invention shown in Figs. 1 and 2. Fig. 4 is a vertical cross section through a block provided with a modified form of metallic reinforce which embodies the invention. Figs. 5 and 6 are, respectively, a plan view and a perspective view showing other embodiments of the invention. Figs. 7, 8 and 9 illustrate in cross section a variety of shapes which may be given to the metallic reinforce.

The block, A, shown in Figs. 1, 2 and 3, consists of a molded mass of homogeneous material, B, and a metallic reinforce, C, the latter being molded in the mass, B, so as to be substantially flush with the lateral surfaces thereof, an edge portion of said reinforce, C, being substantially flush, also, with the top surface of said molded mass, B, whereby the wearing surface is composed partly of the molded mass and partly of the metallic reinforce.

The material composing the body portion of the block is, preferably, an asphaltic composition, such as ordinary paving composition, which consists usually of 88 to 90 percent. of sand and from 10 to 12 percent. of asphalt; or I may use a material known in the art as "mastic", consisting, usually, of rock asphalt mixed with various ingredients to meet the special conditions of operation.

The metallic reinforce, C, may consist of a cast steel open frame which conforms to the shape and dimensions of the block, but for certain practical purposes, it is preferred to employ a reinforce which is composed of a rolled steel bar adapted to be cut, subsequent to the rolling operation, into suitable lengths, and thereafter bent to the required shape and size. As shown more clearly in Figs. 1, 3, 7, 8 and 9, the reinforce, C, consists of a rolled bar which may have any de-

sired cross sectional shape; that is the flat bar may have a tapered longitudinal rib or barb, *c*, on one of its faces, see Figs. 2, 4 and 8, or said bar may have a flange, *c*², as in Fig. 7, or the bar may be simply a flat bar with openings, *d*, see Fig. 9, or said bar may have the flange and the openings, see Fig. 4. The rib or barb, *c*, extends lengthwise along the inner face of the rolled strip, preferably close to one edge thereof, and this rib is adapted to extend into, and to be embedded within, the molded material, whereby the rib is adapted to serve as an anchor for retaining the metal reinforce against displacement, particularly in an upward direction, relative to the homogeneous mass of material of the block. After the bar shall have been rolled it is bent to conform to the shape and size of the block, but the end portions of the rolled bar are extended inwardly to form the arms, *C'*, said ends of the bar being free or disconnected from each other. As shown in Figs. 1 and 3, the arms, *C'*, extend inwardly with respect to the skeleton reinforce, and preferably on diverging lines, the upper edges of said arms, *C'*, being in the plane of the upper edge of the reinforce, whereby the edges of the arms will be substantially flush with the wearing surface of the paving block, see Fig. 2. By leaving the end portions of the bent bar reinforce free or disconnected, the metallic reinforce is adapted to expand and contract under changes in temperature, and as the material composing the molded mass is capable of a like expansion and contraction, although possibly not to so great an extent, it will be seen that there is uniformity between the molded mass and the metallic reinforce so far as concerns the expansion and contraction.

An essential feature of the invention consists in so disposing the homogeneous mass of material and the metallic reinforce that the interior space of the skeleton reinforce is filled with the material of said molded mass, the material filling the frame like reinforce, *C*, being of the same character, and forming a part of the material composing the body of the block; in fact there are only two materials used in the new composite block, to wit: the asphaltic composition or mass, *B*, and the steel or other material composing the reinforce, *C*.

In the manufacture of my new paving block, I employ suitable molds. The asphaltic composition is prepared in any usual or well known way, and the metallic reinforce is rolled, cut and bent to substantially the form shown in Fig. 1. One practical mode of procedure in producing the blocks consists in placing the reinforce, *C*, within the mold, and depositing the asphaltic composition into said mold so that the composition will fill the openings of the reinforce

and also fill the mold to a suitable depth. The asphaltic composition is in a hot condition when deposited in the mold, and thereafter pressure is applied to the mass contained in the mold for the purpose of condensing the material into the frame like metallic reinforce and to give the mass of material the required shape and form. I prefer to mold the asphaltic composition while hot and to apply very great pressure thereto, the mass being molded under hydraulic pressure, if necessary, with a view to securing a very considerable degree of condensation of the molded material into the reinforce, thereby securing an intimate union between the molded material and the frame like reinforce. This mode of procedure, and the materials employed, enables me to produce paving blocks which are uniform in structure and composition, so that all the blocks will present the same appearance and possess the same wearing qualities.

