R. D. BAKER.

ARMORED PAVEMENT JOINT.

APPLICATION FILED APR. 2, 1913.

1,113,733. Patented Oct. 13, 1914.

Fig 1

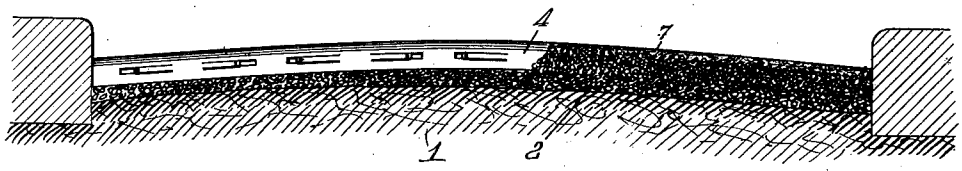


Fig 2

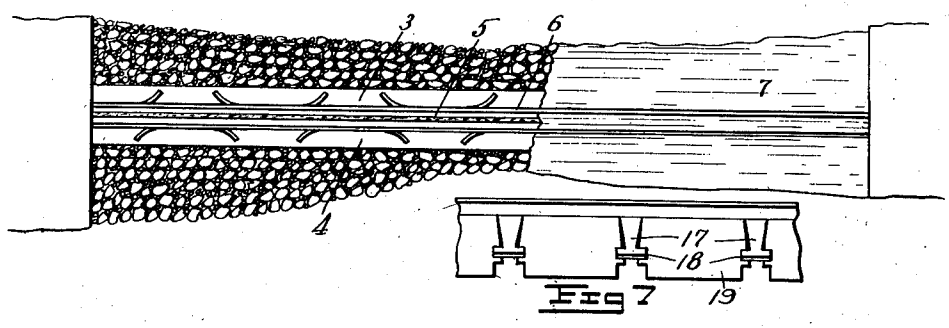


Fig 7

Fig 3

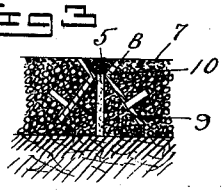


Fig 4

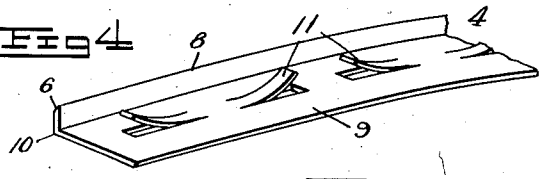


Fig 6

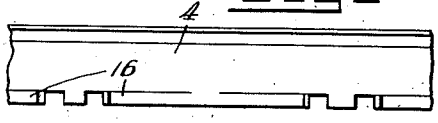


Fig 5

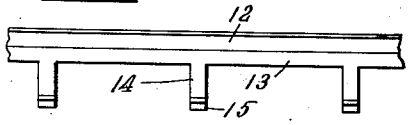


Fig 8

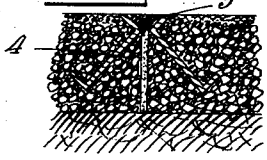


Fig 10

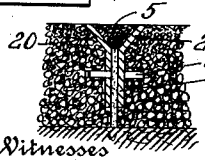


Fig 9



Witnesses

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ARMORED PAVEMENT-JOINT.

1,113,733. Specification of Letters Patent. Patented Oct. 13, 1914.

Application filed April 2, 1913. Serial No. 758,423.

To all whom it may concern:

Be it known that I, ROBERT D. BAKER, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Armored Pavement-Joints, of which the following is a specification.

This invention relates to armored pavement joints; and it relates more particularly to means for armoring expansion joints in pavement composed of concrete or the like; and it comprises a joint in which two armoring members are in parallel spaced arrangement; each such member consisting of a plate of irregular or angular cross section and so located that the upper portion of the joint formed between the parallel plates is more or less trough or V-shaped, with the walls of the trough diverging upwardly; the lower portions of the parallel plates being best arranged to diverge downwardly and to be embedded in concrete; all as more fully hereinafter set forth and as claimed.

In constructing pavements of concrete it is necessary, in order to prevent undue cracking and heaving by reason of expansion or contraction incident to temperature changes, to provide expansion joints at intervals along the roadway, and to protect or armor the edges of these joints by plates of suitable material, such as iron or steel, arranged in parallel pairs and suitably anchored in the concrete of the pavement. As ordinarily constructed heretofore, these joints have been formed by pairs of parallel flat metal plates set vertically on edge in the joints or slots separating the pavement sections, and suitably spaced apart, the upper edges of the plates being as nearly flush as possible with the surface of the finished pavement. Both the protected faces of the concrete and the armor plates themselves are vertical or, in other words, perpendicular to the pavement surface. It is usually advantageous to fill the spaces between the parallel plates with some kind of yielding material such as felt, paper, tar, asphalt, etc. While this type of joint has proved fairly satisfactory in many respects, nevertheless it has been found that the concrete is apt to wear and crumble at points immediately adjacent either side of the joint, breaking down and wearing away to a considerable extent and thus causing the formation of undesirable transverse ruts in the roadway. This is due in part at least, to the fact that it is rather difficult to provide armor plates which will wear down in use at the same rate as does the concrete. As a rule, the upper edges of the plates, even though originally flush with the surface of the pavement, tend to project above the concrete slightly in the course of time. The result is that when a wagon or other vehicle passes over the joint, the wheels ride a trifle high over the edge of the plates and then drop with a chuck therebeyond, thus pounding the concrete on either side of the joint and consequently tending to crumble and shatter it to some extent. With vertically disposed plates, these defects exist in some cases even where the metal is of a selected degree of softness calculated to give a rate of wear approximately equal to that of the concrete. The impact of vehicle wheels against the vertical plates breaks up and loosens the concrete in contact with the upper portions of the plates with the formation of depressions and hollows adjacent to the joints. Another difficulty encountered with flat vertical armor plates is that they sometimes tend, under heavy traffic, to bend away slightly from the contiguous concrete faces, leaving the edges of the concrete exposed to spalling from the shoe calks of horses which cut in and form an opening behind the plates. When an opening of this kind has once been formed behind a plate, the wheels of passing vehicles strike the upper edge of the plate slightly from behind, thereby driving it still farther from the concrete and ultimately destroying the joint. Various methods have been proposed heretofore to obviate these difficulties. For example it has been proposed to provide pairs of parallel armor plates in which each plate is bent away at right angles from the joint at the pavement surface, the flat and relatively broad upper surface of the bends being arranged flush with the pavement surface as originally laid. This gives a joint in which the vertical faces of the concrete and a portion of the horizontal surface of the pavement immediately adjacent the joint, are protected by the bent armor plate. This construction however does not obviate the difficulties before described, but, on the contrary, rather increases them. So much more

metal surface is exposed at the joint that the projecting plates do not wear down anywhere near as rapidly as the concrete; and consequently the armoring at each joint soon projects noticeably above the concrete on either side. The concrete immediately below the horizontal portions of the armor plates is of course not affected materially by the traffic but remains hard and resistant, serving to maintain the horizontal portions of the plates in their elevated position and insuring the permanence of the resultant ridge in the roadway.