The blocks of my invention are adapted to be laid substantially as indicated in Fig. 3, so as to produce a pavement, the wearing surface of which consists partly of the molded material and partly of metal. In this connection, it is desired to state that unskilled labor can be employed in laying the blocks. As shown in Fig. 3, the blocks are laid in the direction of their length and so as to break joints, the metal band or reinforce of one block meeting the metal bands or reinforces of two adjacent blocks along their side edges. The blocks may be laid on any appropriate kind of foundation, such as on a layer of sand, stone or even on the soil itself. Should it be desired to take up the pavement for renewal, repairs, or for other purposes, it may become necessary to destroy one of the blocks in order to obtain access to other blocks, but it will be noted that my new blocks, when laid, are not required to be cemented together or to be united by any bonding material.

While I have shown and described in detail one of the blocks, the method of making it and the manner in which the blocks are to be laid, it is obvious that the invention is susceptible of modification in various ways.

In Fig. 4, I have shown a block constructed substantially as in Figs. 1 and 2, but with the addition of transverse perforations, *d*, in the metallic reinforce, *C*. These perforations may be in the form of slots extending lengthwise of the bar, but as shown, the openings are provided above the rib, *c*. When the plastic material is forced into the openings of the frame like reinforce, some of the material enters the openings, *d*, whereby the frame is keyed to the material by said material entering the openings or slots, *d*, and by being pressed around the ribs, *c*.

Fig. 5 shows another form of the paving block wherein the metallic reinforce, *C*², is

composed of a rolled bar, the end portions of which are separated slightly, as indicated at *e*. In this form of the invention, the metallic reinforce is devoid of the inwardly extending diverging arms, *C'*, shown in Figs. 1 and 3, but in other respects the paving block of Fig. 5 is the same as the block shown in Figs. 1, 2 and 3.

Another embodiment of invention is shown in Fig. 6, wherein the paving block is provided with two metallic reinforces, *C*, *C'*, the former being at the top edge of the block and the latter at the lower edge of said block. The two reinforces of Fig. 6 are constructed in the same manner as the reinforce, *C*, of Figs. 1, 2, and 3, and they are so positioned in or on the mass of molded material, *B*, as to have their edges exposed on the top and bottom faces, respectively, of the block. While the construction shown in Fig. 6 adds somewhat to the cost of manufacture, it possesses the advantage of enabling the blocks to be laid either face up, and when one surface becomes worn, the block may be reversed in position so as to present a fresh wearing surface.

Having thus fully described the invention, what I claim as new, and desire to secure by Letters Patent is:

1. A composite paving block comprising a body of homogeneous material, and a metallic band forming a part of the wearing surface of the block, said metallic band being divided and the ends of said band being disconnected.

2. A paving block composed of substantially homogeneous material and having a metal reinforce in its wearing surface consisting of a band with disconnected ends, said metal reinforce being molded into the block and flush with the upper lateral surfaces of the block.

3. A paving block composed of substantially homogeneous material and having a metal reinforce in its wearing surface, means extending from the metal reinforce into the body of the material for anchoring the reinforce, said means being provided with openings and with barbs, whereby the reinforce is securely locked to the block.

4. A paving block composed of substantially homogeneous material and having a metal reinforce in its wearing surface, said reinforce being provided with disconnected ends which extend into the material forming the body of the block, said disconnected ends being prolonged within the boundary of the reinforce.

5. A paving block composed of substantially homogeneous material and having a metal reinforce in its wearing surface, said reinforce being provided with disconnected

ends which extend into the material forming the body of the block, said disconnected ends being in the same plane as the reinforce and constituting a part of the wearing surface of the block.

6. A paving block composed of substantially homogeneous material and having a metal reinforce in its wearing surface and extending only part way to the base of said block, said reinforce being provided with openings into which the material forming the body of the block may enter and thereby assist in locking the reinforce to the block.

7. A paving block composed of substantially homogeneous material and having a metal reinforce at the wearing surface of the block and a separate reinforce at the base of the block, the ends of each of said reinforces being disconnected.

8. A paving block composed of substantially homogeneous material and having a band extending around the upper part of the block and forming a metal reinforce at the wearing surface of said block, said reinforce being provided on its inner face with a rib or barb which is embedded in the material of the block and serves to anchor said reinforce against upward displacement.

9. A paving block composed of substantially homogeneous material and having a metal reinforce at the wearing surface of said block, said reinforce being composed of a band the end portions of which on the lateral surfaces of the block are disconnected.

10. A composite paving block comprising a body of molded homogeneous material, and a metallic band united to said homogeneous material and forming a substantial part of the wearing surface of the block, said band being divided and the free ends of said band being disconnected from each other.

11. A paving block composed of molded homogeneous material, and a reinforcing band the ends of which are disconnected and extended inwardly with respect to said band.

12. A paving block composed of molded homogeneous material, and a reinforcing band the ends of which are disconnected and extended inwardly with respect to the band, said band and its extended ends being substantially flush with said molded material and constituting a part of the wearing surface of the block.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EDWIN H. BENNERS.

Witnesses:

JAS. H. GRIFFIN,
H. I. BERNHARD.