According to the present invention the pairs of parallel plates forming the armor joint are of different cross-sectional shape from that hitherto employed, and their arrangement is also materially different. I employ plates in the form of angles or channels or other suitable angular cross-sectional form; and I place them in position in the pavement in such a manner that only the edges of the plates are exposed at the pavement surface. Instead however of having the angle between the armor plate and the pavement surface a right angle, the plates are so arranged in pairs as to give a joint which is somewhat wider at the pavement surface than it is a short distance therebelow. In other words, at the surface of the pavement each armor plate makes an obtuse angle with the pavement surface. It is apparent that in this type of construction the portion of the plate which is at the upper part of the joint and which is exposed to the heaviest wear and stress of traffic, while protecting a corner and face of a joint, is also supported to some extent by the subadjacent concrete, thus lessening and substantially removing the tendency, noticeable with vertical flat plates, to spring away from the concrete when subjected to hard service. With the present type of armor plate, the action of wheels and shoe calks is to press the plate still more firmly against the concrete. The security and permanency of the joint is materially increased by the fact that the lower portions, of the plates, in the most advantageous embodiments of the invention, diverge downwardly and are firmly embedded in and surrounded by solid concrete. At the same time only the edge of the plate is exposed to actual abrasion, the wear being thus concentrated on a comparatively thin section of metal. It is to be noticed also that much thinner plates can be used, since the angular cross-sectional shape of the plates greatly increases their stiffness and strength laterally. The thickness of the exposed upper edges may therefore be much less than in former types of joints, so that the plates wear down more uniformly with the concrete. Still another advantage of my novel joint lies in the fact that the protected upper edges of the concrete at the joint are rounded or beveled instead of square; and rounded edges do not break as easily as do square edges.

In the accompanying drawings I have illustrated typical armored joints within the scope of the present invention.

In these drawings, Figure 1 is a cross section of a pavement at an armored joint; Fig. 2 is a plan of Fig. 1; Fig. 3 is a cross section of a joint with plates of typical shape; Fig. 4 is a perspective detail view of a portion of one of the plates shown in Fig. 3; Figs. 5, 6 and 7 are side elevations of modified forms of plates; and Figs. 8, 9 and 10 are cross sections of joints formed with plates having various cross-sectional shapes.

Referring to the drawings, 1 is a roadway foundation upon which rests a layer, or a plurality of layers 2, of any suitable concrete mixture.

3 and 4 are armor plates in parallel spaced arrangement extending across the roadway and slightly spaced apart at 5 by means of paper, felt, asphalt, etc., to form an expansion joint. As shown, the slot or space between pavement sections usually extends to a greater depth than the armoring members. The upper edges 6 of each armor plate are substantially flush with the upper surface 7 of the finished pavement. The plates are of angular cross section, with an upper portion 8 making an obtuse angle with the surface of the pavement; while the lower portion 9 of each plate bends away at substantially right angles to the upper portion of the plate. It is apparent therefore that in the assembled joint, the upper portions of the adjacent bars are divergent upwardly from a point 10; while below said joint the plates diverge downwardly. The trough shaped space at the upper side of the joint is of relatively small width, of course, and moreover is best filled with felt, tar-paper, asphalt, or other durable elastic material, as shown. Prongs or spurs 11 may be partially sheared from the lower portion of each bar so as to project therefrom and serve as anchoring elements. In lieu of providing prongs or spurs of this kind, holes may simply be punched through the plate through which the concrete material may be joined monolithically on both sides of the lower portions of the plate, thus affording firm anchorage.

Fig. 5 shows a type of plate in which the body of each plate extends only a short distance below the point of bending; the upper and lower portions, 12 and 13 respectively, of the plate proper thus being approximately equal, instead of having the lower portion relatively long as compared to the upper. With this type of plate, it is well to provide integral downwardly extending strips 14 having bent ends or feet 15 for anchoring in the concrete.

In Fig. 6 is shown a plate similar in a

general way to that illustrated in Figs. 3 and 4, but the prongs 16 are cut or punched out of the lower edge of the plate. Fig. 7 illustrates a form of plate in which strips or prongs 17, having enlarged ends 18, are sheared out of the lower portion 19 and project outwardly from the line of bending between the upper and lower portions of the plate. This form of plate has special advantages for certain classes of work.

In Fig. 8 the joint is shown as composed of two channel bars or plates. This is a very convenient type of joint since the angle plates are standard sections easily obtained, and since their form insures efficient anchorage in the concrete without necessarily employing special anchoring members.

Fig. 9 shows a joint in which the members are Z-bars.

A modified form of joint within the invention is illustrated in Fig. 10, where the upper portions 20 of the plates diverge upwardly as before, while the lower portions 21 are vertical and are thus not wholly embedded in concrete. Prongs 22 extend from the non-adjacetn sides of the parallel bars and provide anchorage in the concrete. For heavy service, I do not consider this form of joint as good as those shown in Figs. 3, 8 and 9.

The armor plates may be, and usually are, curved to conform to a standard road crowning; or, less often, they may be straight. Each plate may consist of a unitary bar stretching across the roadway or it may consist of a number of sections abutting end to end and suitably connected. In building the pavement, a pair of plates are placed parallel to each other and transverse to the roadway, and are held in position at the required elevation by any suitable means. As a rule the plates are best spaced apart by felt, paper or the like. Concrete is then applied to the road bed and is tamped carefully around the joint thus formed. Where the lower portions of the plates diverge, the concrete is flowed in under these portions and directly against the spacing material as shown in Figs. 3, 8 and 9. The surface of the pavement is smoothed off carefully, leaving the upper longitudinal edges of the plates flush with the pavement surface. Upon setting and drying, the concrete usually shrinks more or less and widens the joints which may be filled with asphalt or the like. The spacing material first placed between the plates may be very thin, merely enough to keep the abutting portions of concrete at the joint from uniting monolithically; or it may be of greater thickness. Temporary division plates of steel or the like may also be used to space the armoring members apart while placing the concrete, these division plates being removed subsequently and the resulting space being filled, as before described, with felt, tar, asphalt, etc.

What I claim is:

1. A pavement joint comprising, the combination, with adjacent pavement sections, of a pair of armor plates in substantially parallel arrangement protecting the adjacent section edges and suitably secured to the material of the pavement, each plate extending to and making an obtuse angle with the surface of the pavement section to which said plate is secured.

2. A pavement joint comprising, the combination with adjacent pavement sections, of a pair of armor plates in substantially parallel arrangement and suitably secured to the material of the pavement, the upper portions of the plates diverging upwardly to the pavement surface, and the upper longitudinal edges of said plates being substantially flush with the pavement surface.

3. A pavement joint comprising, the combination, with adjacent pavement sections, of a pair of armor plates in substantially parallel arrangement and suitably secure to the material of the pavement, the upper portions of the plates diverging upwardly to the pavement surface, the upper longitudinal edges of said plates being substantially flush therewith, and the lower portions of said plates diverging downwardly.

4. A pavement joint comprising, the combination, with adjacent pavement sections, of a pair of armor plates in parallel arrangement and located between said adjacent pavement sections, the upper portions of said plates diverging upwardly and covering the exposed upper portions of the pavement joint, and the upper longitudinal edges of said plates being substantially flush with the pavement surface, and means for yieldingly spacing said plates apart.

5. A pavement joint comprising, the combination, with adjacent pavement sections, of a pair of armor plates in parallel arrangement and located between said adjacent sections, the upper portions of said plates diverging upwardly and covering the exposed upper portions of the pavement joint, the upper longitudinal edges of said plates being substantially flush with the pavement surface, and the lower portions of said plates diverging downwardly and being embedded within the material of the pavement, and means for anchoring said lower portions in such material.

6. A pavement joint comprising, in combination with spaced pavement sections, a pair of armor plates in adjacent parallel arrangement and located between said adjacent sections, the upper portions of said plates diverging upwardly and covering the exposed upper portions of the pavement joint, the upper longitudinal edges of said plates being substantially flush with the

pavement surface, and the lower portions of said plates diverging downwardly and being embedded within the material of the pavement, the cross sectional length of such downwardly diverging portions being greater than that of the upwardly diverging portions.

In testimony whereof, I affix my signature in the presence of two subscribing witnesses.

ROBERT D. BAKER.

Witnesses:
JAMES M. BAKER.
ARCHIBALD G. BAKER.